Friend of the Sea Standard

FOS-Aqua Fish Welfare

Standards for the certification in aquaculture

Friend of the Sea

www.friendofthesea.org

REV	DATE	REASON	APPROVED	VALIDATED	RATIFIED
1	05/11/2021	New standard	Friend of the Sea Technical Committee	Accredia	Friend of the Sea Board of Directors

Valid from: 05/11/2021

Compulsory from: 05/11/2024

Foreword

Friend of the Sea is a non-governmental organisation established in 2008. Its objective is to safeguard the marine environment and its resources, encouraging a sustainable market and implementing specific conservation projects.

The Friend of the Sea certification program allows for the assessment of fisheries and aquaculture products according to sustainability criteria and requirements. The certification, granted following an audit by independent certification bodies, ensures that a product complies with the sustainability requirements.

Requirements are classified as Important, Important or Recommendations, according to their level of importance.

Essential Requirements: The unit of certification shall be 100% compliant with essential requirements to be recommended for certification by the Certification Body (CB). Failure to comply with essential requirements is a major non-conformity. To achieve certification, corrective actions shall be implemented within three months from the date of assessment of non-conformities. The unit of certification shall provide the CB with satisfactory evidence of correction of all major non-conformities, if necessary, with additional audits.

Important Requirements: Failure to comply with important requirements is a minor non-conformity. To achieve certification, the unit of certification shall first propose a corrective action plan within maximum three weeks from the date of assessment of the non-conformities - to the satisfaction of the CB. In the proposal, the unit of certification shall include the timeframe for the implementation of each corrective action, considering that all minor non-conformities must be closed before the surveillance audit. The proposal shall be analysed by the CB regarding its consistency and feasibility. If accepted, the certificate can be granted. Then, in the surveillance audit, the unit of certification shall be able to demonstrate that all minor non-conformities reported in the approved proposal were solved. If the approved proposal has not been fully implemented, the certificate is suspended until the resolution of any remaining minor non-conformities.

Recommendations: It is not compulsory for the unit of certification to comply with recommendations to achieve certification. Nonetheless, compliance with recommendations shall be verified during the audit and any non-conformities shall be highlighted in the audit report as a "recommendation". The unit of certification shall inform the CB, during the following audit, regarding any corrective measures implemented.

Requirements that are not applicable to the audited unit of certification will be marked with "N.A."

Description of the unit of certification

This document shall only be filled out by personnel of the CB in charge of the audit. It shall be filled out in English, if spoken fluently.

a) NAME OF THE UNIT OF CERTIFICATION TO BE AUDITED:
b) NAME OF THE UNIT OF CERTIFICATION THAT REQUESTED THE AUDIT:
c) IS THE UNIT OF CERTIFICATION TO BE AUDITED PART OF A GROUP?
d) ADDRESS OF THE UNIT OF CERTIFICATION TO BE AUDITED:
e) NAME AND CONTACTS OF THE PERSON RESPONSIBLE FOR THE UNIT OF CERTIFICATION TO BE AUDITED:
f) SITES TO BE AUDITED: *(please list site names and locations)*

g) SITES VISITED BY THE AUDITOR:

h) DESCRIPTION OF THE AQUACULTURE SYSTEM:

(E.g.: land, bay, offshore, extensive, intensive, basin, tank, cage, nets, etc. Geographical extension, other. If available include a map)

i) DESCRIPTION OF BREEDING TECHNIQUES:

(Summary of breeding techniques from broodstock, to hatching, to the finished product)

j) ACTIVITY OF THE UNIT OF CERTIFICATION TO BE AUDITED:

□ **breeding**

□ **pre-transformation**

□ **final transformation**

□ **import**

□ **export**

□ **distribution**

k) DESCRIPTION OF THE FINAL PRODUCT:

(e.g.: fresh, frozen, canned, other)

l) BRANDS OF FINISHED PRODUCT:

(List of brands under which the product is sold. If available include images of the brands)

m) DESCRIPTION AND LOCATION OF FREEZERS AND WAREHOUSES, IF ANY: *(For product traceability purposes)*
n) TOTAL NUMBER OF EMPLOYEES: *optional*
o) ENVIRONMENTAL CERTIFICATIONS AND AWARDS:
p) ADDITIONAL INFORMATION:

☐ **The Friend of the Sea project was introduced** *(If not, the Auditor shall provide a short description)*

☐ **The unit of certification were informed of the opportunity, in case of approval, of using the Friend of the Sea logo on the certified products**

☐ **The unit of certification has a document qualifying and confirming the roles of the staff carrying out the audit**

☐ **The duration of the Audit was agreed upon**

☐ **The information included in the Preliminary Information Form (PIF) has been confirmed** (in case of changes to the PIF, an updated version has to be promptly provided)**:**

<table>
<tr><td>CERTIFICATION BODY:</td><td>AUDIT TEAM:</td><td>AUDIT START AND END DATE:</td></tr>
<tr><td rowspan="2">SIGNATURE OF AUDITOR:</td><td rowspan="2">NAME OF THE PERSON IN CHARGE OF THE UNIT OF CERTIFICATION AND ACCOMPANYING THE AUDITOR DURING THE AUDIT:</td><td>AUDIT CODE:</td></tr>
<tr><td>TYPE OF AUDIT:</td></tr>
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NOTES TO THE AUDITOR

1) The Auditor shall fill out all fields in the checklist.
2) The Auditor shall provide an explanation when requirements are not applicable.
3) The Auditor shall write YES when the unit of certification complies with a requirement and NO when it does not.
4) The Auditor shall comment and explain the positive or negative answers. Simple "YES," "NO," or "N.A." are insufficient.
5) Each relevant document shall be added to the final Audit Report in a separate and numbered attachment.
6) Photographic explanations added to the checklist or attached are appreciated.
7) This checklist is divided in two main sections: Hatchery and On-growing. If the checklist must be applied to only one of the two sections, the auditor must specify it in the above section p) ADDITIONAL INFORMATION.

FOS-Aqua – *Acipenser baerii*– Fish Welfare Standard for the certification of Siberian sturgeon in aquaculture

HATCHERY REQUIREMENTS

1 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimizing fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the larvae and young.	Important	Absence of dangerous protrusions.		
1.3	Back-up power generators must exist, must be functional and must be ready to support essential equipment in case of a power failure. Generators should be tested and maintained weekly.	Important	Records, documents generator test.		
1.4	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly.	Important	Good overall condition of tanks and equipment. e.g. hand nets.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist	Important	Facility allocated within the natural photoperiod and geographical range		

	advice. Maximum range: 8:16 to 16:8 L:D.		of the species.		
1.6	Additional lighting either fixed or portable must be available, but only should be switched to allow examination of the animals and equipment.	Important	Stock inspection all times.		
1.7	Any pest control substances or equipment must be enclosed in a secure location, so there is no risk of water contamination or accidental access by non-target species.	Important	There must be a system of regular documented monitoring these baits point and recording results.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. No loud noises are permitted in the vicinity of the tanks or raceways: air compressors, loading docks, air guns, machinery, etc.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

2 – WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		

2.2	Temperature should be verifiable at all times, and must be between 16-20º C.	Important	Regular records of temperature.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish veterinarian or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have access to one regularly.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plan.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments of feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	**Requirement**	**Level**	**Parameters and information**	**Y/N**	**Comments**
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact on fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only or/and thrown.	Important	Records, documents, videos or on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected upon each use and replaced when damaged. Their design must not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

6 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	The use of vaccines is encouraged for the prevention of disease, rather than relying on treatment.	Important	Records, documents, SOP, on-site observation.		
6.2	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		

6.3	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		
6.4	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.5	There must be back-up systems and contingency plans in place in order to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

7 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation. (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or causing stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation. (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all times.	Important	Records, SOP, documents.		

7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

8 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		

8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		
8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems.	Important	Records, documents.		

8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

9 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, this must always be $\leq$ 50-degree days but special monitoring must be performed as this species is highly sensitive to starvation.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate, feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

10 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, on-site observation.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale.	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point. Critical level for Siberian sturgeon: 4 mg/L (or above 60% saturation).	Important	Records, documents, videos, on-site measurements.		

11 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using overdose of anesthetic.	Important	Documents, on-site observations.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Documents.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviour (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated in order to identify the cause of the issue and prevent reocccurence by implementing effective prevention strategies.	Important	on-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	on-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins. of observation (minimum).	Important	on-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviour should be absent in 5 consecutive mins. of observation (minimum).	Important	on-site observation.		
12.7	Anticipatory behaviour must be apparent prior to feeding routines.	Important	on-site observation.		
12.8	If individual observation is possible in detail, ventilatory activity should be normal (50-70 opercular beats per min. (bpm)); hyperventilation (>90 bpm) should be absent at all times. Abnormal values must be reported to the welfare specialist.	Important	on-site observation.		
12.9	Swimming activity should be regular, without major or sudden changes.	Important	on-site observation.		

12.10	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Important	on-site observation		
12.11	Farmers should be aware of, and consider the use of, new technology that improves the welfare of fish.	Recommended			
12.12	Farmers should have access to reliable and relevant information on fish welfare.	Recommended			
12.13	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, *i.e*. an internal evaluation based on welfare indicators.	Important	On-site observation		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 3 Animal Health and Welfare and Section 12 Welfare Assessment). Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the water immediately. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate their proficiency in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease.	Important			

14- BROODSTOCK AND EGGS

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Tank sizes must be > $5m^3$ and > 1m deep, rounded or avoiding angles and contain structural enrichment, provided that it does not hinder fish swimming activities or tank cleaning operations.	Important			
14.2	Environmental parameters (temperature and photoperiod) of broodstock tanks should follow the natural rhythms for overwintering.	Important	Records, documents.		
14.3	Natural spawning methods, *i.e.* without handling or manipulation, should be implemented. In the absence of such, all handling procedures (*e.g.* stripping) must be performed under anesthesia by a trained staff member or team.	Important	Records, documents.		
14.4	Developing eggs may be maintained in dim light or darkness to reduce mortality and must not be handled after placement for 40-45 degree days (e.g. 4 days at 10º C).	Important	Records, documents.		

ON-GROWING REQUIREMENTS

1 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters	Y/N	Comments

			and information		
1.1	Production units should provide horizontal and vertical withdrawal space, optimising fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the fish.	Important	Absence of dangerous protrusions.		
1.3	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly and records must be ready for inspection.	Important	Good overall condition of nets and infrastructures. Records of periodicity and methods as assessment.		
1.4	Farm design should be such that inspection of all stock is possible.	Important	Water visibility, ROVs, divers, cameras etc.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist advice. Maximum range: 8:16 to 16:8 L:D	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Production units must be of adequate depth to prevent damage from ultraviolet radiation (> 45 cm) or shade must be provided if considered appropriate.	Important	Depth of net-pen.		
1.7	Additional lighting, either fixed or portable, must be available, but only should be switched on to allow examination of the animals and equipment.	Important	Stock inspection at all times.		

1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. No loud noises are permitted in the vicinity of the tanks or raceways: air compressors, loading docks, air guns, machinery, etc.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

2– WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be below 26º C.	Important	Regular records of temperature.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish vet or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have regular access to one.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plans.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are carried out according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments to feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact to fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only and/or thrown.	Important	Records, documents, videos, on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected after use and replaced when damaged. Their design must be as to not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

6 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		
6.2	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		

6.3	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.4	There must be back-up systems and contingency plans in place to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

7 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary, *e.g.* before vaccination, to avoid cannibalism or before slaughtering.	Important	Records, documents, SOP, on-site observation (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or cause stress to the fish (*e.g*. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all time.	Important	Records, SOP, documents.		
7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, on-site observation (grading system).		

8 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max. 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		
8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		

8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems	Important	Records, documents.		
8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

9 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, must always be < 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

10 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, observation on site.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point. Critical saturation levels for Siberian sturgeon: 10 °C = 30%; 15 °C = 38%; 20 °C = 45%; 25 °C = 53%.	Important	Records, documents, videos, on-site measurements.		

11 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using an overdose of anesthetic.	Important	Documents, on-site observation.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Records, documents, on-site observation, training.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm, schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviours (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 13 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated to identify the cause of the issue and be prevented from reoccuring by implementing effective prevention strategies.	Important	On-site observation.		

12.4	Fish should be shoaling or schooling (*i.e.* group swimming with polarized orientation)	Important	On-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviours should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.7	Anticipatory behaviour must appear prior to feeding routines.	Important	On-site observation.		
12.8	Swimming activity should be regular, without major or sudden changes.	Important	On-site observation.		

12.9	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Recommended			
12.10	Farmers should be aware of, and consider, the use of new technology that improves the welfare of fish.	Recommended			
12.11	Farmers should have access to reliable and relevant information on fish welfare.	Important	On-site observation.		
12.12	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, *i.e.* an internal evaluation based on welfare indicators.	Important	On-site observation.		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Density of fish must be between 7 and 22 kg/m^3 for Siberian sturgeon.	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the production units. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			
13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			

13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate that they received training and that they are proficient in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease (see Section 12 Welfare Assessment).	Important			

14- HARVESTING, STUNNING AND SLAUGHTER

No.	**Requirement**	**Level**	**Parameters and information**	**Y/N**	**Comments**

14.1	Harvesting can only be performed using fish pumps. The dimensions of pumps and tubes must be scaled to the operation and approved by an engineer. The maximum flow rate should be 3m/s.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.2	The only permitted stunning and subsequent killing methods are: a) an effectively applied percussive blow, b) electronarcosis followed by bleeding, asphyxia or other slaughter method that must be applied while the fish are unconscious, c) electrocution (*i.e.* killing by electrical current).	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.3	A backup system *e.g.* 'priest' must be available throughout the killing process.	Important	Documents, videos, on-site observation.		
14.4	Any fish which fall to the ground during the process must be humanely killed with the main or back up system.	Important	Documents, videos, on-site observation.		
14.5	External damage such as scale loss, fin erosion, predator bites, lesions resulting from aggression, handling scares, parasite lesions and deformities must be noted at slaughter or upon arrival to the processing station.	Important	Documents, videos, on-site observation.		

14.6	All staff involved with the stunning and killing process must have received full training.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.7	There must be a named person responsible for fish welfare throughout the killing process. This person is responsible for harvest records including stunning and slaughtering efficiency.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.8	A written procedure for fish humane stunning and slaughtering (see Section 14.1 to 14.4 Harvesting, stunning and slaughter) must be in place and carried out all time.	Important	Documents, videos, on-site observation.		
14.9	Video recordings of harvesting, stunning and slaughtering must be performed regularly (once per month or every time there is any change in protocols).	Important	Documents, videos, on-site observation.		

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HATCHERY REQUIREMENTS

3 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimizing fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the larvae and young.	Important	Absence of dangerous protrusions.		
1.3	Back-up power generators must exist, must be functional and must be ready to support essential equipment in case of a power failure. Generators should be tested and maintained weekly.	Important	Records, documents generator test.		
1.4	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly.	Important	Good overall condition of tanks and equipment. e.g. hand nets.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist advice. Maximum range: 8:16 to 16:8 L:D.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Additional lighting either fixed or portable must be available, but only should be switched to allow examination of the animals and equipment.	Important	Stock inspection all times.		
1.7	Any pest control substances or equipment must be enclosed in a secure location, so there is no risk of water contamination or accidental	Important	There must be a system of regular documented monitoring these		

	access by non-target species.		baits points and recording results.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. No loud noises are permitted in the vicinity of the tanks or raceways: air compressors, loading docks, air guns, machinery, etc.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

4 – WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be between 10-20º C., preferably 15-20º C.	Important	Regular records of temperature.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish veterinarian or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have access to one regularly.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plan.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments of feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	**Requirement**	**Level**	**Parameters and information**	**Y/N**	**Comments**
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact on fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only or/and thrown.	Important	Records, documents, videos or on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected upon each use and replaced when damaged. Their design must not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

12 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	The use of vaccines is encouraged for the prevention of disease, rather than relying on treatment.	Important	Records, documents, SOP, on-site observation.		
6.2	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		

6.3	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		
6.4	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.5	There must be back-up systems and contingency plans in place in order to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

13 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation. (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or causing stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation. (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all times.	Important	Records, SOP, documents.		

7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

14 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		

8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		
8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems.	Important	Records, documents.		

8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

15 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, this must always be $\leq$ 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate, feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

16 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, on-site observation.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale.	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (the critical point will vary between species and with environmental factors). Critical level for Russian sturgeon: 5 mg/L.	Important	Records, documents, videos, on-site measurements.		

17 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using overdose of anesthetic.	Important	Documents, on-site observations.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Documents.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviour (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated in order to identify the cause of the issue and prevent reocccurence by implementing effective prevention strategies.	Important	on-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	on-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins. of observation (minimum).	Important	on-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviour should be absent in 5 consecutive mins. of observation (minimum).	Important	on-site observation.		
12.7	Anticipatory behaviour must be apparent prior to feeding routines.	Important	on-site observation.		
12.8	If individual observation is possible in detail, ventilatory activity should be normal (50-70 opercular beats per min. (bpm)); hyperventilation (>90 bpm) should be absent at all times. Abnormal values must be reported to the welfare specialist.	Important	on-site observation.		
12.9	Swimming activity should be regular, without major or sudden changes.	Important	on-site observation.		

12.10	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Important	on-site observation		
12.11	Farmers should be aware of, and consider the use of, new technology that improves the welfare of fish.	Recommended			
12.12	Farmers should have access to reliable and relevant information on fish welfare.	Recommended			
12.13	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 3 Animal Health and Welfare and Section 12 Welfare Assessment). Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the water immediately. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate their proficiency in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease.	Important			

14- BROODSTOCK AND EGGS

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Density of spawners must be kept <10kg/m^3 for overwintering (stocking during winter conditions prior to spawning).	Important	Records, documents.		
14.2	Tank sizes must be > 5m^3 and > 1m deep, rounded or avoiding angles and contain structural enrichment, provided that it does not hinder fish swimming activities or tank cleaning operations.	Important			
14.3	Environmental parameters (temperature and photoperiod) of broodstock tanks should follow the natural rhythms for overwintering.	Important	Records, documents.		
14.4	Natural spawning methods, i.e. without handling or manipulation, should be implemented. In the absence of such, all handling procedures (e.g. stripping) must be performed under anesthesia by a trained staff member or team.	Important	Records, documents.		
14.5	Developing eggs may be maintained in dim light or darkness to reduce mortality and must not be handled after placement for 40-45 degree days (e.g. 4 days at 10º C).	Important	Records, documents.		

ON-GROWING REQUIREMENTS

2 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimising fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the fish.	Important	Absence of dangerous protrusions.		
1.3	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly and records must be ready for inspection.	Important	Good overall condition of nets and infrastructures. Records of periodicity and methods as assessment.		
1.4	Farm design should be such that inspection of all stock is possible.	Important	Water visibility, ROVs, divers, cameras etc.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist advice. Maximum range: 8:16 to 16:8 L:D	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Production units must be of adequate depth to prevent damage from ultraviolet radiation (> 45 cm) or shadows must be provided if considered appropriate.	Important	Depth of net-pen.		

1.7	Additional lighting, either fixed or portable, must be available, but only should be switched on to allow examination of the animals and equipment.	Important	Stock inspection at all times.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. No loud noises are permitted in the vicinity of the tanks or raceways: air compressors, loading docks, air guns, machinery, etc.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

2– WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be below 25º C.	Important	Regular records of temperature.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish vet or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have regular access to one.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plans.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are carried out according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments to feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact to fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only and/or thrown.	Important	Records, documents, videos, on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected after use and replaced when damaged. Their design must be as to not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

12 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		
6.2	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		

6.3	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.4	There must be back-up systems and contingency plans in place to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

13 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or cause stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all time.	Important	Records, SOP, documents.		
7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, on-site observation (grading system).		

14 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		
8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		

8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems	Important	Records, documents.		
8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

15 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, must always be < 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

16 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, observation on site.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (the critical point will vary between species and with environmental factors). Critical level: 5 mg/L.	Important	Records, documents, videos, on-site measurements.		

17 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using an overdose of anesthetic.	Important	Documents, on-site observation.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Records, documents, on-site observation, training.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm, schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviours (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 13 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated to identify the cause of the issue and be prevented from reoccuring by implementing effective prevention strategies.	Important	On-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	On-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviours should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.7	Anticipatory behaviour must appear prior to feeding routines.	Important	On-site observation.		
12.8	Swimming activity should be regular, without major or sudden changes.	Important	On-site observation.		

12.9	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Recommended			
12.10	Farmers should be aware of, and consider, the use of new technology that improves the welfare of fish.	Recommended			
12.11	Farmers should have access to reliable and relevant information on fish welfare.	Important	On-site observation.		
12.12	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation.		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Density of fish must be below 10kg/m^3.	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the production units. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			
13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			

13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate that they received training and that they are proficient in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease (see Section 12 Welfare Assessment).	Important			

14- HARVESTING, STUNNING AND SLAUGHTER

No.	**Requirement**	**Level**	**Parameters and information**	**Y/N**	**Comments**

14.1	Harvesting can only be performed using fish pumps. The dimensions of pumps and tubes must be scaled to the operation and approved by an engineer. The maximum flow rate should be 3m/s.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.2	The only permitted stunning and subsequent killing methods are: a) an effectively applied percussive blow, b) electronarcosis followed by bleeding, asphyxia or other slaughter method that must be applied while the fish are unconscious, c) electrocution (i.e. killing by electrical current).	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.3	A backup system e.g. 'priest' must be available throughout the killing process.	Important	Documents, videos, on-site observation.		
14.4	Any fish which fall to the ground during the process must be humanely killed with the main or back up system.	Important	Documents, videos, on-site observation.		
14.5	External damage such as scale loss, fin erosion, predator bites, lesions resulting from aggression, handling scares, parasite lesions and deformities must be noted at slaughter or upon arrival to the processing station.	Important	Documents, videos, on-site observation.		

14.6	All staff involved with the stunning and killing process must have received full training.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.7	There must be a named person responsible for fish welfare throughout the killing process. This person is responsible for harvest records including stunning and slaughtering efficiency.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.8	A written procedure for fish humane stunning and slaughtering (see Section 14.1 to 14.4 Harvesting, stunning and slaughter) must be in place and carried out all time.	Important	Documents, videos, on-site observation.		
14.9	Video recordings of harvesting, stunning and slaughtering must be performed regularly (once per month or every time there is any change in protocols)	Important	Documents, videos, on-site observation.		

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HATCHERY REQUIREMENTS

5 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimizing fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the larvae and young.	Important	Absence of dangerous protrusions.		
1.3	Back-up power generators must exist, must be functional and must be ready to support essential equipment in case of a power failure. Generators should be tested and maintained weekly.	Important	Records, documents generator test.		
1.4	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly.	Important	Good overall condition of tanks and equipment. e.g. hand nets.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist advice. Maximum range: 8:16 to 16:8 L:D.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Additional lighting either fixed or portable must be available, but only should be switched to allow examination of the animals and equipment.	Important	Stock inspection all times.		
1.7	Any pest control substances or equipment must be enclosed in a secure location, so there is no risk of water contamination or accidental	Important	There must be a system of regular documented monitoring these		

	access by non-target species.		baits point and recording results.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. No loud noises are permitted in the vicinity of the tanks or raceways: air compressors, loading docks, air guns, machinery, etc.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

6 – WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be below 25º C.	Important	Regular records of temperature.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish veterinarian or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have access to one regularly.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plan.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments of feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	**Requirement**	**Level**	**Parameters and information**	**Y/N**	**Comments**
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact on fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only or/and thrown.	Important	Records, documents, videos or on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected upon each use and replaced when damaged. Their design must not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

18 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	The use of vaccines is encouraged for the prevention of disease, rather than relying on treatment.	Important	Records, documents, SOP, on-site observation.		
6.2	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		

6.3	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		
6.4	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.5	There must be back-up systems and contingency plans in place in order to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

19 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation. (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or causing stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation. (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all times.	Important	Records, SOP, documents.		

7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

20 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		

8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		
8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems.	Important	Records, documents.		

8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

21 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, this must always be $\leq$ 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate, feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

22 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, on-site observation.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale.	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (the critical point will vary between species and with environmental factors). Critical level for Adriatic sturgeon: 5 mg/L.	Important	Records, documents, videos, on-site measurements.		

23 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using overdose of anesthetic.	Important	Documents, on-site observations.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Documents.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviour (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated in order to identify the cause of the issue and prevent reocccurence by implementing effective prevention strategies.	Important	on-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	on-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum)	Important	on-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviour should be absent in 5 consecutive mins of observation (minimum)	Important	on-site observation.		
12.7	Anticipatory behaviour must be apparent prior to feeding routines	Important	on-site observation.		
12.8	If individual observation is possible in detail, ventilatory activity should be normal (50-70 opercular beats per min. (bpm)); hyperventilation (>90 bpm) should be absent at all times. Abnormal values must be reported to the welfare specialist.	Important	on-site observation.		
12.9	Swimming activity should be regular, without major or sudden changes.	Important	on-site observation.		

12.10	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Important	on-site observation		
12.11	Farmers should be aware of, and consider the use of, new technology that improves the welfare of fish.	Recommended			
12.12	Farmers should have access to reliable and relevant information on fish welfare.	Recommended			
12.13	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 3 Animal Health and Welfare and Section 12 Welfare Assessment). Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the water immediately. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate their proficiency in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease.	Important			

14- BROODSTOCK AND EGGS

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Density of spawners must be kept <15kg/m^3 for overwintering (stocking during winter conditions prior to spawning).	Important			
14.2	Tank sizes must be > 5m^3 and > 1m deep, rounded or avoiding angles and contain structural enrichment, provided that it does not hinder fish swimming activities or tank cleaning operations.	Important			
14.3	Environmental parameters (temperature and photoperiod) of broodstock tanks should follow the natural rhythms for overwintering. Temperature during during this phase should be < 7º C.	Important	Records, documents.		
14.4	Natural spawning methods, i.e. without handling or manipulation, should be implemented. In the absence of such, all handling procedures (e.g. stripping) must be performed under anesthesia by a trained staff member or team.	Important	Records, documents.		
14.5	Developing eggs may be maintained in dim light or darkness to reduce mortality and must not be handled after placement for 40-45 degree days (e.g. 4 days at 10º C).	Important	Records, documents.		

ON-GROWING REQUIREMENTS

3 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimising fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the fish.	Important	Absence of dangerous protrusions.		
1.3	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly and records must be ready for inspection.	Important	Good overall condition of nets and infrastructures. Records of periodicity and methods as assessment.		
1.4	Farm design should be such that inspection of all stock is possible.	Important	Water visibility, ROVs, divers, cameras etc.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist advice. Maximum range: 8:16 to 16:8 L:D	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Production units must be of adequate depth to prevent damage from ultraviolet radiation (> 45 cm) or shadows must be provided if considered appropriate.	Important	Depth of net-pen.		

1.7	Additional lighting, either fixed or portable, must be available, but only should be switched on to allow examination of the animals and equipment.	Important	Stock inspection at all times.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. No loud noises are permitted in the vicinity of the tanks or raceways: air compressors, loading docks, air guns, machinery, etc.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

2– WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be below 25º C.	Important	Regular records of temperature.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish vet or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have regular access to one.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plans.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are carried out according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments to feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact to fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only and/or thrown.	Important	Records, documents, videos, on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected after use and replaced when damaged. Their design must be as to not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

18 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		
6.2	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		

6.3	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.4	There must be back-up systems and contingency plans in place to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

19 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or cause stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all time.	Important	Records, SOP, documents.		
7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, on-site observation (grading system).		

20 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		
8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		

8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems	Important	Records, documents.		
8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

21 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, must always be < 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

22 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, observation on site.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (the critical point will vary between species and with environmental factors). Critical level for Adriatic sturgeon: 5 mg/L.	Important	Records, documents, videos, on-site measurements.		

23 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using an overdose of anesthetic.	Important	Documents, on-site observation.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Records, documents, on-site observation, training.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm, schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviours (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated to identify the cause of the issue and be prevented from reoccuring by implementing effective prevention strategies.	Important	On-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	On-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviours should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.7	Anticipatory behaviour must appear prior to feeding routines.	Important	On-site observation.		
12.8	Swimming activity should be regular, without major or sudden changes.	Important	On-site observation.		

12.9	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Recommended			
12.10	Farmers should be aware of, and consider, the use of new technology that improves the welfare of fish.	Recommended			
12.11	Farmers should have access to reliable and relevant information on fish welfare.	Important	On-site observation.		
12.12	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation.		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Density of fish must be below 20kg/m^3.	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the production units. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate that they received training and that they are proficient in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease (see Section 12 Welfare Assessment).	Important			

14- HARVESTING, STUNNING AND SLAUGHTER

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Harvesting can only be performed using fish pumps. The dimensions of pumps and tubes must be scaled to the operation and approved by an engineer. The maximum flow rate should be 3m/s.	Import IMPORTANT (but w/ transition period) ant	Documents, videos, on-site observation.		
14.2	The only permitted stunning and subsequent killing methods are: a) an effectively applied percussive blow, b) electronarcosis followed by bleeding, asphyxia or other slaughter method that must be applied while the fish are unconscious, c) electrocution (i.e. killing by electrical current).	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.3	A backup system e.g. 'priest' must be available throughout the killing process.	Important	Documents, videos, on-site observation.		
14.4	Any fish which fall to the ground during the process must be humanely killed with the main or back up system.	Important	Documents, videos, on-site observation.		

14.5	External damage such as scale loss, fin erosion, predator bites, lesions resulting from aggression, handling scares, parasite lesions and deformities must be noted at slaughter or upon arrival to the processing station.	Important	Documents, videos, on-site observation.		
14.6	All staff involved with the stunning and killing process must have received full training.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.7	There must be a named person responsible for fish welfare throughout the killing process. This person is responsible for harvest records including stunning and slaughtering efficiency.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.8	A written procedure for fish humane stunning and slaughtering (see Section 14.1 – 4 Harvesting, stunning and slaughter) must be in place and carried out all time.	Important	Documents, videos, on-site observation.		
14.9	Video recordings of harvesting, stunning and slaughtering must be performed regularly (once per month or every time there is any change in protocols)	Important	Documents, videos, on-site observation.		

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HATCHERY REQUIREMENTS

Z – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimizing fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the larvae and young.	Important	Absence of dangerous protrusions.		
1.3	Back-up power generators must exist, must be functional and must be ready to support essential equipment in case of a power failure. Generators should be tested and maintained weekly.	Important	Records, documents generator test.		
1.4	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly.	Important	Good overall condition of tanks and equipment. e.g. hand nets.		

1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist advice. Maximum range: 4:20 to 20:4 L:D.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Additional lighting either fixed or portable must be available, but only should be switched to allow examination of the animals and equipment.	Important	Stock inspection all times.		
1.7	Any pest control substances or equipment must be enclosed in a secure location, so there is no risk of water contamination or accidental access by non-target species.	Important	There must be a system of regular documented monitoring these baits points and recording results.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. No loud noises are permitted in the vicinity of the tanks or raceways: air compressors, loading docks, air guns, machinery, *etc*.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

8 – WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		

2.2	Temperature should be verifiable at all times, and must be between 10-15º C.	Important	Regular records of temperature.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish veterinarian or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have access to one regularly.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plan.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments of feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	**Requirement**	**Level**	**Parameters and information**	**Y/N**	**Comments**
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact on fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only or/and thrown.	Important	Records, documents, videos or on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected upon each use and replaced when damaged. Their design must not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

24 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	The use of vaccines is encouraged for the prevention of disease, rather than relying on treatment.	Important	Records, documents, SOP, on-site observation.		
6.2	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		

6.3	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		
6.4	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.5	There must be back-up systems and contingency plans in place in order to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

25 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation. (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or causing stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation. (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all times.	Important	Records, SOP, documents.		

7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

26 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		

8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		
8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems.	Important	Records, documents.		

8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

27 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, this must always be $\leq$ 50-degree days but special monitoring must be performed as this species is highly sensitive to starvation.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate, feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

28 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, on-site observation.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale.	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (the critical point will vary between species and with environmental factors). Critical level for Sterlet sturgeon: 4 mg/L (or above 60% saturation).	Important	Records, documents, videos, on-site measurements.		

29 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using overdose of anesthetic.	Important	Documents, on-site observations.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Documents.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviour (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated in order to identify the cause of the issue and prevent reocccurence by implementing effective prevention strategies.	Important	on-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	on-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins. of observation (minimum).	Important	on-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviour should be absent in 5 consecutive mins. of observation (minimum).	Important	on-site observation.		
12.7	Anticipatory behaviour must be apparent prior to feeding routines.	Important	on-site observation.		
12.8	If individual observation is possible in detail, ventilatory activity should be normal (50-70 opercular beats per min. (bpm)); hyperventilation (>90 bpm) should be absent at all times. Abnormal values must be reported to the welfare specialist.	Important	on-site observation.		
12.9	Swimming activity should be regular, without major or sudden changes.	Important	on-site observation.		

12.10	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Important	on-site observation		
12.11	Farmers should be aware of, and consider the use of, new technology that improves the welfare of fish.	Recommended			
12.12	Farmers should have access to reliable and relevant information on fish welfare.	Recommended			
12.13	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, *i.e*. an internal evaluation based on welfare indicators.	Important	On-site observation		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 3 Animal Health and Welfare and Section 12 Welfare Assessment). Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the water immediately. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate their proficiency in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease.	Important			

14- BROODSTOCK AND EGGS

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Tank sizes must be > $5m^3$ and > 1m deep, rounded or avoiding angles and contain structural enrichment, provided that it does not hinder fish swimming activities or tank cleaning operations.	Important			
14.2	Environmental parameters (temperature and photoperiod) of broodstock tanks should follow the natural rhythms for overwintering.	Important	Records, documents.		
14.3	Natural spawning methods, *i.e.* without handling or manipulation, should be implemented. In the absence of such, all handling procedures (*e.g.* stripping) must be performed under anesthesia by a trained staff member or team.	Important	Records, documents.		
14.4	Developing eggs may be maintained in dim light or darkness to reduce mortality and must not be handled after placement for 40-45 degree days (e.g. 4 days at 10º C).	Important	Records, documents.		

ON-GROWING REQUIREMENTS

4 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters	Y/N	Comments

			and information		
1.1	Production units should provide horizontal and vertical withdrawal space, optimising fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the fish.	Important	Absence of dangerous protrusions.		
1.3	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly and records must be ready for inspection.	Important	Good overall condition of nets and infrastructures. Records of periodicity and methods as assessment.		
1.4	Farm design should be such that inspection of all stock is possible.	Important	Water visibility, ROVs, divers, cameras etc.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist advice. Maximum range: 4:20 to 20:4 L:D.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Production units must be of adequate depth to prevent damage from ultraviolet radiation, walls and bottom should be of a dark colour or shade must be provided.	Important	Depth of net-pen.		
1.7	Additional lighting, either fixed or portable, must be available, but only should be switched on to allow examination of the animals and equipment.	Important	Stock inspection at all times.		

1.8	Structural enrichment should be provided, but not long and soft vegetation as it may entangle the animals. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. No loud noises are permitted in the vicinity of the tanks or raceways: air compressors, loading docks, air guns, machinery, etc.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

2– WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be below 26º C.	Important	Regular records of temperature.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish vet or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have regular access to one.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plans.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are carried out according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments to feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact to fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only and/or thrown.	Important	Records, documents, videos, on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected after use and replaced when damaged. Their design must be as to not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

24 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		
6.2	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		

6.3	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.4	There must be back-up systems and contingency plans in place to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

25 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary, *e.g.* before vaccination, to avoid cannibalism or before slaughtering.	Important	Records, documents, SOP, on-site observation (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or cause stress to the fish (*e.g*. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all time.	Important	Records, SOP, documents.		
7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, on-site observation (grading system).		

26 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max. 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		
8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		

8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems	Important	Records, documents.		
8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

27 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, must always be < 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

28 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, observation on site.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (the critical point will vary between species and with environmental factors). Critical saturation levels for Sterlet sturgeon: 60%.	Important	Records, documents, videos, on-site measurements.		

29 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using an overdose of anesthetic.	Important	Documents, on-site observation.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Records, documents, on-site observation, training.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm, schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviours (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 13 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated to identify the cause of the issue and be prevented from reoccuring by implementing effective prevention strategies.	Important	On-site observation.		

12.4	Fish should be shoaling or schooling (*i.e.* group swimming with polarized orientation)	Important	On-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviours should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.7	Anticipatory behaviour must appear prior to feeding routines.	Important	On-site observation.		
12.8	Swimming activity should be regular, without major or sudden changes.	Important	On-site observation.		

12.9	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Recommended			
12.10	Farmers should be aware of, and consider, the use of new technology that improves the welfare of fish.	Recommended			
12.11	Farmers should have access to reliable and relevant information on fish welfare.	Important	On-site observation.		
12.12	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, *i.e.* an internal evaluation based on welfare indicators.	Important	On-site observation.		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Density of fish must be below 12 kg/m^3 for Sterlet sturgeon.	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the production units. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			
13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			

13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate that they received training and that they are proficient in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease (see Section 12 Welfare Assessment).	Important			

14- HARVESTING, STUNNING AND SLAUGHTER

No.	**Requirement**	**Level**	**Parameters and information**	**Y/N**	**Comments**

14.1	Harvesting can only be performed using fish pumps. The dimensions of pumps and tubes must be scaled to the operation and approved by an engineer. The maximum flow rate should be 3m/s.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.2	The only permitted stunning and subsequent killing methods are: a) an effectively applied percussive blow, b) electronarcosis followed by bleeding, asphyxia or other slaughter method that must be applied while the fish are unconscious, c) electrocution (*i.e.* killing by electrical current).	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.3	A backup system *e.g.* 'priest' must be available throughout the killing process.	Important	Documents, videos, on-site observation.		
14.4	Any fish which fall to the ground during the process must be humanely killed with the main or back up system.	Important	Documents, videos, on-site observation.		
14.5	External damage such as scale loss, fin erosion, predator bites, lesions resulting from aggression, handling scares, parasite lesions and deformities must be noted at slaughter or upon arrival to the processing station.	Important	Documents, videos, on-site observation.		

14.6	All staff involved with the stunning and killing process must have received full training.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.7	There must be a named person responsible for fish welfare throughout the killing process. This person is responsible for harvest records including stunning and slaughtering efficiency.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.8	A written procedure for fish humane stunning and slaughtering (see Section 14.1 to 14.4 Harvesting, stunning and slaughter) must be in place and carried out all time.	Important	Documents, videos, on-site observation.		
14.9	Video recordings of harvesting, stunning and slaughtering must be performed regularly (once per month or every time there is any change in protocols).	Important	Documents, videos, on-site observation.		

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HATCHERY REQUIREMENTS

9 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimizing fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the larvae and young.	Important	Absence of dangerous protrusions.		
1.3	Back-up power generators must exist, must be functional and must be ready to support essential equipment in case of a power failure. Generators should be tested and maintained weekly.	Important	Records, documents generator test.		
1.4	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly.	Important	Good overall condition of tanks and equipment. e.g. hand nets.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist advice. Maximum range: 8:16 to 16:8 L:D.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Additional lighting either fixed or portable must be available, but only should be switched to allow examination of the animals and equipment.	Important	Stock inspection all times.		
1.7	Any pest control substances or equipment must be enclosed in a secure location, so there is no risk of water contamination or accidental	Important	There must be a system of regular documented monitoring these		

	access by non-target species.		baits points and recording results.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. No loud noises are permitted in the vicinity of the tanks or raceways: air compressors, loading docks, air guns, machinery, etc.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

10 – WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be between 10-20º C.	Important	Regular records of temperature.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish veterinarian or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have access to one regularly.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plan.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments of feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding, and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact on fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only or/and thrown.	Important	Records, documents, videos or on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected upon each use and replaced when damaged. Their design must not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

30 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	The use of vaccines is encouraged for the prevention of disease, rather than relying on treatment.	Important	Records, documents, SOP, on-site observation.		
6.2	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		

6.3	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		
6.4	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.5	There must be back-up systems and contingency plans in place in order to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

31 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation. (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or causing stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation. (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all times.	Important	Records, SOP, documents.		

7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

32 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		

8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		
8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems.	Important	Records, documents.		

8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

33 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, this must always be $\leq$ 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate, feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

34 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, on-site observation.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale.	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (the critical point will vary between species and with environmental factors). Critical level for Stellate sturgeon: 5 mg/L.	Important	Records, documents, videos, on-site measurements.		

35 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using overdose of anesthetic.	Important	Documents, on-site observations.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Documents.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviour (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated in order to identify the cause of the issue and prevent reocccurence by implementing effective prevention strategies.	Important	on-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	on-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum).	Important	on-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviour should be absent in 5 consecutive mins of observation (minimum).	Important	on-site observation.		
12.7	Anticipatory behaviour must be apparent prior to feeding routines.	Important	on-site observation.		
12.8	If individual observation is possible in detail, ventilatory activity should be normal (50-70 opercular beats per min. (bpm)); hyperventilation (>90 bpm) should be absent at all times. Abnormal values must be reported to the welfare specialist.	Important	on-site observation.		
12.9	Swimming activity should be regular, without major or sudden changes.	Important	on-site observation.		

12.10	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Important	on-site observation		
12.11	Farmers should be aware of, and consider the use of, new technology that improves the welfare of fish.	Recommended			
12.12	Farmers should have access to reliable and relevant information on fish welfare.	Recommended			
12.13	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 3 Animal Health and Welfare and Section 12 Welfare Assessment). Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the water immediately. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate their proficiency in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease.	Important			

14- BROODSTOCK AND EGGS

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Density of spawners must be kept <15kg/m^3 for overwintering (stocking during winter conditions prior to spawning).	Important	Records, documents.		
14.2	Tank sizes must be > 5m^3 and > 1m deep, rounded or avoiding angles and contain structural enrichment, provided that it does not hinder fish swimming activities or tank cleaning operations.	Important			
14.3	Environmental parameters (temperature and photoperiod) of broodstock tanks should follow the natural rhythms for overwintering. Spawning temperatures must be between 12-29º C.	Important	Records, documents.		
14.4	Natural spawning methods, i.e. without handling or manipulation, should be implemented. In the absence of such, all handling procedures (e.g. stripping) must be performed under anesthesia by a trained staff member or team.	Important	Records, documents.		
14.5	Developing eggs may be maintained in dim light or darkness to reduce mortality and should not be handled after placement for 100-120 degree days (e.g. 4 days at 10º C).	Important	Records, documents.		

ON-GROWING REQUIREMENTS

5 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimising fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the fish.	Important	Absence of dangerous protrusions.		
1.3	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly and records must be ready for inspection.	Important	Good overall condition of nets and infrastructures. Records of periodicity and methods as assessment.		
1.4	Farm design should be such that inspection of all stock is possible.	Important	Water visibility, ROVs, divers, cameras etc.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist advice. Maximum range: 8:16 to 16:8 L:D.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Production units must be of adequate depth to prevent damage from ultraviolet radiation (> 45 cm) or shadows must be provided if considered appropriate.	Important	Depth of net-pen.		

1.7	Additional lighting, either fixed or portable, must be available, but only should be switched on to allow examination of the animals and equipment.	Important	Stock inspection at all times.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. No loud noises are permitted in the vicinity of the tanks or raceways: air compressors, loading docks, air guns, machinery, etc.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

2– WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be between 10-25º C.	Important	Regular records of temperature.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish vet or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have regular access to one.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plans.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are carried out according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments to feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact to fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only and/or thrown.	Important	Records, documents, videos, on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected after use and replaced when damaged. Their design must be as to not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

30 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		
6.2	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		

6.3	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.4	There must be back-up systems and contingency plans in place to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

31 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or cause stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all time.	Important	Records, SOP, documents.		
7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, on-site observation (grading system).		

32 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		
8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		

8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems	Important	Records, documents.		
8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

33 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, must always be < 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

34 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, observation on site.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (the critical point will vary between species and with environmental factors). Critical level FOR Stellate sturgeon: 5 mg/L.	Important	Records, documents, videos, on-site measurements.		

35 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using an overdose of anesthetic.	Important	Documents, on-site observation.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Records, documents, on-site observation, training.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm, schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviours (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated to identify the cause of the issue and be prevented from reoccuring by implementing effective prevention strategies.	Important	On-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	On-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviours should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.7	Anticipatory behaviour must appear prior to feeding routines.	Important	On-site observation.		
12.8	Swimming activity should be regular, without major or sudden changes.	Important	On-site observation.		

12.9	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Recommended			
12.10	Farmers should be aware of, and consider, the use of new technology that improves the welfare of fish.	Recommended			
12.11	Farmers should have access to reliable and relevant information on fish welfare.	Important	On-site observation.		
12.12	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation.		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Density of fish must be below 10kg/m^3.	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the production units. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			
13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			

13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate that they received training and that they are proficient in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease (see Section 12 Welfare Assessment).	Important			

14- HARVESTING, STUNNING AND SLAUGHTER

No.	**Requirement**	**Level**	**Parameters and information**	**Y/N**	**Comments**

14.1	Harvesting can only be performed using fish pumps. The dimensions of pumps and tubes must be scaled to the operation and approved by an engineer. The maximum flow rate should be 3m/s.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.2	The only permitted stunning and subsequent killing methods are: a) an effectively applied percussive blow, b) electronarcosis followed by bleeding, asphyxia or other slaughter method that must be applied while the fish are unconscious, c) electrocution (i.e. killing by electrical current).	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.3	A backup system e.g. 'priest' must be available throughout the killing process.	Important	Documents, videos, on-site observation.		
14.4	Any fish which fall to the ground during the process must be humanely killed with the main or back up system.	Important	Documents, videos, on-site observation.		
14.5	External damage such as scale loss, fin erosion, predator bites, lesions resulting from aggression, handling scares, parasite lesions and deformities must be noted at slaughter or upon arrival to the processing station.	Important	Documents, videos, on-site observation.		

14.6	All staff involved with the stunning and killing process must have received full training.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.7	There must be a named person responsible for fish welfare throughout the killing process. This person is responsible for harvest records including stunning and slaughtering efficiency.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.8	A written procedure for fish humane stunning and slaughtering (see Section 14 1 - 4 Harvesting, stunning and slaughter) must be in place and carried out all time.	Important	Documents, videos, on-site observation.		
14.9	Video recordings of harvesting, stunning and slaughtering must be performed regularly (once per month or every time there is any change in protocols)	Important	Documents, videos, on-site observation.		

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HATCHERY REQUIREMENTS

11 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimizing fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the larvae and young.	Important	Absence of dangerous protrusions.		
1.3	Back-up power generators must exist, must be functional and must be ready to support essential equipment in case of a power failure. Generators should be tested and maintained weekly.	Important	Records, documents generator test.		
1.4	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly.	Important	Good overall condition of tanks and equipment. e.g. hand nets.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist advice. Maximum range: 6:18 to 18:6 L:D.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Additional lighting either fixed or portable must be available, but only should be switched to allow examination of the animals and equipment.	Important	Stock inspection all times.		
1.7	Any pest control substances or equipment must be enclosed in a secure location, so there is no risk of water contamination or accidental	Important	There must be a system of regular documented monitoring these		

	access by non-target species.		baits points and recording results.		
1.8	Structural enrichment should be provided (*e.g.* gravel substrate 1.2-1.9 cm ø) but sand must be avoided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. No loud noises are permitted in the vicinity of the tanks or raceways: air compressors, loading docks, air guns, machinery, *etc*.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

12 – WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be below 20º C., preferably 14-17º C.	Important	Regular records of temperature.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish veterinarian or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have access to one regularly.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plan.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments of feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact on fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only or/and thrown.	Important	Records, documents, videos or on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected upon each use and replaced when damaged. Their design must not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

36 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	The use of vaccines is encouraged for the prevention of disease, rather than relying on treatment.	Important	Records, documents, SOP, on-site observation.		
6.2	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		

6.3	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		
6.4	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.5	There must be back-up systems and contingency plans in place in order to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

37 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation. (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or causing stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation. (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all times.	Important	Records, SOP, documents.		

7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

38 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		

8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		
8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems.	Important	Records, documents.		

8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

39 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, must always be < 50 degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate, feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

40 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, on-site observation.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale.	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (the critical point will vary between species and with environmental factors). Critical level for White sturgeon: 4 mg/L.	Important	Records, documents, videos, on-site measurements.		

41 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using overdose of anesthetic.	Important	Documents, on-site observations.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Documents.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviour (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated in order to identify the cause of the issue and prevent reocccurence by implementing effective prevention strategies.	Important	on-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	on-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins. of observation (minimum).	Important	on-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviour should be absent in 5 consecutive mins. of observation (minimum).	Important	on-site observation.		
12.7	Anticipatory behaviour must be apparent prior to feeding routines.	Important	on-site observation.		
12.8	If individual observation is possible in detail, ventilatory activity should be normal (50-70 opercular beats per min. (bpm)); hyperventilation (>90 bpm) should be absent at all times. Abnormal values must be reported to the welfare specialist.	Important	on-site observation.		
12.9	Swimming activity should be regular, without major or sudden changes.	Important	on-site observation.		

12.10	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Important	on-site observation		
12.11	Farmers should be aware of, and consider the use of, new technology that improves the welfare of fish.	Recommended			
12.12	Farmers should have access to reliable and relevant information on fish welfare.	Recommended			
12.13	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, *i.e*. an internal evaluation based on welfare indicators.	Important	On-site observation		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 3 Animal Health and Welfare and Section 12 Welfare Assessment). Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the water immediately. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate their proficiency in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease.	Important			

14- BROODSTOCK AND EGGS

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Tank sizes must be > $5m^3$ and > 1m deep, rounded or avoiding angles and contain structural enrichment, provided that it does not hinder fish swimming activities or tank cleaning operations.	Important			
14.2	Environmental parameters (temperature and photoperiod) of broodstock tanks should follow the natural rhythms for overwintering.	Important	Records, documents.		
14.3	Natural spawning methods, *i.e.* without handling or manipulation, should be implemented. In the absence of such, all handling procedures (*e.g.* stripping) must be performed under anesthesia by a trained staff member or team.	Important	Records, documents.		
14.4	Developing eggs may be maintained in dim light or darkness to reduce mortality and must not be handled after placement for 40-45 degree days (e.g. 4 days at 10º C).	Important	Records, documents.		

ON-GROWING REQUIREMENTS

6 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters	Y/N	Comments

			and information		
1.1	Production units should provide horizontal and vertical withdrawal space, optimising fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the fish.	Important	Absence of dangerous protrusions.		
1.3	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly and records must be ready for inspection.	Important	Good overall condition of nets and infrastructures. Records of periodicity and methods as assessment.		
1.4	Farm design should be such that inspection of all stock is possible.	Important	Water visibility, ROVs, divers, cameras etc.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist advice. Maximum range: 6:18 to 18:6 L:D.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Production units must be of adequate depth to prevent damage from ultraviolet radiation or shade must be provided if considered appropriate.	Important	Depth of net-pen.		
1.7	Additional lighting, either fixed or portable, must be available, but only should be switched on to allow examination of the animals and equipment.	Important	Stock inspection at all times.		

1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. No loud noises are permitted in the vicinity of the tanks or raceways: air compressors, loading docks, air guns, machinery, etc.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

2– WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be below 19º C.	Important	Regular records of temperature.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish vet or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have regular access to one.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plans.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are carried out according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments to feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact to fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only and/or thrown.	Important	Records, documents, videos, on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected after use and replaced when damaged. Their design must be as to not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

36 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		
6.2	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		

6.3	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.4	There must be back-up systems and contingency plans in place to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

37 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary, *e.g.* before vaccination, to avoid cannibalism or before slaughtering.	Important	Records, documents, SOP, on-site observation (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or cause stress to the fish (*e.g*. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all time.	Important	Records, SOP, documents.		
7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, on-site observation (grading system).		

38 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max. 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		
8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		

8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems	Important	Records, documents.		
8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

39 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, must always be < 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

40 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, observation on site.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (the critical point will vary between species and with environmental factors). Critical saturation levels for White sturgeon: 5 mg/L.	Important	Records, documents, videos, on-site measurements.		

41 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using an overdose of anesthetic.	Important	Documents, on-site observation.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Records, documents, on-site observation, training.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm, schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviours (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 13 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated to identify the cause of the issue and be prevented from reoccuring by implementing effective prevention strategies.	Important	On-site observation.		

12.4	Fish should be shoaling or schooling (*i.e.* group swimming with polarized orientation)	Important	On-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviours should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.7	Anticipatory behaviour must appear prior to feeding routines.	Important	On-site observation.		
12.8	Swimming activity should be regular, without major or sudden changes.	Important	On-site observation.		

12.9	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Recommended			
12.10	Farmers should be aware of, and consider, the use of new technology that improves the welfare of fish.	Recommended			
12.11	Farmers should have access to reliable and relevant information on fish welfare.	Important	On-site observation.		
12.12	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, *i.e.* an internal evaluation based on welfare indicators.	Important	On-site observation.		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Density of fish must be below 15 kg/m^3 for White sturgeon.	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the production units. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			
13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			

13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate that they received training and that they are proficient in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease (see Section 12 Welfare Assessment).	Important			

14- HARVESTING, STUNNING AND SLAUGHTER

No.	**Requirement**	**Level**	**Parameters and information**	**Y/N**	**Comments**

14.1	Harvesting can only be performed using fish pumps. The dimensions of pumps and tubes must be scaled to the operation and approved by an engineer. The maximum flow rate should be 3m/s.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.2	The only permitted stunning and subsequent killing methods are: a) an effectively applied percussive blow, b) electronarcosis followed by bleeding, asphyxia or other slaughter method that must be applied while the fish are unconscious, c) electrocution (*i.e.* killing by electrical current).	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.3	A backup system *e.g.* 'priest' must be available throughout the killing process.	Important	Documents, videos, on-site observation.		
14.4	Any fish which fall to the ground during the process must be humanely killed with the main or back up system.	Important	Documents, videos, on-site observation.		
14.5	External damage such as scale loss, fin erosion, predator bites, lesions resulting from aggression, handling scares, parasite lesions and deformities must be noted at slaughter or upon arrival to the processing station.	Important	Documents, videos, on-site observation.		

14.6	All staff involved with the stunning and killing process must have received full training.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.7	There must be a named person responsible for fish welfare throughout the killing process. This person is responsible for harvest records including stunning and slaughtering efficiency.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.8	A written procedure for fish humane stunning and slaughtering (see Section 14.1 to 14.4 Harvesting, stunning and slaughter) must be in place and carried out all time.	Important	Documents, videos, on-site observation.		
14.9	Video recordings of harvesting, stunning and slaughtering must be performed regularly (once per month or every time there is any change in protocols).	Important	Documents, videos, on-site observation.		

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HATCHERY REQUIREMENTS

13 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimizing fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the larvae and young.	Important	Absence of dangerous protrusions.		
1.3	Back-up power generators must exist, must be functional and must be ready to support essential equipment in case of a power failure. Generators should be tested and maintained weekly.	Important	Records, documents generator test.		
1.4	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly.	Important	Good overall condition of tanks and equipment. e.g. hand nets.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis matching the natural limits and using practical experience, research and welfare specialist advice. North Atlantic latitudes photoperiod optimum range: 12L:12D; Intensity range 500 lux.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Additional lighting either fixed or portable must be available, but only should be switched to allow examination of the animals and equipment.	Important	Stock inspection all times.		

1.7	Any pest control substances or equipment must be enclosed in a secure location, so there is no risk of water contamination or accidental access by non-target species.	Important	There must be a system of regular documented monitoring these baits points and recording results.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. The maximum sound pressure level should be under 150 dB re 1 µPa rms in the 0.1-3kHz frequency range in any point of the tank at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

14 – WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be between 18 and 25º C.	Important	Regular records of temperature.		
2.3	Oxygen levels must be verifiable at all times and must be > 70% oxygen saturation (> 5.6 mg/L).	Important	Regular records of oxygen.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish veterinarian or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have access to one regularly.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plan.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments of feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact on fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only or/and thrown.	Important	Records, documents, videos or on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected upon each use and replaced when damaged. Their design must not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

42 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	The use of vaccines is encouraged for the prevention of disease, rather than relying on treatment.	Important	Records, documents, SOP, on-site observation.		
6.2	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		

6.3	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		
6.4	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.5	There must be back-up systems and contingency plans in place in order to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

43 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation. (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or causing stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation. (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all times.	Important	Records, SOP, documents.		

7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

44 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		

8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		
8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems.	Important	Records, documents.		

8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

45 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, this must always be $\leq$ 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate, feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

46 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, on-site observation.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale.	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (Recommended oxygen saturation for Meagre > 70%).	Important	Records, documents, videos, on-site measurements.		

47 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using overdose of anesthetic.	Important	Documents, on-site observations.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Documents.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviour (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated in order to identify the cause of the issue and prevent reocccurence by implementing effective prevention strategies.	Important	on-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	on-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins. of observation (minimum).	Important	on-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviour should be absent in 5 consecutive mins. of observation (minimum).	Important	on-site observation.		
12.7	Anticipatory behaviour must be apparent prior to feeding routines.	Important	on-site observation.		
12.8	If individual observation is possible in detail, ventilatory activity should be normal (50-70 opercular beats per min. (bpm)); hyperventilation (>90 bpm) should be absent at all times. Abnormal values must be reported to the welfare specialist.	Important	on-site observation.		
12.9	Swimming activity should be regular, without major or sudden changes.	Important	on-site observation.		

12.10	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Important	on-site observation		
12.11	Farmers should be aware of, and consider the use of, new technology that improves the welfare of fish.	Recommended			
12.12	Farmers should have access to reliable and relevant information on fish welfare.	Recommended			
12.13	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 3 Animal Health and Welfare and Section 12 Welfare Assessment). Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the water immediately. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate their proficiency in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease.	Important			

14- BROODSTOCK AND EGGS

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Stocking of broodstock should match the natural sex ratio of the species (1M:1F).	Important	Records, documents.		
14.2	Density of spawners must be kept <5kg/m^3 both for stocking and spawning.	Important	Records, documents.		
14.3	Tank sizes must be > 5m^3 and > 1m deep, rounded or avoiding angles and contain structural enrichment, provided that it does not hinder fish swimming activities or tank cleaning operations.	Important			
14.4	Environmental parameters (temperature and photoperiod) of broodstock tanks should follow the natural rhythms, variation and ranges as the original habitat. (Temperature range: 14-25º C. Photoperiod: 12L:12D or 10L:14D).	Important	Records, documents.		
14.5	Natural spawning methods, i.e. without handling or manipulation, should be implemented. In the absence of such, all handling procedures (e.g. stripping) must be performed under anesthesia by a trained staff member or team.	Important	Records, documents.		

14.6	Developing eggs may be maintained in dim light or darkness to reduce mortality and must not be handled after placement for 40-45 degree days (about 2 days at 19-20 º C).	Important	Records, documents.		

ON-GROWING REQUIREMENTS

Z – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimising fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the fish.	Important	Absence of dangerous protrusions.		
1.3	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly and records must be ready for inspection.	Important	Good overall condition of nets and infrastructures. Records of periodicity and methods as assessment.		
1.4	Farm design should be such that inspection of all stock is possible.	Important	Water visibility, ROVs, divers, cameras etc.		

1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis matching natural limits using practical experience, research and welfare specialist advice. (North Atlantic latitudes photoperiod optimum range: from 12L:12D to 8L-16D.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Production units must be of adequate depth to prevent damage from ultraviolet radiation (> 45 cm) or shadows must be provided if considered appropriate.	Important	Depth of net-pen.		
1.7	Additional lighting, either fixed or portable, must be available, but only should be switched on to allow examination of the animals and equipment.	Important	Stock inspection at all times.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. The maximum sound pressure level should be under 150 dB re 1 µPa rms in the 0.1-3kHz frequency range in any point of the tank at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

2– WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments

2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be between 13 and 28º C.	Important	Regular records of temperature.		
2.3	Oxygen levels must be verifiable at all times and must be > 70% oxygen saturation.	Important	Regular records of oxygen.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish vet or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have regular access to one.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plans.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are carried out according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments to feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact to fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only and/or thrown.	Important	Records, documents, videos, on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected after use and replaced when damaged. Their design must be as to not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

42 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		
6.2	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		

6.3	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.4	There must be back-up systems and contingency plans in place to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

43 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or cause stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all time.	Important	Records, SOP, documents.		
7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, on-site observation (grading system).		

44 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		
8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		

8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems	Important	Records, documents.		
8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

45 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, must always be < 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

46 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, observation on site.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (the critical point will vary between species and with environmental factors). Critical level for Meagre: > 6 mg/L. See Section 2 Water.	Important	Records, documents, videos, on-site measurements.		

47 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using an overdose of anesthetic.	Important	Documents, on-site observation.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Records, documents, on-site observation, training.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm, schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviours (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated to identify the cause of the issue and be prevented from reoccuring by implementing effective prevention strategies.	Important	On-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	On-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviours should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.7	Anticipatory behaviour must appear prior to feeding routines.	Important	On-site observation.		
12.8	Swimming activity should be regular, without major or sudden changes.	Important	On-site observation.		

12.9	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Recommended			
12.10	Farmers should be aware of, and consider, the use of new technology that improves the welfare of fish.	Recommended			
12.11	Farmers should have access to reliable and relevant information on fish welfare.	Important	On-site observation.		
12.12	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation.		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 12 Welfare Assessment). Limit stocking to 20 kg/m3 max. Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the production units. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate that they received training and that they are proficient in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease (see Section 12 Welfare Assessment).	Important			

14- HARVESTING, STUNNING AND SLAUGHTER

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Harvesting can only be performed using fish pumps. The dimensions of pumps and tubes must be scaled to the operation and approved by an engineer. The maximum flow rate should be 3m/s.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.2	The only permitted stunning and subsequent killing methods are: a) an effectively applied percussive blow, b) electronarcosis followed by bleeding, asphyxia or other slaughter method that must be applied while the fish are unconscious, c) electrocution (i.e. killing by electrical current).	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.3	A backup system e.g. 'priest' must be available throughout the killing process.	Important	Documents, videos, on-site observation.		
14.4	Any fish which fall to the ground during the process must be humanely killed with the main or back up system.	Important	Documents, videos, on-site observation.		

14.5	External damage such as scale loss, fin erosion, predator bites, lesions resulting from aggression, handling scares, parasite lesions and deformities must be noted at slaughter or upon arrival to the processing station.	Important	Documents, videos, on-site observation.		
14.6	All staff involved with the stunning and killing process must have received full training.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.7	There must be a named person responsible for fish welfare throughout the killing process. This person is responsible for harvest records including stunning and slaughtering efficiency.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.8	A written procedure for fish humane stunning and slaughtering (see Section 14.1 - 4 Harvesting, stunning and slaughter) must be in place and carried out all time.	Important	Documents, videos, on-site observation.		
14.9	Video recordings of harvesting, stunning and slaughtering must be performed regularly (once per month or every time there is any change in protocols)	Important	Documents, videos, on-site observation.		

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HATCHERY REQUIREMENTS

15 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimizing fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the larvae and young.	Important	Absence of dangerous protrusions.		
1.3	Back-up power generators must exist, must be functional and must be ready to support essential equipment in case of a power failure. Generators should be tested and maintained weekly.	Important	Records, documents generator test.		
1.4	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly.	Important	Good overall condition of tanks and equipment. e.g. hand nets.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist	Important	Facility allocated within the natural photoperiod of the species.		

	advice. Mediterranean latitudes photoperiod optimum range: from 12L:12D to 8L:16D/16L:8D; Intensity range: 500-1500 lux.				
1.6	Additional lighting either fixed or portable must be available, but only should be switched to allow examination of the animals and equipment.	Important	Stock inspection all times.		
1.7	Any pest control substances or equipment must be enclosed in a secure location, so there is no risk of water contamination or accidental access by non-target species.	Important	There must be a system of regular documented monitoring these baits points and recording results.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. The maximum sound pressure level should be under 128 dB re 1 µPa rms in the 0.1-3kHz frequency range in any point of the tank at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

16 – WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		

2.2	Temperature should be verifiable at all times, and must be between 15 and 25º C.	Important	Regular records of temperature.		
2.3	Oxygen levels must be verifiable at all times and must be > 70% oxygen saturation.	Important	Regular records of oxygen.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish veterinarian or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have access to one regularly.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plan.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments of feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding, and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact on fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only or/and thrown.	Important	Records, documents, videos or on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected upon each use and replaced when damaged. Their design must not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

48 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	The use of vaccines is encouraged for the prevention of disease, rather than relying on treatment.	Important	Records, documents, SOP, on-site observation.		
6.2	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		

6.3	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		
6.4	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.5	There must be back-up systems and contingency plans in place in order to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

49 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation. (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or causing stress to the fish (e.g. absence of protrusions to avoid injuries, never emerged).	Important	Records, documents, on-site observation. (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all times.	Important	Records, SOP, documents.		

7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		
7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, on-site observations (grading system).		

50 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		

8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		
8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems.	Important	Records, documents.		

8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

51 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, this must always be $\leq$ 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate, feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

52 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, on-site observation.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale.	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point. Recommended oxygen saturation for Dentex > 70%.	Important	Records, documents, videos, on-site measurements.		

53 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using overdose of anesthetic.	Important	Documents, on-site observations.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Documents.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviour (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated in order to identify the cause of the issue and prevent reocccurence by implementing effective prevention strategies.	Important	on-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	on-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum)	Important	on-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviour should be absent in 5 consecutive mins of observation (minimum)	Important	on-site observation.		
12.7	Anticipatory behaviour must be apparent prior to feeding routines	Important	on-site observation.		
12.8	If individual observation is possible in detail, ventilatory activity should be normal (50-70 opercular beats per min. (bpm)); hyperventilation (>90 bpm) should be absent at all times. Abnormal values must be reported to the welfare specialist.	Important	on-site observation.		
12.9	Swimming activity should be regular, without major or sudden changes.	Important	on-site observation.		

12.10	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Important	on-site observation		
12.11	Farmers should be aware of, and consider the use of, new technology that improves the welfare of fish.	Recommended			
12.12	Farmers should have access to reliable and relevant information on fish welfare.	Recommended			
12.13	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important			

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 3 Animal Health and Welfare and Section 12 Welfare Assessment). Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the water immediately. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate their proficiency in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease.	Important			

14- BROODSTOCK AND EGGS

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Stocking of broodstock should match the natural sex ratio of the species (1M:1F).	Important	Records, documents.		
14.2	Density of spawners must be kept <7kg/m^3 both for stocking and spawning.	Important			
14.3	Tank sizes must be > 5m^3 and > 1m deep, rounded or avoiding angles and contain structural enrichment, provided that it does not hinder fish swimming activities or tank cleaning operations.	Important			
14.4	Environmental parameters (temperature and photoperiod) of broodstock tanks should follow the natural rhythms, variations and ranges as their original habitat.	Important	Records, documents.		
14.5	Natural spawning methods, i.e. without handling or manipulation must be implemented. In the absence of such, all handling procedures (e.g. stripping) must be performed under a proven humane protocol by a trained staff member	Important	Records, documents.		

14.6	Developing eggs may be maintained in dim light or darkness to reduce mortality and must not be handled after placement for 40-45 degree days (about 2 days at 19-20º C).	Important	Records, documents.		

ON-GROWING REQUIREMENTS

8 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimising fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the fish.	Important	Absence of dangerous protrusions.		
1.3	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly and records must be ready for inspection.	Important	Good overall condition of nets and infrastructures. Records of periodicity and methods as assessment.		
1.4	Farm design should be such that inspection of all stock is possible.	Important	Water visibility, ROVs, divers, cameras etc.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis matching the natural limits and using practical experience, research and welfare specialist advice. Mediterranean latitudes photoperiod optimum range: from 12L:12D to 8L:16D/16L:8D.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Production units must be of adequate depth to prevent damage from ultraviolet radiation or shade must be provided if considered appropriate.	Important	Depth of net-pen.		

1.7	Additional lighting, either fixed or portable, must be available, but only should be switched on to allow examination of the animals and equipment.	Important	Stock inspection at all times.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The cages should be located in a site protected from human induced noise. The maximum sound pressure level should be under 128 dB re 1 µPa rms in the 0.1-3kHz frequency range in any point of the tank at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

2– WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be between 15 and 25º C.	Important	Regular records of temperature.		

2.3	Oxygen levels must be verifiable at all times and must be > 70% oxygen saturation.	Important	Regular records of oxygen.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish vet or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have regular access to one.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plans.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are carried out according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments to feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact to fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only and/or thrown.	Important	Records, documents, videos, on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected after use and replaced when damaged. Their design must be as to not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

48 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		
6.2	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		

6.3	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.4	There must be back-up systems and contingency plans in place to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

49 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or cause stress to the fish (e.g. absence of protrusions to avoid injuries, never emerged).	Important	Records, documents, on-site observation (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all time.	Important	Records, SOP, documents.		
7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, on-site observation (grading system).		

50 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		
8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		

8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems	Important	Records, documents.		
8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

51 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, must always be < 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

52 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, observation on site.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (the critical point will vary between species and with environmental factors). (Recommended oxygen saturation > 70%).	Important	Records, documents, videos, on-site measurements.		

53 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using an overdose of anesthetic.	Important	Documents, on-site observation.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Records, documents, on-site observation, training.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm, schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviours (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated to identify the cause of the issue and be prevented from reoccuring by implementing effective prevention strategies.	Important	On-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	On-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviours should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.7	Anticipatory behaviour must appear prior to feeding routines.	Important	On-site observation.		
12.8	Swimming activity should be regular, without major or sudden changes.	Important	On-site observation.		

12.9	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Recommended			
12.10	Farmers should be aware of, and consider, the use of new technology that improves the welfare of fish.	Recommended			
12.11	Farmers should have access to reliable and relevant information on fish welfare.	Important	On-site observation.		
12.12	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation.		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 12 Welfare Assessment). Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the production units. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate that they received training and that they are proficient in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease (see Section 12 Welfare Assessment).	Important			

14- HARVESTING, STUNNING AND SLAUGHTER

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Harvesting can only be performed using fish pumps. The dimensions of pumps and tubes must be scaled to the operation and approved by an engineer. The maximum flow rate should be 3m/s.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.2	The only permitted stunning and subsequent killing methods are: a) an effectively applied percussive blow, b) electronarcosis followed by bleeding, asphyxia or other slaughter method that must be applied while the fish are unconscious, c) electrocution (i.e. killing by electrical current).	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.3	A backup system e.g. 'priest' must be available throughout the killing process.	Important	Documents, videos, on-site observation.		
14.4	Any fish which fall to the ground during the process must be humanely killed with the main or back up system.	Important	Documents, videos, on-site observation.		

14.5	External damage such as scale loss, fin erosion, predator bites, lesions resulting from aggression, handling scares, parasite lesions and deformities must be noted at slaughter or upon arrival to the processing station.	Important	Documents, videos, on-site observation.		
14.6	All staff involved with the stunning and killing process must have received full training.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.7	There must be a named person responsible for fish welfare throughout the killing process. This person is responsible for harvest records including stunning and slaughtering efficiency.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.8	A written procedure for fish humane stunning and slaughtering (see Section 14.1 – 4 Harvesting, stunning and slaughter) must be in place and carried out all time.	Important	Documents, videos, on-site observation.		
14.9	Video recordings of harvesting, stunning and slaughtering must be performed regularly (once per month or every time there is any change in protocols)	Important	Documents, videos, on-site observation.		

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HATCHERY REQUIREMENTS

17 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimizing fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the larvae and young.	Important	Absence of dangerous protrusions.		
1.3	Back-up power generators must exist, must be functional and must be ready to support essential equipment in case of a power failure. Generators should be tested and maintained weekly.	Important	Records, documents generator test.		
1.4	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly.	Important	Good overall condition of tanks and equipment. e.g. hand nets.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis matching natural limitis and using practical experience, research	Important	Facility allocated within the natural photoperiod and geographical range		

	and welfare specialist advice. NorthAtlantic latitudes photoperiod max. range: 16L:8D-8L:16D. Intensity range for larvae: <100 lux, for juveniles: 150-1000 lux.		of the species.		
1.6	Additional lighting either fixed or portable must be available, but only should be switched to allow examination of the animals and equipment.	Important	Stock inspection all times.		
1.7	Any pest control substances or equipment must be enclosed in a secure location, so there is no risk of water contamination or accidental access by non-target species.	Important	There must be a system of regular documented monitoring these baits points and recording results.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. The maximum sound pressure level should be under 150 dB re 1 µPa rms in the 0.2-1kHz frequency range in any point of the tank at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

18 – WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		

2.2	Temperature should be verifiable at all times, and must be between 8 and 24º C.	Important	Regular records of temperature.		
2.3	Oxygen levels must be verifiable at all times and must be > 70% oxygen saturation.	Important	Regular records of oxygen.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish veterinarian or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have access to one regularly.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plan.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments of feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding, and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact on fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only or/and thrown.	Important	Records, documents, videos or on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected upon each use and replaced when damaged. Their design must not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

54 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	The use of vaccines is encouraged for the prevention of disease, rather than relying on treatment.	Important	Records, documents, SOP, on-site observation.		
6.2	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		

6.3	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		
6.4	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.5	There must be back-up systems and contingency plans in place in order to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

55 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation. (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or causing stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation. (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all times.	Important	Records, SOP, documents.		

7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

56 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		

8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		
8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems.	Important	Records, documents.		

8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

57 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, this must always be $\leq$ 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate, feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

58 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, on-site observation.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale.	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point. Recommended oxygen saturation > 70%.	Important	Records, documents, videos, on-site measurements.		

59 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using overdose of anesthetic.	Important	Documents, on-site observations.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Documents.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviour (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated in order to identify the cause of the issue and prevent reocccurence by implementing effective prevention strategies.	Important	on-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	on-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum)	Important	on-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviour should be absent in 5 consecutive mins of observation (minimum)	Important	on-site observation.		
12.7	Anticipatory behaviour must be apparent prior to feeding routines	Important	on-site observation.		
12.8	If individual observation is possible in detail, ventilatory activity should be normal (50-70 opercular beats per min. (bpm)); hyperventilation (>90 bpm) should be absent at all times. Abnormal values must be reported to the welfare specialist.	Important	on-site observation.		
12.9	Swimming activity should be regular, without major or sudden changes.	Important	on-site observation.		

12.10	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Important	on-site observation		
12.11	Farmers should be aware of, and consider the use of, new technology that improves the welfare of fish.	Recommended			
12.12	Farmers should have access to reliable and relevant information on fish welfare.	Recommended			
12.13	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 3 Animal Health and Welfare and Section 12 Welfare Assessment). Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the water immediately. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate their proficiency in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease.	Important			

14- BROODSTOCK AND EGGS

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Stocking of broodstock should match the natural sex ratio of the species (1M:2F).	Important	Records, documents.		
14.2	Density of spawners must be kept <5kg/m^3 both for stocking and spawning.	Important			
14.3	Tank sizes must be > 5m^3 and > 1m deep, rounded or avoiding angles and contain structural enrichment, provided that it does not hinder fish swimming activities or tank cleaning operations.	Important			
14.4	Environmental parameters (temperature and photoperiod) of broodstock tanks should follow the natural rhythms, variation and ranges as the original habitat.	Important	Records, documents.		
14.5	Natural spawning methods, i.e. without handling or manipulation, should be implemented. In the absence of such, all handling procedures (e.g. stripping) must be performed under anesthesia by a trained staff member or team.	Important	Records, documents.		

14.6	Developing eggs may be maintained in dim light or darkness to reduce mortality and must not be handled after placement for 40-45 degree days (e.g. around 2 days at 19-20 º C).	Important	Records, documents.		

ON-GROWING REQUIREMENTS

9 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimising fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the fish.	Important	Absence of dangerous protrusions.		
1.3	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly and records must be ready for inspection.	Important	Good overall condition of nets and infrastructures. Records of periodicity and methods as assessment.		
1.4	Farm design should be such that inspection of all stock is possible.	Important	Water visibility, ROVs, divers, cameras etc.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis matching natural limits and using practical experience, research and welfare specialist advice. North Atlantic latitudes photoperiod max. range: 16L:8D-8L:16D.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Production units must be of adequate depth to prevent damage from ultraviolet radiation (> 45 cm) or shadows must be provided if considered appropriate.	Important	Depth of net-pen.		

1.7	Additional lighting, either fixed or portable, must be available, but only should be switched on to allow examination of the animals and equipment.	Important	Stock inspection at all times.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The cages should be located in a site protected from human induced noise. The maximum sound pressure level should be under 150 dB re 1 µPa rms in the 0.2-1kHz frequency range in any point of the tank at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

2– WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be between 8 and 30º C.	Important	Regular records of temperature.		

2.3	Oxygen levels must be verifiable at all times and must be ≥ 70% oxygen saturation.	Important	Regular records of oxygen.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish vet or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have regular access to one.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plans.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are carried out according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments to feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact to fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only and/or thrown.	Important	Records, documents, videos, on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected after use and replaced when damaged. Their design must be as to not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

54 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		
6.2	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		

6.3	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.4	There must be back-up systems and contingency plans in place to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

55 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or cause stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all time.	Important	Records, SOP, documents.		
7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, on-site observation (grading system).		

56 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		
8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		

8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems	Important	Records, documents.		
8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

57 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, must always be < 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

58 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, observation on site.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (the critical point will vary between species and with environmental factors). Critical level for European seabass: > 6 mg/L. See Section 2 Water.	Important	Records, documents, videos, on-site measurements.		

59 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using an overdose of anesthetic.	Important	Documents, on-site observation.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Records, documents, on-site observation, training.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm, schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviours (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated to identify the cause of the issue and be prevented from reoccuring by implementing effective prevention strategies.	Important	On-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	On-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviours should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.7	Anticipatory behaviour must appear prior to feeding routines.	Important	On-site observation.		
12.8	Swimming activity should be regular, without major or sudden changes.	Important	On-site observation.		

12.9	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Recommended			
12.10	Farmers should be aware of, and consider, the use of new technology that improves the welfare of fish.	Recommended			
12.11	Farmers should have access to reliable and relevant information on fish welfare.	Important	On-site observation.		
12.12	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation.		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators. Limit stocking to 20 kg/m^3 max. Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the production units. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate that they received training and that they are proficient in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease (see Section 12 Welfare Assessment).	Important			

14- HARVESTING, STUNNING AND SLAUGHTER

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Harvesting can only be performed using fish pumps. The dimensions of pumps and tubes must be scaled to the operation and approved by an engineer. The maximum flow rate should be 3m/s.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.2	The only permitted stunning and subsequent killing methods are: a) an effectively applied percussive blow, b) electronarcosis followed by bleeding, asphyxia or other slaughter method that must be applied while the fish are unconscious, c) electrocution (i.e. killing by electrical current).	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.3	A backup system e.g. 'priest' must be available throughout the killing process.	Important	Documents, videos, on-site observation.		
14.4	Any fish which fall to the ground during the process must be humanely killed with the main or back up system.	Important	Documents, videos, on-site observation.		

14.5	External damage such as scale loss, fin erosion, predator bites, lesions resulting from aggression, handling scares, parasite lesions and deformities must be noted at slaughter or upon arrival to the processing station.	Important	Documents, videos, on-site observation.		
14.6	All staff involved with the stunning and killing process must have received full training.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.7	There must be a named person responsible for fish welfare throughout the killing process. This person is responsible for harvest records including stunning and slaughtering efficiency.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.8	A written procedure for fish humane stunning and slaughtering (see Section 14.1 – 4 Harvesting, stunning and slaughter) must be in place and carried out all time.	Important	Documents, videos, on-site observation.		
14.9	Video recordings of harvesting, stunning and slaughtering must be performed regularly (once per month or every time there is any change in protocols)	Important	Documents, videos, on-site observation.		

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HATCHERY REQUIREMENTS

19 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimizing fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the larvae and young.	Important	Absence of dangerous protrusions.		
1.3	Back-up power generators must exist, must be functional and must be ready to support essential equipment in case of a power failure. Generators should be tested and maintained weekly.	Important	Records, documents generator test.		
1.4	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly.	Important	Good overall condition of tanks and equipment. e.g. hand nets.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist advice. Photoperiods should match species natural limits. Larvae in light	Important	Facility allocated within the natural photoperiod and geographical range of the species.		

	conditions (30-450 lux) had a better ability to digest.				
1.6	Additional lighting either fixed or portable must be available, but only should be switched to allow examination of the animals and equipment.	Important	Stock inspection all times.		
1.7	Any pest control substances or equipment must be enclosed in a secure location, so there is no risk of water contamination or accidental access by non-target species.	Important	There must be a system of regular documented monitoring these baits point and recording results.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. The maximum sound pressure level should be under 128 dB re 1 µPa rms in the 0.1-3kHz frequency range in any point of the tank at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

20 – WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		

2.2	Temperature should be verifiable at all times, and must be between 16 and 28º C.	Important	Regular records of temperature.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish veterinarian or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have access to one regularly.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plan.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments of feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact on fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only or/and thrown.	Important	Records, documents, videos or on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected upon each use and replaced when damaged. Their design must not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

60 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	The use of vaccines is encouraged for the prevention of disease, rather than relying on treatment.	Important	Records, documents, SOP, on-site observation.		
6.2	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		

6.3	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		
6.4	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.5	There must be back-up systems and contingency plans in place in order to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

61 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation. (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or causing stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation. (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all times.	Important	Records, SOP, documents.		

7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

62 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		

8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		
8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems.	Important	Records, documents.		

8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

63 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, this must always be $\leq$ 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate, feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

64 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, on-site observation.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale.	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below 70%.	Important	Records, documents, videos, on-site measurements.		

65 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using overdose of anesthetic.	Important	Documents, on-site observations.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Documents.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviour (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated in order to identify the cause of the issue and prevent reocccurence by implementing effective prevention strategies.	Important	on-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	on-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum).	Important	on-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviour should be absent in 5 consecutive mins of observation (minimum).	Important	on-site observation.		
12.7	Anticipatory behaviour must be apparent prior to feeding routines.	Important	on-site observation.		
12.8	If individual observation is possible in detail, ventilatory activity should be normal (50-70 opercular beats per min. (bpm)); hyperventilation (>90 bpm) should be absent at all times. Abnormal values must be reported to the welfare specialist.	Important	on-site observation.		
12.9	Swimming activity should be regular, without major or sudden changes.	Important	on-site observation.		

12.10	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Important	on-site observation		
12.11	Farmers should be aware of, and consider the use of, new technology that improves the welfare of fish.	Recommended			
12.12	Farmers should have access to reliable and relevant information on fish welfare.	Recommended			
12.13	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 3 Animal Health and Welfare and Section 12 Welfare Assessment). Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the water immediately. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate their proficiency in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease.	Important			

14- BROODSTOCK AND EGGS

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Stocking of broodstock should match the natural sex ratio of the species (1M:1F).	Important	Records, documents.		
14.2	Density of spawners must be kept <8kg/m^3 both for stocking and spawning.	Important	Records, documents.		
14.3	Tank sizes must be > 5m^3 and > 1m deep, rounded or avoiding angles and contain structural enrichment, provided that it does not hinder fish swimming activities or tank cleaning operations.	Important			
14.4	Environmental parameters (temperature and photoperiod) of broodstock tanks should follow the natural rhythms, variation and ranges as the original habitat.	Important	Records, documents.		
14.5	Apart from natural spawning, other methods to promote spawning are not allowed.	Important	Records, documents.		

14.6	Developing eggs may be maintained in dim light or darkness to reduce mortality and must not be handled after placement for 40-45 degree days (about 2 days at 19-20 º C).	Important	Records, documents.		

ON-GROWING REQUIREMENTS

10 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimising fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the fish.	Important	Absence of dangerous protrusions.		
1.3	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly and records must be ready for inspection.	Important	Good overall condition of nets and infrastructures. Records of periodicity and methods as assessment.		
1.4	Farm design should be such that inspection of all stock is possible.	Important	Water visibility, ROVs, divers, cameras etc.		

1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist advice.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Production units must be of adequate depth to prevent damage from ultraviolet radiation (> 45 cm) or shadows must be provided if considered appropriate.	Important	Depth of net-pen.		
1.7	Additional lighting, either fixed or portable, must be available, but only should be switched on to allow examination of the animals and equipment.	Important	Stock inspection at all times.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The cages should be located in a site protected from human induced noise. The maximum sound pressure level should be under 128 dB re 1 µPa rms in the 0.1-3kHz frequency range in any point of the cage at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

2– WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments

2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be between 16 and 28º C.	Important	Regular records of temperature.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish vet or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have regular access to one.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plans.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are carried out according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments to feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact to fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only and/or thrown.	Important	Records, documents, videos, on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected after use and replaced when damaged. Their design must be as to not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

60 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		
6.2	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		

6.3	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.4	There must be back-up systems and contingency plans in place to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

61 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or cause stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all time.	Important	Records, SOP, documents.		
7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, on-site observation (grading system).		

62 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		
8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		

8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems	Important	Records, documents.		
8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

63 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, must always be < 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

64 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, observation on site.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below 70%.	Important	Records, documents, videos, on-site measurements.		

65 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using an overdose of anesthetic.	Important	Documents, on-site observation.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Records, documents, on-site observation, training.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm, schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviours (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 13 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated to identify the cause of the issue and be prevented from reoccuring by implementing effective prevention strategies.	Important	On-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	On-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviours should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.7	Anticipatory behaviour must appear prior to feeding routines.	Important	On-site observation.		
12.8	Swimming activity should be regular, without major or sudden changes.	Important	On-site observation.		

12.9	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Recommended			
12.10	Farmers should be aware of, and consider, the use of new technology that improves the welfare of fish.	Recommended			
12.11	Farmers should have access to reliable and relevant information on fish welfare.	Important	On-site observation.		
12.12	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation.		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour (see Section 12 Welfare Assessment). Limit stocking to 20 kg/m3 max. Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the production units. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		

13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			
13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate that they received training and that they are proficient in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			

13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease (see Section 12 Welfare Assessment).	Important			

14- HARVESTING, STUNNING AND SLAUGHTER

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Harvesting can only be performed using fish pumps. The dimensions of pumps and tubes must be scaled to the operation and approved by an engineer. The maximum flow rate should be 3m/s.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.2	The only permitted stunning and subsequent killing methods are: a) an effectively applied percussive blow, b) electronarcosis followed by bleeding, asphyxia or other slaughter method that must be applied while the fish are unconscious, c) electrocution (i.e. killing by electrical current).	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		

14.3	A backup system e.g. 'priest' must be available throughout the killing process.	Important	Documents, videos, on-site observation.		
14.4	Any fish which fall to the ground during the process must be humanely killed with the main or back up system.	Important	Documents, videos, on-site observation.		
14.5	External damage such as scale loss, fin erosion, predator bites, lesions resulting from aggression, handling scares, parasite lesions and deformities must be noted at slaughter or upon arrival to the processing station.	Important	Documents, videos, on-site observation.		
14.6	All staff involved with the stunning and killing process must have received full training.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.7	There must be a named person responsible for fish welfare throughout the killing process. This person is responsible for harvest records including stunning and slaughtering efficiency.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		

14.8	A written procedure for fish humane stunning and slaughtering (see Section 14 1 - 4 Harvesting, stunning and slaughter) must be in place and carried out all time.	Important	Documents, videos, on-site observation.		
14.9	Video recordings of harvesting, stunning and slaughtering must be performed regularly (once per month or every time there is any change in protocols)	Important	Documents, videos, on-site observation.		

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HATCHERY REQUIREMENTS

21 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimizing fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		

1.2	Production units must not have sharp protrusions which may be injurious to the larvae and young.	Important	Absence of dangerous protrusions.		
1.3	Back-up power generators must exist, must be functional and must be ready to support essential equipment in case of a power failure. Generators should be tested and maintained weekly.	Important	Records, documents generator test.		
1.4	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly.	Important	Good overall condition of tanks and equipment. e.g. hand nets.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist advice. Maximum range: 8:16 to 16:8 L:D	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Additional lighting either fixed or portable must be available, but only should be switched to allow examination of the animals and equipment.	Important	Stock inspection all times.		
1.7	Any pest control substances or equipment must be enclosed in a secure location, so there is no risk of water contamination or accidental access by non-target species.	Important	There must be a system of regular documented monitoring these baits points and recording results.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. No loud noises are permitted in the vicinity of the tanks or raceways: air compressors, loading docks, air guns, machinery, *etc*	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

22 – WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be between 11-15 ºC for egg hatching and below 18 ºC for larval rearing.	Important	Regular records of temperature.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish veterinarian or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have access to one regularly.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plan.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments of feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	**Requirement**	**Level**	**Parameters and information**	**Y/N**	**Comments**
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact on fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only or/and thrown.	Important	Records, documents, videos or on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected upon each use and replaced when damaged. Their design must not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

66 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	The use of vaccines is encouraged for the prevention of disease, rather than relying on treatment.	Important	Records, documents, SOP, on-site observation.		
6.2	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		

6.3	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		
6.4	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.5	There must be back-up systems and contingency plans in place in order to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

67 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation. (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or causing stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation. (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all times.	Important	Records, SOP, documents.		

7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

68 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		

8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		
8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems.	Important	Records, documents.		

8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

69 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, must always be < 50 degree days but special monitoring must be performed as this species is highly sensitive to starvation.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate, feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

70 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, on-site observation.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale.	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point. Recommended oxygen saturation for Beluga sturgeon: > 70%.	Important	Records, documents, videos, on-site measurements.		

Z1 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using overdose of anesthetic.	Important	Documents, on-site observations.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Documents.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviour (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated in order to identify the cause of the issue and prevent reocccurence by implementing effective prevention strategies.	Important	on-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	on-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins. of observation (minimum).	Important	on-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviour should be absent in 5 consecutive mins. of observation (minimum).	Important	on-site observation.		
12.7	Anticipatory behaviour must be apparent prior to feeding routines.	Important	on-site observation.		
12.8	If individual observation is possible in detail, ventilatory activity should be normal (50-70 opercular beats per min. (bpm)); hyperventilation (>90 bpm) should be absent at all times. Abnormal values must be reported to the welfare specialist.	Important	on-site observation.		
12.9	Swimming activity should be regular, without major or sudden changes.	Important	on-site observation.		

12.10	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Important	on-site observation		
12.11	Farmers should be aware of, and consider the use of, new technology that improves the welfare of fish.	Recommended			
12.12	Farmers should have access to reliable and relevant information on fish welfare.	Recommended			
12.13	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, *i.e*. an internal evaluation based on welfare indicators.	Important	On-site observation		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 3 Animal Health and Welfare and Section 12 Welfare Assessment). Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the water immediately. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate their proficiency in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease.	Important			

14- BROODSTOCK AND EGGS

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Density of spawners must be kept < 25kg/m^3 for overwintering (stocking during winter conditions prior to spawning).	Important			
14.2	Tank sizes must be > 5m^3 and > 1m deep, rounded or avoiding angles and contain structural enrichment, provided that it does not hinder fish swimming activities or tank cleaning operations.	Important			
14.3	Environmental parameters (temperature and photoperiod) of broodstock tanks should follow the natural rhythms for overwintering.	Important	Records, documents.		
14.4	Natural spawning methods, *i.e.* without handling or manipulation, should be implemented. In the absence of such, all handling procedures (*e.g.* stripping) must be performed under anesthesia by a trained staff member or team.	Important	Records, documents.		
14.5	Developing eggs may be mantained in dim light or darkness to reduce mortality and must not be handled after placement for 40-45 degree days (e.g. 4 days at 10º C).	Important	Records, documents.		

ON-GROWING REQUIREMENTS

11 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimising fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the fish.	Important	Absence of dangerous protrusions.		
1.3	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly and records must be ready for inspection.	Important	Good overall condition of nets and infrastructures. Records of periodicity and methods as assessment.		
1.4	Farm design should be such that inspection of all stock is possible.	Important	Water visibility, ROVs, divers, cameras etc.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist advice. Maximum range: 8:16 to 16:8 L:D	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Production units must be of adequate depth to prevent damage from ultraviolet radiation or shade must be provided if considered appropriate.	Important	Depth of net-pen.		

1.7	Additional lighting, either fixed or portable, must be available, but only should be switched on to allow examination of the animals and equipment.	Important	Stock inspection at all times.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. No loud noises are permitted in the vicinity of the tanks or raceways: air compressors, loading docks, air guns, machinery, *etc*.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

2– WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be below 20˚C.	Important	Regular records of temperature.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish vet or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have regular access to one.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plans.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are carried out according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments to feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact to fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only and/or thrown.	Important	Records, documents, videos, on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected after use and replaced when damaged. Their design must be as to not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

66 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		
6.2	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		

6.3	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.4	There must be back-up systems and contingency plans in place to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

67 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary, *e.g.* before vaccination, to avoid cannibalism or before slaughtering.	Important	Records, documents, SOP, on-site observation (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or cause stress to the fish (*e.g*. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all time.	Important	Records, SOP, documents.		
7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, on-site observation (grading system).		

68 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max. 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		
8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		

8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems	Important	Records, documents.		
8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

69 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, must always be < 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

70 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, observation on site.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (the critical point will vary between species and with environmental factors). Critical level for Beluga sturgeon: 60%.	Important	Records, documents, videos, on-site measurements.		

71 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using an overdose of anesthetic.	Important	Documents, on-site observation.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Records, documents, on-site observation, training.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm, schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviours (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 13 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated to identify the cause of the issue and be prevented from reoccuring by implementing effective prevention strategies.	Important	On-site observation.		

12.4	Fish should be shoaling or schooling (*i.e.* group swimming with polarized orientation)	Important	On-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviours should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.7	Anticipatory behaviour must appear prior to feeding routines.	Important	On-site observation.		
12.8	Swimming activity should be regular, without major or sudden changes.	Important	On-site observation.		

12.9	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Recommended			
12.10	Farmers should be aware of, and consider, the use of new technology that improves the welfare of fish.	Recommended			
12.11	Farmers should have access to reliable and relevant information on fish welfare.	Important	On-site observation.		
12.12	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, *i.e.* an internal evaluation based on welfare indicators.	Important	On-site observation.		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators. Limit stocking to below 15 kg/m^3 max. Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the production units. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate that they received training and that they are proficient in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease (see Section 12 Welfare Assessment).	Important			

14- HARVESTING, STUNNING AND SLAUGHTER

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Harvesting can only be performed using fish pumps. The dimensions of pumps and tubes must be scaled to the operation and approved by an engineer. The maximum flow rate should be 3m/s.	Important during the transition period, after must be IMPORTANT	Documents, videos, on-site observation.		
14.2	The only permitted stunning and subsequent killing methods are: a) an effectively applied percussive blow, b) electronarcosis followed by bleeding, asphyxia or other slaughter method that must be applied while the fish are unconscious, c) electrocution (*i.e.* killing by electrical current).	Important during the transition period, after must be IMPORTANT	Documents, videos, on-site observation.		
14.3	A backup system *e.g.* 'priest' must be available throughout the killing process.	Important	Documents, videos, on-site observation.		
14.4	Any fish which fall to the ground during the process must be humanely killed with the main or back up system.	Important	Documents, videos, on-site observation.		

14.5	External damage such as scale loss, fin erosion, predator bites, lesions resulting from aggression, handling scares, parasite lesions and deformities must be noted at slaughter or upon arrival to the processing station.	Important	Documents, videos, on-site observation.		
14.6	All staff involved with the stunning and killing process must have received full training.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.7	There must be a named person responsible for fish welfare throughout the killing process. This person is responsible for harvest records including stunning and slaughtering efficiency.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.8	A written procedure for fish humane stunning and slaughtering (see Section 14.1 to 14.4 Harvesting, stunning and slaughter) must be in place and carried out all time.	Important	Documents, videos, on-site observation.		
14.9	Video recordings of harvesting, stunning and slaughtering must be performed regularly (once per month or every time there is any change in protocols).	Important	Documents, videos, on-site observation.		

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HATCHERY REQUIREMENTS

23 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimizing fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the larvae and young.	Important	Absence of dangerous protrusions.		
1.3	Back-up power generators must exist, must be functional and must be ready to support essential equipment in case of a power failure. Generators should be tested and maintained weekly.	Important	Records, documents generator test.		
1.4	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly.	Important	Good overall condition of tanks and equipment. e.g. hand nets.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis matching natural limits and using practical experience, research and welfare specialist advice. Photoperiod optimum range:	Important	Facility allocated within the natural photoperiod and geographical range of the species.		

	12L:12D-10L:14D, Light intensity for juveniles: 600-1400 lux.				
1.6	Additional lighting either fixed or portable must be available, but only should be switched to allow examination of the animals and equipment.	Important	Stock inspection all times.		
1.7	Any pest control substances or equipment must be enclosed in a secure location, so there is no risk of water contamination or accidental access by non-target species.	Important	There must be a system of regular documented monitoring these baits points and recording results.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. The maximum sound pressure level should be under 150 dB re 1 µPa rms in the 0.1-3kHz frequency range in any point of the tank at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

24 – WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		

2.2	Temperature should be verifiable at all times, and must be between 10 and 35º C.	Important	Regular records of temperature.		
2.3	Oxygen levels must be verifiable at all times, and must be > 70% oxygen saturation or above 5 mg/L.	Important	Regular records of oxygen.		
2.4	Salinity levels must be verifiable at all times, and must be between 20-40 psu.	Important	Regular records of salinity.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish veterinarian or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have access to one regularly.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plan.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments of feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding, and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact on fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only or/and thrown.	Important	Records, documents, videos or on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected upon each use and replaced when damaged. Their design must not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

72 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	The use of vaccines is encouraged for the prevention of disease, rather than relying on treatment.	Important	Records, documents, SOP, on-site observation.		
6.2	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		

6.3	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		
6.4	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.5	There must be back-up systems and contingency plans in place in order to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

73 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation. (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or causing stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation. (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all times.	Important	Records, SOP, documents.		

7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		
7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, observation on site (grading system).		

74 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		

8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		
8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems.	Important	Records, documents.		

8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

75 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, this must always be $\leq$ 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate, feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

76 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, on-site observation.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale.	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (Recommended oxygen saturation > 70%).	Important	Records, documents, videos, on-site measurements.		

77 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using overdose of anesthetic.	Important	Documents, on-site observations.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Documents.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviour (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated in order to identify the cause of the issue and prevent reocccurence by implementing effective prevention strategies.	Important	on-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	on-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum)	Important	on-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviour should be absent in 5 consecutive mins of observation (minimum)	Important	on-site observation.		
12.7	Anticipatory behaviour must be apparent prior to feeding routines	Important	on-site observation.		
12.8	If individual observation is possible in detail, ventilatory activity should be normal (50-70 opercular beats per min. (bpm)); hyperventilation (>90 bpm) should be absent at all times. Abnormal values must be reported to the welfare specialist.	Important	on-site observation.		
12.9	Swimming activity should be regular, without major or sudden changes.	Important	on-site observation.		

12.10	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Important	on-site observation		
12.11	Farmers should be aware of, and consider the use of, new technology that improves the welfare of fish.	Recommended			
12.12	Farmers should have access to reliable and relevant information on fish welfare.	Recommended			
12.13	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 3 Animal Health and Welfare and Section 12 Welfare Assessment). Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the water immediately. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate their proficiency in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease.	Important			

14- BROODSTOCK AND EGGS

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Stocking of broodstock should match the natural sex ratio of the species (1M:1-2F).	Important	Records, documents.		
14.2	Density of spawners must be kept <2kg/m^3 both for stocking and spawning.	Important			
14.3	Tank sizes must be > 5m^3 and > 1m deep, rounded or avoiding angles and contain structural enrichment, provided that it does not hinder fish swimming activities or tank cleaning operations.	Important			
14.4	Environmental parameters (temperature and photoperiod) of broodstock tanks should follow the natural rhythms, variation and ranges as the original habitat. Natural temperature range: 15-35 º C, optimum during spawning: 20-25º C. Optimum salinity range: 20-40 psu. Lighting period should match with natural distribution range, 12L:12D-10L:14D.	Important	Records, documents.		
14.5	Natural spawning methods, i.e. without handling or manipulation, should be implemented. In the absence of such, all handling procedures (e.g. stripping) must be performed under anesthesia by a trained staff member or team.	Important	Records, documents.		

14.6	Developing eggs may be mantained in dim light or darkness to reduce mortality and must not be handled after placement for 40-45 degree days (about 2 days at 19-20 º C).	Important	Records, documents.		

ON-GROWING REQUIREMENTS

12 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimising fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the fish.	Important	Absence of dangerous protrusions.		
1.3	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly and records must be ready for inspection.	Important	Good overall condition of nets and infrastructures. Records of periodicity and methods as assessment.		
1.4	Farm design should be such that inspection of all stock is possible.	Important	Water visibility, ROVs, divers, cameras etc.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis matching natural limits and using practical experience, research and welfare specialist advice. Photoperiod optimum range: 12L:12D-10L:14D.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Production units must be of adequate depth to prevent damage from ultraviolet radiation (> 45 cm) or shadows must be provided if considered appropriate.	Important	Depth of net-pen.		

1.7	Additional lighting, either fixed or portable, must be available, but only should be switched on to allow examination of the animals and equipment.	Important	Stock inspection at all times.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. The maximum sound pressure level should be under 150 dB re 1 µPa rms in the 0.1-3kHz frequency range in any point of the tank at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

2– WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be between 10 and 35º C.	Important	Regular records of temperature.		

2.3	Oxygen levels must be verifiable at all times, and must be > 70% oxygen saturation or above 5 mg/L	Important	Regular records of oxygen.		
2.4	Salinity levels must be verifiable at all times, and must be between 20-40 psu.	Important	Regular records of salinity.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish vet or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have regular access to one.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plans.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are carried out according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments to feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact to fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only and/or thrown.	Important	Records, documents, videos, on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected after use and replaced when damaged. Their design must be as to not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

Z2 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		
6.2	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		

6.3	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.4	There must be back-up systems and contingency plans in place to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

73 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or cause stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all time.	Important	Records, SOP, documents.		
7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, on-site observation (grading system).		

74 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		
8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		

8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems	Important	Records, documents.		
8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

75 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, must always be < 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

76 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, observation on site.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (the critical point will vary between species and with environmental factors). (Recommended oxygen saturation > 70%).	Important	Records, documents, videos, on-site measurements.		

ZZ - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using an overdose of anesthetic.	Important	Documents, on-site observation.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Records, documents, on-site observation, training.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm, schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviours (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated to identify the cause of the issue and be prevented from reoccuring by implementing effective prevention strategies.	Important	On-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	On-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviours should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.7	Anticipatory behaviour must appear prior to feeding routines.	Important	On-site observation.		
12.8	Swimming activity should be regular, without major or sudden changes.	Important	On-site observation.		

12.9	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Recommended			
12.10	Farmers should be aware of, and consider, the use of new technology that improves the welfare of fish.	Recommended			
12.11	Farmers should have access to reliable and relevant information on fish welfare.	Important	On-site observation.		
12.12	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation.		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 12 Welfare Assessment). Limit stocking to 20 kg/m^3 max. Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the production units. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate that they received training and that they are proficient in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease (see Section 12 Welfare Assessment).	Important			

14- HARVESTING, STUNNING AND SLAUGHTER

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Harvesting can only be performed using fish pumps. The dimensions of pumps and tubes must be scaled to the operation and approved by an engineer. The maximum flow rate should be 3m/s.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.2	The only permitted stunning and subsequent killing methods are: a) an effectively applied percussive blow, b) electronarcosis followed by bleeding, asphyxia or other slaughter method that must be applied while the fish are unconscious, c) electrocution (i.e. killing by electrical current).	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.3	A backup system e.g. 'priest' must be available throughout the killing process.	Important	Documents, videos, on-site observation.		
14.4	Any fish which fall to the ground during the process must be humanely killed with the main or back up system.	Important	Documents, videos, on-site observation.		

14.5	External damage such as scale loss, fin erosion, predator bites, lesions resulting from aggression, handling scares, parasite lesions and deformities must be noted at slaughter or upon arrival to the processing station.	Important	Documents, videos, on-site observation.		
14.6	All staff involved with the stunning and killing process must have received full training.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.7	There must be a named person responsible for fish welfare throughout the killing process. This person is responsible for harvest records including stunning and slaughtering efficiency.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.8	A written procedure for fish humane stunning and slaughtering (see Section 14.1 – 4 Harvesting, stunning and slaughter) must be in place and carried out all time.	Important	Documents, videos, on-site observation.		
14.9	Video recordings of harvesting, stunning and slaughtering must be performed regularly (once per month or every time there is any change in protocols)	Important	Documents, videos, on-site observation.		

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HATCHERY REQUIREMENTS

25 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimizing fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the larvae and young.	Important	Absence of dangerous protrusions.		
1.3	Back-up power generators must exist, must be functional and must be ready to support essential equipment in case of a power failure. Generators should be tested and maintained weekly.	Important	Records, documents generator test.		
1.4	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly.	Important	Good overall condition of tanks and equipment. e.g. hand nets.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis matching natural limits and using practical experience, research and welfare specialist advice. Photoperiod optimum range:	Important	Facility allocated within the natural photoperiod and geographical range of the species.		

	12L:12D-10L:14D, Light intensity for juveniles: 600-1400 lux.				
1.6	Additional lighting either fixed or portable must be available, but only should be switched to allow examination of the animals and equipment.	Important	Stock inspection all times.		
1.7	Any pest control substances or equipment must be enclosed in a secure location, so there is no risk of water contamination or accidental access by non-target species.	Important	There must be a system of regular documented monitoring these baits points and recording results.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. The maximum sound pressure level should be under 150 dB re 1 µPa rms in the 0.1-3kHz frequency range in any point of the tank at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

26 – WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		

2.2	Temperature should be verifiable at all times and must be between 10 and 34º C.	Important	Regular records of temperature.		
2.3	Oxygen levels must be verifiable at all times, and must be > 70% oxygen saturation or above 5 mg/L.	Important	Regular records of oxygen.		
2.4	Salinity levels must be verifiable at all times and must be between 20-40 psu.	Important	Regular records of salinity.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish veterinarian or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have access to one regularly.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plan.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments of feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	**Requirement**	**Level**	**Parameters and information**	**Y/N**	**Comments**
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact on fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only or/and thrown.	Important	Records, documents, videos or on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected upon each use and replaced when damaged. Their design must not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

78 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	The use of vaccines is encouraged for the prevention of disease, rather than relying on treatment.	Important	Records, documents, SOP, on-site observation.		
6.2	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		

6.3	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		
6.4	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.5	There must be back-up systems and contingency plans in place in order to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

79 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation. (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or causing stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation. (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all times.	Important	Records, SOP, documents.		

7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

80 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		

8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		
8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems.	Important	Records, documents.		

8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

81 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, this must always be $\leq$ 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate, feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

82 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, on-site observation.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale.	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (Recommended oxygen saturation > 70%).	Important	Records, documents, videos, on-site measurements.		

83 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using overdose of anesthetic.	Important	Documents, on-site observations.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Documents.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviour (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated in order to identify the cause of the issue and prevent reocccurence by implementing effective prevention strategies.	Important	on-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	on-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum)	Important	on-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviour should be absent in 5 consecutive mins of observation (minimum)	Important	on-site observation.		
12.7	Anticipatory behaviour must be apparent prior to feeding routines	Important	on-site observation.		
12.8	If individual observation is possible in detail, ventilatory activity should be normal (50-70 opercular beats per min. (bpm)); hyperventilation (>90 bpm) should be absent at all times. Abnormal values must be reported to the welfare specialist.	Important	on-site observation.		
12.9	Swimming activity should be regular, without major or sudden changes.	Important	on-site observation.		

12.10	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Important	on-site observation		
12.11	Farmers should be aware of, and consider the use of, new technology that improves the welfare of fish.	Recommended			
12.12	Farmers should have access to reliable and relevant information on fish welfare.	Recommended			
12.13	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 3 Animal Health and Welfare and Section 12 Welfare Assessment). Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the water immediately. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate their proficiency in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease.	Important			

14- BROODSTOCK AND EGGS

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Stocking of broodstock should match the natural sex ratio of the species (1M:1F).	Important	Records, documents.		
14.2	Density of spawners must be kept <1kg/m^3 both for stocking and spawning.	Important			
14.3	Tank sizes must be > 5m^3 and > 1m deep, rounded or avoiding angles and contain structural enrichment, provided that it does not hinder fish swimming activities or tank cleaning operations.	Important			
14.4	Environmental parameters (temperature and photoperiod) of broodstock tanks should follow the natural rhythms, variation and ranges as the original habitat. Natural temperature range: 15-35 º C, optimum during spawning: 20-25º C. Optimum salinity range: 20-40 psu, optimum during spawning.	Important	Records, documents.		
14.5	Natural spawning methods, i.e. without handling or manipulation, should be implemented. In the absence of such, all handling procedures (e.g. stripping) must be performed under anesthesia by a trained staff member or team.	Important	Records, documents.		

14.6	Developing eggs may be maintained in dim light or darkness to reduce mortality and must not be handled after placement for 40-45 degree days (about 2 days at 19-20 º C).	Important	Records, documents.		

ON-GROWING REQUIREMENTS

13 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimising fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the fish.	Important	Absence of dangerous protrusions.		
1.3	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly and records must be ready for inspection.	Important	Good overall condition of nets and infrastructures. Records of periodicity and methods as assessment.		
1.4	Farm design should be such that inspection of all stock is possible.	Important	Water visibility, ROVs, divers, cameras etc.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis matching natural limits and using practical experience, research and welfare specialist advice. Photoperiod optimum range: 12L:12D-10L:14D.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Production units must be of adequate depth to prevent damage from ultraviolet radiation (> 45 cm) or shadows must be provided if considered appropriate.	Important	Depth of net-pen.		

1.7	Additional lighting, either fixed or portable, must be available, but only should be switched on to allow examination of the animals and equipment.	Important	Stock inspection at all times.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. The maximum sound pressure level should be under 150 dB re 1 µPa rms in the 0.1-3kHz frequency range in any point of the tank at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

2– WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be between 10 and 34º C.	Important	Regular records of temperature.		

2.3	Oxygen levels must be verifiable at all times, and must be > 70% oxygen saturation or above 5 mg/L.	Important	Regular records of oxygen.		
2.4	Salinity levels must be verifiable at all times and must be between 20-40 psu.	Important	Regular records of salinity.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish vet or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have regular access to one.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plans.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are carried out according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments to feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact to fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only and/or thrown.	Important	Records, documents, videos, on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected after use and replaced when damaged. Their design must be as to not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

78 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		
6.2	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		

6.3	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.4	There must be back-up systems and contingency plans in place to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

79 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or cause stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all time.	Important	Records, SOP, documents.		
7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, on-site observation (grading system).		

80 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		
8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		

8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems	Important	Records, documents.		
8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

81 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, must always be < 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

82 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, observation on site.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (the critical point will vary between species and with environmental factors). (Recommended oxygen saturation > 70%).	Important	Records, documents, videos, on-site measurements.		

83 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using an overdose of anesthetic.	Important	Documents, on-site observation.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Records, documents, on-site observation, training.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm, schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviours (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated to identify the cause of the issue and be prevented from reoccuring by implementing effective prevention strategies.	Important	On-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	On-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviours should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.7	Anticipatory behaviour must appear prior to feeding routines.	Important	On-site observation.		
12.8	Swimming activity should be regular, without major or sudden changes.	Important	On-site observation.		

12.9	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Recommended			
12.10	Farmers should be aware of, and consider, the use of new technology that improves the welfare of fish.	Recommended			
12.11	Farmers should have access to reliable and relevant information on fish welfare.	Important	On-site observation.		
12.12	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation.		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 12 Welfare Assessment). Limit stocking to 20 kg/m^3 max. Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the production units. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate that they received training and that they are proficient in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease (see Section 12 Welfare Assessment).	Important			

14- HARVESTING, STUNNING AND SLAUGHTER

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Harvesting can only be performed using fish pumps. The dimensions of pumps and tubes must be scaled to the operation and approved by an engineer. The maximum flow rate should be 3m/s.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.2	The only permitted stunning and subsequent killing methods are: a) an effectively applied percussive blow, b) electronarcosis followed by bleeding, asphyxia or other slaughter method that must be applied while the fish are unconscious, c) electrocution (i.e. killing by electrical current).	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.3	A backup system e.g. 'priest' must be available throughout the killing process.	Important	Documents, videos, on-site observation.		
14.4	Any fish which fall to the ground during the process must be humanely killed with the main or back up system.	Important	Documents, videos, on-site observation.		

14.5	External damage such as scale loss, fin erosion, predator bites, lesions resulting from aggression, handling scares, parasite lesions and deformities must be noted at slaughter or upon arrival to the processing station.	Important	Documents, videos, on-site observation.		
14.6	All staff involved with the stunning and killing process must have received full training.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.7	There must be a named person responsible for fish welfare throughout the killing process. This person is responsible for harvest records including stunning and slaughtering efficiency.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.8	A written procedure for fish humane stunning and slaughtering (see Section 14.1 – 4 Harvesting, stunning and slaughter) must be in place and carried out all time.	Important	Documents, videos, on-site observation.		
14.9	Video recordings of harvesting, stunning and slaughtering must be performed regularly (once per month or every time there is any change in protocols)	Important	Documents, videos, on-site observation.		

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HATCHERY REQUIREMENTS

27 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimizing fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the larvae and young.	Important	Absence of dangerous protrusions.		
1.3	Back-up power generators must exist, must be functional and must be ready to support essential equipment in case of a power failure. Generators should be tested and maintained weekly.	Important	Records, documents generator test.		
1.4	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly.	Important	Good overall condition of tanks and equipment. e.g. hand nets.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist advice. Maximum range: 12:12 to 8:16 L:D.	Important	Facility allocated within the natural photoperiod of the species.		

1.6	Additional lighting either fixed or portable must be available, but only should be switched to allow examination of the animals and equipment.	Important	Stock inspection all times.		
1.7	Any pest control substances or equipment must be enclosed in a secure location, so there is no risk of water contamination or accidental access by non-target species.	Important	There must be a system of regular documented monitoring these baits points and recording results.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. The maximum sound pressure level should be under 150 dB re 1 µPa rms in the 0.2-2kHz frequency range in any point of the tank at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

28 – WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be between 0 to 20º C, preferably below 15ºC.	Important	Regular records of temperature.		

2.3	Oxygen levels must be verifiable at all times and must be > 9 mg/L for eggs, 4 mg/L for juveniles < 15ºC, 6 mg/L > 15ºC.	Important	Regular records of oxygen.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish veterinarian or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have access to one regularly.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plan.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments of feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding, and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact on fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only or/and thrown.	Important	Records, documents, videos or on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected upon each use and replaced when damaged. Their design must not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

84 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	The use of vaccines is encouraged for the prevention of disease, rather than relying on treatment.	Important	Records, documents, SOP, on-site observation.		
6.2	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		

6.3	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		
6.4	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.5	There must be back-up systems and contingency plans in place in order to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

85 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation. (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or causing stress to the fish (e.g. absence of protrusions to avoid injuries, never emerged).	Important	Records, documents, on-site observation. (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all times.	Important	Records, SOP, documents.		

7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

86 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		

8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		
8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems.	Important	Records, documents.		

8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

87 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, this must always be $\leq$ 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate, feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

88 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, on-site observation.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale.	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (the critical point will vary between species and with environmental factors). Critical level for Rainbow trout: > 9 mg/L for eggs, 4 mg/L for juveniles < 15º C, 6 mg/L > 15º C.	Important	Records, documents, videos, on-site measurements.		

89 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using overdose of anesthetic.	Important	Documents, on-site observations.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Documents.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviour (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated in order to identify the cause of the issue and prevent reocccurence by implementing effective prevention strategies.	Important	on-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	on-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum)	Important	on-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviour should be absent in 5 consecutive mins of observation (minimum)	Important	on-site observation.		
12.7	Anticipatory behaviour must be apparent prior to feeding routines	Important	on-site observation.		
12.8	If individual observation is possible in detail, ventilatory activity should be normal (50-70 opercular beats per min. (bpm)); hyperventilation (>90 bpm) should be absent at all times. Abnormal values must be reported to the welfare specialist.	Important	on-site observation.		
12.9	Swimming activity should be regular, without major or sudden changes.	Important	on-site observation.		

12.10	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Important	on-site observation		
12.11	Farmers should be aware of, and consider the use of, new technology that improves the welfare of fish.	Recommended			
12.12	Farmers should have access to reliable and relevant information on fish welfare.	Recommended			
12.13	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important			

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 3 Animal Health and Welfare and Section 12 Welfare Assessment). Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the water immediately. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate their proficiency in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease.	Important			

14- BROODSTOCK AND EGGS

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Density of spawners must be kept <10kg/m3 for stocking.	Important			
14.2	Tank sizes must be > $5m^3$ and > 1m deep, rounded or avoiding angles and contain structural enrichment, provided that it does not hinder fish swimming activities or tank cleaning operations.	Important			
14.3	Environmental parameters (temperature and photoperiod) of broodstock tanks should follow the natural rhythms, variations and ranges as their original habitat.	Important	Records, documents.		
14.4	Natural spawning methods, i.e. without handling or manipulation should be implemented. In the absence of such, all handling procedures (e.g. stripping) must be performed under anaesthesia by a trained staff member or team.	Important	Records, documents.		

14.5	Developing eggs may be maintained in dim light or darkness to reduce mortality and must not be handled after placement for 40-45 degree days (e.g. 4 days at 10º C).	Important	Records, documents.		

ON-GROWING REQUIREMENTS

14 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimising fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the fish.	Important	Absence of dangerous protrusions.		
1.3	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly and records must be ready for inspection.	Important	Good overall condition of nets and infrastructures. Records of periodicity and methods as assessment.		
1.4	Farm design should be such that inspection of all stock is possible.	Important	Water visibility, ROVs, divers, cameras etc.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist advice. Maximum range: 8:16 to 16:8 L:D.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Production units must be of adequate depth to prevent damage from ultraviolet radiation or shade must be provided if considered appropriate.	Important	Depth of net-pen.		

1.7	Additional lighting, either fixed or portable, must be available, but only should be switched on to allow examination of the animals and equipment.	Important	Stock inspection at all times.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The rearing facilities should be located in a site protected from human induced noise. The maximum sound pressure level should be under 150 dB re 1 µPa rms in the 0.2-2kHz frequency range in any point of the tank at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

2– WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be between 0 to 20º C.	Important	Regular records of temperature.		

2.3	Oxygen levels must be verifiable at all times, and must be for > 4 mg/L for juveniles < 15ºC, 6 mg/L > 15º C.	Important	Regular records of oxygen.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish vet or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have regular access to one.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plans.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are carried out according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments to feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact to fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only and/or thrown.	Important	Records, documents, videos, on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected after use and replaced when damaged. Their design must be as to not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

84 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		
6.2	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		

6.3	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.4	There must be back-up systems and contingency plans in place to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

85 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or cause stress to the fish (e.g. absence of protrusions to avoid injuries, never emerged).	Important	Records, documents, on-site observation (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all time.	Important	Records, SOP, documents.		
7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, on-site observation (grading system).		

86 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		
8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		

8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems	Important	Records, documents.		
8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see section 9 Starvation).	Important	Records, documents.		

87 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, must always be < 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

88 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, observation on site.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (the critical point will vary between species and with environmental factors). Critical level for Rainbow trout: 4 mg/L < 15º C, 6 mg/L > 15º C.	Important	Records, documents, videos, on-site measurements.		

89 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using an overdose of anesthetic.	Important	Documents, on-site observation.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Records, documents, on-site observation, training.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm, schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviours (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated to identify the cause of the issue and be prevented from reoccuring by implementing effective prevention strategies.	Important	On-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	On-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviours should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.7	Anticipatory behaviour must appear prior to feeding routines.	Important	On-site observation.		
12.8	Swimming activity should be regular, without major or sudden changes.	Important	On-site observation.		

12.9	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Recommended			
12.10	Farmers should be aware of, and consider, the use of new technology that improves the welfare of fish.	Recommended			
12.11	Farmers should have access to reliable and relevant information on fish welfare.	Important	On-site observation.		
12.12	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation.		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators. Density must be above 10 kg/m^3 and below 60 kg/m^3. Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the production units. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate that they received training and that they are proficient in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease (see Section 12 Welfare Assessment).	Important			

14- HARVESTING, STUNNING AND SLAUGHTER

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Harvesting can only be performed using fish pumps. The dimensions of pumps and tubes must be scaled to the operation and approved by an engineer. The maximum flow rate should be 3m/s.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.2	The only permitted stunning and subsequent killing methods are: a) an effectively applied percussive blow, b) electronarcosis followed by bleeding, asphyxia or other slaughter method that must be applied while the fish unconscious, c) electrocution (i.e. killing by electrical current).	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.3	A backup system e.g. 'priest' must be available throughout the killing process.	Important	Documents, videos, on-site observation.		
14.4	Any fish which fall to the ground during the process must be humanely killed with the main or back up system.	Important	Documents, videos, on-site observation.		

14.5	External damage such as scale loss, fin erosion, predator bites, lesions resulting from aggression, handling scares, parasite lesions and deformities must be noted at slaughter or upon arrival to the processing station.	Important	Documents, videos, on-site observation.		
14.6	All staff involved with the stunning and killing process must have received full training.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.7	There must be a named person responsible for fish welfare throughout the killing process. This person is responsible for harvest records including stunning and slaughtering efficiency.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.8	A written procedure for fish humane stunning and slaughtering (see Section 14.1 – 4 Harvesting, stunning and slaughter) must be in place and carried out all time.	Important	Documents, videos, on-site observation.		
14.9	Video recordings of harvesting, stunning and slaughtering must be performed regularly (once per month or every time there is any change in protocols)	Important	Documents, videos, on-site observation.		

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HATCHERY REQUIREMENTS

29 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimizing fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the larvae and young.	Important	Absence of dangerous protrusions.		
1.3	Back-up power generators must exist, must be functional and must be ready to support essential equipment in case of a power failure. Generators should be tested and maintained weekly.	Important	Records, documents generator test.		
1.4	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly.	Important	Good overall condition of tanks and equipment. e.g. hand nets.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis, matching natural limits and using practical experience, research and welfare specialist advice. Subtropical photoperiod max. range:	Important	Facility allocated within the natural photoperiod and geographical range of the species.		

	14L:10D-10L:14D.				
1.6	Additional lighting either fixed or portable must be available, but only should be switched to allow examination of the animals and equipment.	Important	Stock inspection all times.		
1.7	Any pest control substances or equipment must be enclosed in a secure location, so there is no risk of water contamination or accidental access by non-target species.	Important	There must be a system of regular documented monitoring these baits points and recording results.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. The maximum sound pressure level should be under 128 dB re 1 µPa rms in the 0.1-3kHz frequency range in any point of the cage at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

30 – WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		

2.2	Temperature should be verifiable at all times, and must be between 17 and 32º C.	Important	Regular records of temperature.		
2.3	Oxygen levels must be verifiable at all times and must be > 70% oxygen saturation.	Important	Regular records of oxygen.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish veterinarian or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have access to one regularly.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plan.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments of feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	**Requirement**	**Level**	**Parameters and information**	**Y/N**	**Comments**
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact on fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only or/and thrown.	Important	Records, documents, videos or on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected upon each use and replaced when damaged. Their design must not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

90 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	The use of vaccines is encouraged for the prevention of disease, rather than relying on treatment.	Important	Records, documents, SOP, on-site observation.		
6.2	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		

6.3	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		
6.4	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.5	There must be back-up systems and contingency plans in place in order to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

91 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation. (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or causing stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation. (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all times.	Important	Records, SOP, documents.		

7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		
7.5	If passive grading is used, the size and design of the grading panels must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, observation on site (grading system)		

92 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		

8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		
8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems.	Important	Records, documents.		

8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

93 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, must always be < 50 degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate, feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

94 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, on-site observation.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale.	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point. Recommended oxygen saturation for Cobia: > 70%.	Important	Records, documents, videos, on-site measurements.		

95 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using overdose of anesthetic.	Important	Documents, on-site observations.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Documents.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviour (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated in order to identify the cause of the issue and prevent reocccurence by implementing effective prevention strategies.	Important	on-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	on-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins. of observation (minimum).	Important	on-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviour should be absent in 5 consecutive mins. of observation (minimum).	Important	on-site observation.		
12.7	Anticipatory behaviour must be apparent prior to feeding routines.	Important	on-site observation.		
12.8	If individual observation is possible in detail, ventilatory activity should be normal (50-70 opercular beats per min. (bpm)); hyperventilation (>90 bpm) should be absent at all times. Abnormal values must be reported to the welfare specialist.	Important	on-site observation.		
12.9	Swimming activity should be regular, without major or sudden changes.	Important	on-site observation.		

12.10	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Important	on-site observation		
12.11	Farmers should be aware of, and consider the use of, new technology that improves the welfare of fish.	Recommended			
12.12	Farmers should have access to reliable and relevant information on fish welfare.	Recommended			
12.13	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, *i.e*. an internal evaluation based on welfare indicators.	Important	On-site observation		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 3 Animal Health and Welfare and Section 12 Welfare Assessment). Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the water immediately. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate their proficiency in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease.	Important			

14- BROODSTOCK AND EGGS

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Stocking of broodstock should match the natural sex ratio of the species (1M: 1-2.5F).	Important	Records, documents.		
14.2	Density of spawners must be kept <2kg/m3 for spawning.	Important			
14.3	Tank sizes must be > $5m^3$ and > 5m deep, rounded or avoiding angles and contain structural enrichment, provided that it does not hinder fish swimming activities or tank cleaning operations.	Important			
14.4	Environmental parameters (temperature and photoperiod) of broodstock tanks should follow the natural rhythms for overwintering.	Important	Records, documents.		
14.5	Natural spawning methods, *i.e.* without handling or manipulation, should be implemented. In the absence of such, all handling procedures (*e.g.* stripping) must be performed under anesthesia by a trained staff member or team.	Important	Records, documents.		

14.6	Developing eggs may be maintained in dim light or darkness to reduce mortality and must not be handled after placement for 40-45 degree days (about 2 days at 19-20°C).	Important	Records, documents.		

ON-GROWING REQUIREMENTS

15 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimising fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the fish.	Important	Absence of dangerous protrusions.		
1.3	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly and records must be ready for inspection.	Important	Good overall condition of nets and infrastructures. Records of periodicity and methods as assessment.		
1.4	Farm design should be such that inspection of all stock is possible.	Important	Water visibility, ROVs, divers, cameras etc.		

1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis, matching natural limits and using practical experience, research and welfare specialist advice. Subtropical photoperiod max. range: 14L:10D-10L:14D.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Production units must be of adequate depth to prevent damage from ultraviolet radiation or shade must be provided if considered appropriate.	Important	Depth of net-pen.		
1.7	Additional lighting, either fixed or portable, must be available, but only should be switched on to allow examination of the animals and equipment.	Important	Stock inspection at all times.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The cages should be located in a site protected from human induced noise. The maximum sound pressure level should be under 128 dB re 1 µPa rms in the 0.1-3kHz frequency range in any point of the cage at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

2– WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments

2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be between 17 and 32º C	Important	Regular records of temperature.		
2.3	Oxygen levels must be verifiable at all times, and must be > 70% oxygen saturation.	Important	Regular records of oxygen.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish vet or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have regular access to one.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plans.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are carried out according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments to feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact to fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only and/or thrown.	Important	Records, documents, videos, on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected after use and replaced when damaged. Their design must be as to not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

90 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		
6.2	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		

6.3	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.4	There must be back-up systems and contingency plans in place to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

91 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary, *e.g.* before vaccination, to avoid cannibalism or before slaughtering.	Important	Records, documents, SOP, on-site observation (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or cause stress to the fish (*e.g*. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all time.	Important	Records, SOP, documents.		
7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, on-site observation (grading system).		

92 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max. 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		
8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		

8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems	Important	Records, documents.		
8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

93 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, must always be < 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

94 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, observation on site.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (the critical point will vary between species and with environmental factors). Critical level for Cobia: > 6 mg/L.	Important	Records, documents, videos, on-site measurements.		

95 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using an overdose of anesthetic.	Important	Documents, on-site observation.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Records, documents, on-site observation, training.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm, schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviours (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 13 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated to identify the cause of the issue and be prevented from reoccuring by implementing effective prevention strategies.	Important	On-site observation.		

12.4	Fish should be shoaling or schooling (*i.e.* group swimming with polarized orientation)	Important	On-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviours should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.7	Anticipatory behaviour must appear prior to feeding routines.	Important	On-site observation.		
12.8	Swimming activity should be regular, without major or sudden changes.	Important	On-site observation.		

12.9	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Recommended			
12.10	Farmers should be aware of, and consider, the use of new technology that improves the welfare of fish.	Recommended			
12.11	Farmers should have access to reliable and relevant information on fish welfare.	Important	On-site observation.		
12.12	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, *i.e.* an internal evaluation based on welfare indicators.	Important	On-site observation.		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators. Limit stocking to 10 - 15 kg/m^3 max. Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the production units. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate that they received training and that they are proficient in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease (see Section 12 Welfare Assessment).	Important			

14- HARVESTING, STUNNING AND SLAUGHTER

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Harvesting can only be performed using fish pumps. The dimensions of pumps and tubes must be scaled to the operation and approved by an engineer. The maximum flow rate should be 3m/s.	Important during the transition period, after must be IMPORTANT	Documents, videos, on-site observation.		
14.2	The only permitted stunning and subsequent killing methods are: a) an effectively applied percussive blow, b) electronarcosis followed by bleeding, asphyxia or other slaughter method that must be applied while the fish are unconscious, c) electrocution (*i.e.* killing by electrical current).	Important during the transition period, after must be IMPORTANT	Documents, videos, on-site observation.		
14.3	A backup system *e.g.* 'priest' must be available throughout the killing process.	Important	Documents, videos, on-site observation.		
14.4	Any fish which fall to the ground during the process must be humanely killed with the main or back up system.	Important	Documents, videos, on-site observation.		

14.5	External damage such as scale loss, fin erosion, predator bites, lesions resulting from aggression, handling scares, parasite lesions and deformities must be noted at slaughter or upon arrival to the processing station.	Important	Documents, videos, on-site observation.		
14.6	All staff involved with the stunning and killing process must have received full training.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.7	There must be a named person responsible for fish welfare throughout the killing process. This person is responsible for harvest records including stunning and slaughtering efficiency.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.8	A written procedure for fish humane stunning and slaughtering (see Section 14.1 to 14.4 Harvesting, stunning and slaughter) must be in place and carried out all time.	Important	Documents, videos, on-site observation.		
14.9	Video recordings of harvesting, stunning and slaughtering must be performed regularly (once per month or every time there is any change in protocols).	Important	Documents, videos, on-site observation.		

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HATCHERY REQUIREMENTS

31 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimizing fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the larvae and young.	Important	Absence of dangerous protrusions.		
1.3	Back-up power generators must exist, must be functional and must be ready to support essential equipment in case of a power failure. Generators should be tested and maintained weekly.	Important	Records, documents generator test.		
1.4	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly.	Important	Good overall condition of tanks and equipment. e.g. hand nets.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist advice. Photoperiod max. range: 9L:16D-16L:14D.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		

1.6	Additional lighting either fixed or portable must be available, but only should be switched to allow examination of the animals and equipment.	Important	Stock inspection all times.		
1.7	Any pest control substances or equipment must be enclosed in a secure location, so there is no risk of water contamination or accidental access by non-target species.	Important	There must be a system of regular documented monitoring these baits points and recording results.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. The maximum sound pressure level should be under 150 dB re 1 µPa rms in the 0.2-2kHz frequency range in any point of the tank at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

32 – WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be between -2° C to 27° C.	Important	Regular records of temperature.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish veterinarian or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have access to one regularly.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plan.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments of feeding regimes should be based	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding, and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	**Requirement**	**Level**	**Parameters and information**	**Y/N**	**Comments**
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact on fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only or/and thrown.	Important	Records, documents, videos or on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected upon each use and replaced when damaged. Their design must not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

96 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	The use of vaccines is encouraged for the prevention of disease, rather than relying on treatment.	Important	Records, documents, SOP, on-site observation.		
6.2	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		

6.3	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		
6.4	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.5	There must be back-up systems and contingency plans in place in order to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

97 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation. (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or causing stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation. (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all times.	Important	Records, SOP, documents.		

7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

98 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		

8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		
8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems.	Important	Records, documents.		

8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

99 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, this must always be $\leq$ 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate, feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

100 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, on-site observation.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale.	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels must be monitored and corrective action must be taken if levels fall below 70-80%.	Important	Records, documents, videos, on-site measurements.		

101 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using overdose of anesthetic.	Important	Documents, on-site observations.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Documents.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviour (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated in order to identify the cause of the issue and prevent reocccurence by implementing effective prevention strategies.	Important	on-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	on-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum)	Important	on-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviour should be absent in 5 consecutive mins of observation (minimum)	Important	on-site observation.		
12.7	Anticipatory behaviour must be apparent prior to feeding routines	Important	on-site observation.		
12.8	If individual observation is possible in detail, ventilatory activity should be normal (50-70 opercular beats per min. (bpm)); hyperventilation (>90 bpm) should be absent at all times. Abnormal values must be reported to the welfare specialist.	Important	on-site observation.		
12.9	Swimming activity should be regular, without major or sudden changes.	Important	on-site observation.		

12.10	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Important	on-site observation		
12.11	Farmers should be aware of, and consider the use of, new technology that improves the welfare of fish.	Recommended			
12.12	Farmers should have access to reliable and relevant information on fish welfare.	Recommended			
12.13	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 3 Animal Health and Welfare and Section 12 Welfare Assessment). Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the water immediately. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate their proficiency in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease.	Important			

14- BROODSTOCK AND EGGS

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Stocking of broodstock should match the natural sex ratio of the species.	Important	Records, documents.		
14.2	Density of spawners must be kept <21kg/m^3 for stocking.	Important			
14.3	Tank sizes must be > 5m^3 and > 1m deep, rounded or avoiding angles and contain structural enrichment, provided that it does not hinder fish swimming activities or tank cleaning operations.	Important			
14.4	Environmental parameters (temperature and photoperiod) of broodstock tanks should follow the natural rhythms.	Important	Records, documents.		
14.5	Natural spawning methods, i.e. without handling or manipulation, should be implemented. In the absence of such, all handling procedures (e.g. stripping) must be performed under anesthesia by a trained staff member or team.	Important	Records, documents.		

14.6	Developing eggs may be maintained in dim light or darkness to reduce mortality and must not be handled after placement for 40-45 degree days (e.g. 4 days at 10º C). Deformed and dead eggs/fry should be carefully removed at least twice per week to prevent the development of fungus.	Important	Records, documents.		

ON-GROWING REQUIREMENTS

16 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimising fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the fish.	Important	Absence of dangerous protrusions.		
1.3	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly and records must be ready for inspection.	Important	Good overall condition of nets and infrastructures. Records of periodicity and methods as assessment.		
1.4	Farm design should be such that inspection of all stock is possible. Total suspended solids 15 mg/L.	Important	Water visibility, ROVs, divers, cameras etc.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist advice. Photoperiod max. range: 9L:16D-16L:14D.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Production units must be of adequate depth to prevent damage from ultraviolet radiation (> 45 cm) or shadows must be provided if considered appropriate.	Important	Depth of net-pen.		

1.7	Additional lighting, either fixed or portable, must be available, but only should be switched on to allow examination of the animals and equipment.	Important	Stock inspection at all times.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. The maximum sound pressure level should be under 150 dB re 1 µPa rms in the 0.2-2kHz frequency range in any point of the tank at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

2– WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be between -2° C to 27° C.	Important	Regular records of temperature.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish vet or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have regular access to one.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plans.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are carried out according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments to feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact to fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only and/or thrown.	Important	Records, documents, videos, on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected after use and replaced when damaged. Their design must be as to not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

96 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		
6.2	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		

6.3	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.4	There must be back-up systems and contingency plans in place to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

97 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or cause stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all time.	Important	Records, SOP, documents.		
7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, on-site observation (grading system).		

98 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		
8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		

8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems	Important	Records, documents.		
8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

99 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, must always be < 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

100 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, observation on site.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels must be monitored and corrective action must be taken if levels fall below 70-80%.	Important	Records, documents, videos, on-site measurements.		

101 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using an overdose of anesthetic.	Important	Documents, on-site observation.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Records, documents, on-site observation, training.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm, schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviours (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated to identify the cause of the issue and be prevented from reoccuring by implementing effective prevention strategies.	Important	On-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	On-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviours should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.7	Anticipatory behaviour must appear prior to feeding routines.	Important	On-site observation.		
12.8	Swimming activity should be regular, without major or sudden changes.	Important	On-site observation.		

12.9	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Recommended			
12.10	Farmers should be aware of, and consider, the use of new technology that improves the welfare of fish.	Recommended			
12.11	Farmers should have access to reliable and relevant information on fish welfare.	Important	On-site observation.		
12.12	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation.		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 12 Welfare Assessment). Density average 21 kg/m^3 best welfare according to the SWIM model (Salmon Welfare Index Model). Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the production units. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate that they received training and that they are proficient in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease (see Section 12 Welfare Assessment).	Important			

14- HARVESTING, STUNNING AND SLAUGHTER

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Harvesting can only be performed using fish pumps. The dimensions of pumps and tubes must be scaled to the operation and approved by an engineer. The maximum flow rate should be 3m/s.	Important	Documents, videos, on-site observation.		
14.2	The only permitted stunning and subsequent killing methods are: a) an effectively applied percussive blow, b) electronarcosis followed by bleeding, asphyxia or other slaughter method that must be applied while the fish are unconscious, c) electrocution (i.e. killing by electrical current).	Important	Documents, videos, on-site observation.		
14.3	A backup system e.g. 'priest' must be available throughout the killing process.	Important	Documents, videos, on-site observation.		
14.4	Any fish which fall to the ground during the process must be humanely killed with the main or back up system.	Important	Documents, videos, on-site observation.		

14.5	External damage such as scale loss, fin erosion, predator bites, lesions resulting from aggression, handling scares, parasite lesions and deformities must be noted at slaughter or upon arrival to the processing station.	Important	Documents, videos, on-site observation.		
14.6	All staff involved with the stunning and killing process must have received full training.	Important	Documents, videos, on-site observation.		
14.7	There must be a named person responsible for fish welfare throughout the killing process. This person is responsible for harvest records including stunning and slaughtering efficiency.	Important	Documents, videos, on-site observation.		
14.8	A written procedure for fish humane stunning and slaughtering fish humane stunning and slaughtering (see Section 14.1 – 4 Harvesting, stunning and slaughter) must be in place and carried out all time.	Important	Documents, videos, on-site observation.		
14.9	Video recordings of harvesting, stunning and slaughtering must be performed regularly (once per month or every time there is any change in protocols)	Important	Documents, videos, on-site observation.		

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HATCHERY REQUIREMENTS

33 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimizing fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the larvae and young.	Important	Absence of dangerous protrusions.		
1.3	Back-up power generators must exist, must be functional and must be ready to support essential equipment in case of a power failure. Generators should be tested and maintained weekly.	Important	Records, documents generator test.		
1.4	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly.	Important	Good overall condition of tanks and equipment. e.g. hand nets.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist advice.	Important	Facility allocated within the natural photoperiod of the species.		

1.6	Additional lighting either fixed or portable must be available, but only should be switched to allow examination of the animals and equipment.	Important	Stock inspection all times.		
1.7	Any pest control substances or equipment must be enclosed in a secure location, so there is no risk of water contamination or accidental access by non-target species.	Important	There must be a system of regular documented monitoring these baits points and recording results.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. The maximum sound pressure level should be under 150 dB re 1 µPa rms in the 0.2-2kHz frequency range in any point of the tank at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

34 – WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times and must be between 0 to 22º C.	Important	Regular records of temperature.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish veterinarian or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have access to one regularly.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plan.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments of feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact on fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only or/and thrown.	Important	Records, documents, videos or on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected upon each use and replaced when damaged. Their design must not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

102 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	The use of vaccines is encouraged for the prevention of disease, rather than relying on treatment.	Important	Records, documents, SOP, on-site observation.		
6.2	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		

6.3	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		
6.4	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.5	There must be back-up systems and contingency plans in place in order to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

103 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation. (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or causing stress to the fish (e.g. absence of protrusions to avoid injuries, never emerged).	Important	Records, documents, on-site observation. (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all times.	Important	Records, SOP, documents.		

7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

104 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		

8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		
8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems.	Important	Records, documents.		

8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

105 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, this must always be ≤ 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate, feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

106 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, on-site observation.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale.	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels must be monitored and corrective action must be taken if levels fall below 70-80%.	Important	Records, documents, videos, on-site measurements.		

107 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using overdose of anesthetic.	Important	Documents, on-site observations.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Documents.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviour (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated in order to identify the cause of the issue and prevent reocccurence by implementing effective prevention strategies.	Important	on-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	on-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum)	Important	on-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviour should be absent in 5 consecutive mins of observation (minimum)	Important	on-site observation.		
12.7	Anticipatory behaviour must be apparent prior to feeding routines	Important	on-site observation.		
12.8	If individual observation is possible in detail, ventilatory activity should be normal (50-70 opercular beats per min. (bpm)); hyperventilation (>90 bpm) should be absent at all times. Abnormal values must be reported to the welfare specialist.	Important	on-site observation.		
12.9	Swimming activity should be regular, without major or sudden changes.	Important	on-site observation.		

12.10	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Important	on-site observation		
12.11	Farmers should be aware of, and consider the use of, new technology that improves the welfare of fish.	Recommended			
12.12	Farmers should have access to reliable and relevant information on fish welfare.	Recommended			
12.13	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important			

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 3 Animal Health and Welfare and Section 12 Welfare Assessment). Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the water immediately. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate their proficiency in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease.	Important			

14- BROODSTOCK AND EGGS

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Stocking of broodstock should match the natural sex ratio of the species (1M:1F).	Important	Records, documents.		
14.2	Density of spawners must be kept <22kg/m^3 for stocking.	Important			
14.3	Tank sizes must be > 5m^3 and > 1m deep, rounded or avoiding angles and contain structural enrichment, provided that it does not hinder fish swimming activities or tank cleaning operations.	Important			
14.4	Environmental parameters (temperature and photoperiod) of broodstock tanks should follow the natural rhythms. Atlantic salmon is naturally an autumn spawner and eggs are normally produced at 4-8° C.	Important	Records, documents.		
14.5	Natural spawning methods, i.e. without handling or manipulation should be implemented. In the absence of such, all handling procedures (e.g. stripping) must be performed under anesthesia by a trained staff member or team.	Important	Records, documents.		

14.6	Developing eggs may be maintained in dim light or darkness to reduce mortality and must not be handled after placement for 40-45 degree days (e.g. 4 days at 10º C). Deformed and dead eggs/fry should be carefully removed at least twice per week to prevent the development of fungus.	Important	Records, documents.		

ON-GROWING REQUIREMENTS

17 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimising fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the fish.	Important	Absence of dangerous protrusions.		
1.3	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly and records must be ready for inspection.	Important	Good overall condition of nets and infrastructures. Records of periodicity and methods as assessment.		
1.4	Farm design should be such that inspection of all stock is possible. Total suspended solids 15 mg/L.	Important	Water visibility, ROVs, divers, cameras etc.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist advice.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Production units must be of adequate depth to prevent damage from ultraviolet radiation (> 45 cm) or shadows must be provided if considered appropriate.	Important	Depth of net-pen.		

1.7	Additional lighting, either fixed or portable, must be available, but only should be switched on to allow examination of the animals and equipment.	Important	Stock inspection at all times.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. The maximum sound pressure level should be under 150 dB re 1 µPa rms in the 0.2-2kHz frequency range in any point of the tank at all times.	Important	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

2– WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be between 0 to 22º C.	Important	Regular records of temperature.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish vet or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have regular access to one.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plans.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are carried out according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments to feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact to fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only and/or thrown.	Important	Records, documents, videos, on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected after use and replaced when damaged. Their design must be as to not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

102 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		
6.2	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		

6.3	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.4	There must be back-up systems and contingency plans in place to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

103 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or cause stress to the fish (e.g. absence of protrusions to avoid injuries, never emerged).	Important	Records, documents, on-site observation (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all time.	Important	Records, SOP, documents.		
7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, on-site observation (grading system).		

104 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		
8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		

8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems	Important	Records, documents.		
8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

105 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, must always be < 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

106 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, observation on site.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below 70% saturation.	Important	Records, documents, videos, on-site measurements.		

107 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using an overdose of anesthetic.	Important	Documents, on-site observation.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Records, documents, on-site observation, training.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm, schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviours (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated to identify the cause of the issue and be prevented from reoccuring by implementing effective prevention strategies.	Important	On-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	On-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviours should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.7	Anticipatory behaviour must appear prior to feeding routines.	Important	On-site observation.		
12.8	Swimming activity should be regular, without major or sudden changes.	Important	On-site observation.		

12.9	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Recommended			
12.10	Farmers should be aware of, and consider, the use of new technology that improves the welfare of fish.	Recommended			
12.11	Farmers should have access to reliable and relevant information on fish welfare.	Important	On-site observation.		
12.12	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation.		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 12 Welfare Assessment). Density < 22 kg/m^3 best welfare according SWIM model (Salmon Welfare Index model). Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the production units. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate that they received training and that they are proficient in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease (see Section 12 Welfare Assessment).	Important			

14- HARVESTING, STUNNING AND SLAUGHTER

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Harvesting can only be performed using fish pumps. The dimensions of pumps and tubes must be scaled to the operation and approved by an engineer. The maximum flow rate should be 3m/s.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.2	The only permitted stunning and subsequent killing methods are: a) an effectively applied percussive blow, b) electronarcosis followed by bleeding, asphyxia or other slaughter method that must be applied while the fish unconscious, c) electrocution (i.e. killing by electrical current).	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.3	A backup system e.g. 'priest' must be available throughout the killing process.	Important	Documents, videos, on-site observation.		
14.4	Any fish which fall to the ground during the process must be humanely killed with the main or back up system.	Important	Documents, videos, on-site observation.		

14.5	External damage such as scale loss, fin erosion, predator bites, lesions resulting from aggression, handling scares, parasite lesions and deformities must be noted at slaughter or upon arrival to the processing station.	Important	Documents, videos, on-site observation.		
14.6	All staff involved with the stunning and killing process must have received full training.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.7	There must be a named person responsible for fish welfare throughout the killing process. This person is responsible for harvest records including stunning and slaughtering efficiency.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.8	A written procedure for fish humane stunning and slaughtering (see Section 14.1 – 4 Harvesting, stunning and slaughter) must be in place and carried out all time.	Important	Documents, videos, on-site observation.		
14.9	Video recordings of harvesting, stunning and slaughtering must be performed regularly (once per month or every time there is any change in protocols)	Important	Documents, videos, on-site observation.		

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HATCHERY REQUIREMENTS

35 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimizing fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the larvae and young.	Important	Absence of dangerous protrusions.		
1.3	Back-up power generators must exist, must be functional and must be ready to support essential equipment in case of a power failure. Generators should be tested and maintained weekly.	Important	Records, documents generator test.		
1.4	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly.	Important	Good overall condition of tanks and equipment. e.g. hand nets.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist advice.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		

1.6	Additional lighting either fixed or portable must be available, but only should be switched to allow examination of the animals and equipment.	Important	Stock inspection all times.		
1.7	Any pest control substances or equipment must be enclosed in a secure location, so there is no risk of water contamination or accidental access by non-target species.	Important	There must be a system of regular documented monitoring these baits points and recording results.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. The maximum sound pressure level should be under 150 dB re 1 µPa rms in the 0.2-2kHz frequency range in any point of the tank at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

36 – WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times and must be between 18 to 24º C.	Important	Regular records of temperature.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish veterinarian or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have access to one regularly.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plan.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments of feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding, and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact on fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only or/and thrown.	Important	Records, documents, videos or on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected upon each use and replaced when damaged. Their design must not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

108 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	The use of vaccines is encouraged for the prevention of disease, rather than relying on treatment.	Important	Records, documents, SOP, on-site observation.		
6.2	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		

6.3	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		
6.4	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.5	There must be back-up systems and contingency plans in place in order to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

109 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation. (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or causing stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation. (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all times.	Important	Records, SOP, documents.		

7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

110 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		

8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		
8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems.	Important	Records, documents.		

8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

111 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, this must always be ≤ 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate, feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

112 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, on-site observation.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale.	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels must be monitored and corrective action must be taken if levels fall below 9 mg/L for eggs between 4 and 12° C and 7 mg/L for juveniles.	Important	Records, documents, videos, on-site measurements.		

113 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using overdose of anesthetic.	Important	Documents, on-site observations.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Documents.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviour (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated in order to identify the cause of the issue and prevent reocccurence by implementing effective prevention strategies.	Important	on-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	on-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum)	Important	on-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviour should be absent in 5 consecutive mins of observation (minimum)	Important	on-site observation.		
12.7	Anticipatory behaviour must be apparent prior to feeding routines	Important	on-site observation.		
12.8	If individual observation is possible in detail, ventilatory activity should be normal (50-70 opercular beats per min. (bpm)); hyperventilation (>90 bpm) should be absent at all times. Abnormal values must be reported to the welfare specialist.	Important	on-site observation.		
12.9	Swimming activity should be regular, without major or sudden changes.	Important	on-site observation.		

12.10	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Important	on-site observation		
12.11	Farmers should be aware of, and consider the use of, new technology that improves the welfare of fish.	Recommended			
12.12	Farmers should have access to reliable and relevant information on fish welfare.	Recommended			
12.13	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 3 Animal Health and Welfare and Section 12 Welfare Assessment). Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the water immediately. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate their proficiency in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease.	Important			

14- BROODSTOCK AND EGGS

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Stocking of broodstock should match the natural sex ratio of the species. (1M : 1.4F in Sea trout but 6M : 1F in Brown trout. No spontaneous spawning in holding tanks, at least for domesticated broodstock).	Important	Records, documents.		
14.2	Density of spawners must be kept <22kg/m^3 for stocking.	Important			
14.3	Tank sizes must be > 5m^3 and > 1m deep, rounded or avoiding angles and contain structural enrichment, provided that it does not hinder fish swimming activities or tank cleaning operations.	Important			
14.4	Environmental parameters (temperature and photoperiod) of broodstock tanks should follow the natural rhythms. *Salmo trutta* is naturally a winter spawner (usually November-December), and eggs are normally produced at 4-12° C.	Important	Records, documents.		
14.5	Natural spawning methods, i.e. without handling or manipulation, should be implemented. In the absence of such, all handling procedures (e.g. stripping) must be performed under anesthesia by a trained staff member or team.	Important	Records, documents.		

14.6	Eggs can be manipulated between 30 minutes and 24 h following fertilisation, after which any shock should be avoided until the eyed stage (typically 300 degree-days). Developing eggs may be maintained in dim light or darkness and water exchange should be moderate (one renewal per hour) and the dissolved oxygen level kept at 100 percent saturation. Deformed and dead eggs/fry should be carefully removed daily to prevent the development of fungus. At the eyed stage, eggs can be manipulated again.	Important	Records, documents.		

ON-GROWING REQUIREMENTS

18 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimising fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the fish.	Important	Absence of dangerous protrusions.		
1.3	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly and records must be ready for inspection.	Important	Good overall condition of nets and infrastructures. Records of periodicity and methods as assessment.		
1.4	Farm design should be such that inspection of all stock is possible. Total suspended solids < 25 mg/dm^3.	Important	Water visibility, ROVs, divers, cameras etc.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist advice.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Production units must be of adequate depth to prevent damage from ultraviolet radiation (> 45 cm) or shadows must be provided if considered appropriate.	Important	Depth of net-pen.		

1.7	Additional lighting, either fixed or portable, must be available, but only should be switched on to allow examination of the animals and equipment.	Important	Stock inspection at all times.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing 1.2.		
1.9	The tanks should be located in a site protected from human induced noise. The maximum sound pressure level should be under 150 dB re 1 µPa rms in the 0.2-2kHz frequency range in any point of the tank at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

2– WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be between 18 to 24º C.	Important	Regular records of temperature.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish vet or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have regular access to one.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plans.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are carried out according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments to feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact to fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only and/or thrown.	Important	Records, documents, videos, on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected after use and replaced when damaged. Their design must be as to not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

108 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		
6.2	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		

6.3	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.4	There must be back-up systems and contingency plans in place to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

109 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or cause stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all time.	Important	Records, SOP, documents.		
7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, on-site observation (grading system).		

110 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		
8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		

8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems	Important	Records, documents.		
8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

111 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, must always be < 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

112 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, observation on site.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels must be monitored and corrective action must be taken if levels fall below 7 mg/L.	Important	Records, documents, videos, on-site measurements.		

113 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using an overdose of anesthetic.	Important	Documents, on-site observation.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Records, documents, on-site observation, training.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm, schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviours (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated to identify the cause of the issue and be prevented from reoccuring by implementing effective prevention strategies.	Important	On-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	On-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviours should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.7	Anticipatory behaviour must appear prior to feeding routines.	Important	On-site observation.		
12.8	Swimming activity should be regular, without major or sudden changes.	Important	On-site observation.		

12.9	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Recommended			
12.10	Farmers should be aware of, and consider, the use of new technology that improves the welfare of fish.	Recommended			
12.11	Farmers should have access to reliable and relevant information on fish welfare.	Important	On-site observation.		
12.12	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation.		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators Optimum density of about 40 kg/m³. Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the production units. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate that they received training and that they are proficient in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease (see Section 12 Welfare Assessment).	Important			

14- HARVESTING, STUNNING AND SLAUGHTER

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Harvesting can only be performed using fish pumps. The dimensions of pumps and tubes must be scaled to the operation and approved by an engineer. The maximum flow rate should be 3m/s.	Important during the transition period, after must be IMPORTANT	Documents, videos, on-site observation.		
14.2	The only permitted stunning and subsequent killing methods are: a) an effectively applied percussive blow, b) electronarcosis followed by bleeding, asphyxia or other slaughter method that must be applied while the fish are unconscious, c) electrocution (i.e. killing by electrical current).	Important during the transition period, after must be IMPORTANT	Documents, videos, on-site observation.		
14.3	A backup system e.g. 'priest' must be available throughout the killing process.	Important	Documents, videos, on-site observation.		
14.4	Any fish which fall to the ground during the process must be humanely killed with the main or back up system.	Important	Documents, videos, on-site observation.		

14.5	External damage such as scale loss, fin erosion, predator bites, lesions resulting from aggression, handling scares, parasite lesions and deformities must be noted at slaughter or upon arrival to the processing station.	Important	Documents, videos, on-site observation.		
14.6	All staff involved with the stunning and killing process must have received full training.	Important during the transition period, after must be IMPORTANT	Documents, videos, on-site observation.		
14.7	There must be a named person responsible for fish welfare throughout the killing process. This person is responsible for harvest records including stunning and slaughtering efficiency.	Important during the transition period, after must be IMPORTANT	Documents, videos, on-site observation.		
14.8	A written procedure for fish humane stunning and slaughtering (see Section 14.1 – 4 Harvesting, stunning and slaughter) must be in place and carried out all time.	Important	Documents, videos, on-site observation.		
14.9	Video recordings of harvesting, stunning and slaughtering must be performed regularly (once per month or every time there is any change in protocols)	Important	Documents, videos, on-site observation.		

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HATCHERY REQUIREMENTS

37 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimizing fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the larvae and young.	Important	Absence of dangerous protrusions.		
1.3	Back-up power generators must exist, must be functional and must be ready to support essential equipment in case of a power failure. Generators should be tested and maintained weekly.	Important	Records, documents generator test.		
1.4	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly.	Important	Good overall condition of tanks and equipment. e.g. hand nets.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist advice. Maximum range: 12:12 to 8:16 L:D.	Important	Facility allocated within the natural photoperiod of the species.		

1.6	Additional lighting either fixed or portable must be available, but only should be switched to allow examination of the animals and equipment.	Important	Stock inspection all times.		
1.7	Any pest control substances or equipment must be enclosed in a secure location, so there is no risk of water contamination or accidental access by non-target species.	Important	There must be a system of regular documented monitoring these baits points and recording results.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. The maximum sound pressure level should be under 150 dB re 1 µPa rms in the 0.2-2kHz frequency range in any point of the tank at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

38 – WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be between 0 to 8º C.	Important	Regular records of temperature.		

2.3	Oxygen levels should be verifiable at all times and must be > 9 mg/L for early stages.	Important	Regular records of oxygen.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish veterinarian or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have access to one regularly.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plan.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments of feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding, and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact on fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only or/and thrown.	Important	Records, documents, videos or on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected upon each use and replaced when damaged. Their design must not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

114 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	The use of vaccines is encouraged for the prevention of disease, rather than relying on treatment.	Important	Records, documents, SOP, on-site observation.		
6.2	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		

6.3	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		
6.4	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.5	There must be back-up systems and contingency plans in place in order to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

115 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation. (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or causing stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation. (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all times.	Important	Records, SOP, documents.		

7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

116 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		

8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		
8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems.	Important	Records, documents.		

8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

117 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, this must always be ≤ 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate, feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

118 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, on-site observation.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale.	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (the critical point will vary between species and with environmental factors). Critical level for Arctic char: > 9mg/L for early stages.	Important	Records, documents, videos, on-site measurements.		

119 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using overdose of anesthetic.	Important	Documents, on-site observations.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Documents.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviour (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated in order to identify the cause of the issue and prevent reocccurence by implementing effective prevention strategies.	Important	on-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	on-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum)	Important	on-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviour should be absent in 5 consecutive mins of observation (minimum)	Important	on-site observation.		
12.7	Anticipatory behaviour must be apparent prior to feeding routines	Important	on-site observation.		
12.8	If individual observation is possible in detail, ventilatory activity should be normal (50-70 opercular beats per min. (bpm)); hyperventilation (>90 bpm) should be absent at all times. Abnormal values must be reported to the welfare specialist.	Important	on-site observation.		
12.9	Swimming activity should be regular, without major or sudden changes.	Important	on-site observation.		

12.10	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Important	on-site observation		
12.11	Farmers should be aware of, and consider the use of, new technology that improves the welfare of fish.	Recommended			
12.12	Farmers should have access to reliable and relevant information on fish welfare.	Recommended			
12.13	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important			

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 3 Animal Health and Welfare and Section 12 Welfare Assessment). Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the water immediately. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate their proficiency in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease.	Important			

14- BROODSTOCK AND EGGS

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Males and females from broodstock should be kept together at 1:1 ratio.	Important	Records, documents.		
14.2	Density of spawners must be kept <25kg/m^3 for stocking. If density exceeds 25 kg/m^3, all points from Section 12 should be considered IMPORTANT.	Important			
14.3	Tank sizes must be > 5m^3 and > 1m deep, rounded or avoiding angles and contain structural enrichment, provided that it does not hinder fish swimming activities or tank cleaning operations.	Important			
14.4	Environmental parameters (temperature and photoperiod) of broodstock tanks should follow the natural rhythms, variation and ranges as the original habitat: temperature of broodstock tanks must never rise above 10º C and photoperiod must vary from 8:16 to 16:8 L:D according to seasons.	Important	Records, documents.		
14.5	Natural spawning methods, i.e. without handling or manipulation should be implemented. In the absence of such, all handling procedures (e.g. stripping) must be performed under anaesthesia by a trained staff member or team.	Important	Records, documents.		

14.6	Developing eggs may be maintained in dim light or darkness to reduce mortality and must not be handled after placement for 40-45 degree days (e.g. 4 days at 10º C).	Important	Records, documents.		

ON-GROWING REQUIREMENTS

19 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimising fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the fish.	Important	Absence of dangerous protrusions.		
1.3	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly and records must be ready for inspection.	Important	Good overall condition of nets and infrastructures. Records of periodicity and methods as assessment.		
1.4	Farm design should be such that inspection of all stock is possible.	Important	Water visibility, ROVs, divers, cameras etc.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist advice. Maximum range: 8:16 to 16:8 L:D.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Production units must be of adequate depth to prevent damage from ultraviolet radiation (> 45 cm) or shade must be provided if considered appropriate.	Important	Depth of net-pen.		

1.7	Additional lighting, either fixed or portable, must be available, but only should be switched on to allow examination of the animals and equipment.	Important	Stock inspection at all times.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing 1.2.		
1.9	The tanks should be located in a site protected from human induced noise. The maximum sound pressure level should be under 150 dB re 1 µPa rms in the 0.2-2kHz frequency range in any point of the tank at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

2– WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be between 0 to 12-15º C.	Important	Regular records of temperature.		

2.3	Oxygen levels should be verifiable at all times and must be >6mg/L for on-growing.	Important	Regular records of oxygen.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish vet or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have regular access to one.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plans.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are carried out according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments to feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact to fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only and/or thrown.	Important	Records, documents, videos, on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected after use and replaced when damaged. Their design must be as to not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

114 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		
6.2	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		

6.3	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.4	There must be back-up systems and contingency plans in place to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

115 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or cause stress to the fish (e.g. absence of protrusions to avoid injuries, never emerged).	Important	Records, documents, on-site observation (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all time.	Important	Records, SOP, documents.		
7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, on-site observation (grading system).		

116 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		
8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		

8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems	Important	Records, documents.		
8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

117 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, must always be < 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

118 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, observation on site.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (the critical point will vary between species and with environmental factors). Critical level for Arctic char: 4 mg/L < 15º C, 6 mg/L > 15º C.	Important	Records, documents, videos, on-site measurements.		

119 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using an overdose of anesthetic.	Important	Documents, on-site observation.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Records, documents, on-site observation, training.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm, schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviours (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated to identify the cause of the issue and be prevented from reoccuring by implementing effective prevention strategies.	Important	On-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	On-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviours should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.7	Anticipatory behaviour must appear prior to feeding routines.	Important	On-site observation.		
12.8	Swimming activity should be regular, without major or sudden changes.	Important	On-site observation.		

12.9	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Recommended			
12.10	Farmers should be aware of, and consider, the use of new technology that improves the welfare of fish.	Recommended			
12.11	Farmers should have access to reliable and relevant information on fish welfare.	Important	On-site observation.		
12.12	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation.		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 12 Welfare Assessment). Density must be above 20 kg/m^3 and below 60 kg/m^3. Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the production units. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate that they received training and that they are proficient in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease (see Section 12 Welfare Assessment).	Important			

14- HARVESTING, STUNNING AND SLAUGHTER

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Harvesting can only be performed using fish pumps. The dimensions of pumps and tubes must be scaled to the operation and approved by an engineer. The maximum flow rate should be 3m/s.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.2	The only permitted stunning and subsequent killing methods are: a) an effectively applied percussive blow, b) electronarcosis followed by bleeding, asphyxia or other slaughter method that must be applied while the fish unconscious, c) electrocution (i.e. killing by electrical current).	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.3	A backup system e.g. 'priest' must be available throughout the killing process.	Important	Documents, videos, on-site observation.		
14.4	Any fish which fall to the ground during the process must be humanely killed with the main or back up system.	Important	Documents, videos, on-site observation.		

14.5	External damage such as scale loss, fin erosion, predator bites, lesions resulting from aggression, handling scares, parasite lesions and deformities must be noted at slaughter or upon arrival to the processing station.	Important	Documents, videos, on-site observation.		
14.6	All staff involved with the stunning and killing process must have received full training.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.7	There must be a named person responsible for fish welfare throughout the killing process. This person is responsible for harvest records including stunning and slaughtering efficiency.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.8	A written procedure for fish humane stunning and slaughtering (see Section 14.1 – 4 Harvesting, stunning and slaughter) must be in place and carried out all time.	Important	Documents, videos, on-site observation.		
14.9	Video recordings of harvesting, stunning and slaughtering must be performed regularly (once per month or every time there is any change in protocols)	Important	Documents, videos, on-site observation.		

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HATCHERY REQUIREMENTS

39 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimizing fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the larvae and young.	Important	Absence of dangerous protrusions.		
1.3	Back-up power generators must exist, must be functional and must be ready to support essential equipment in case of a power failure. Generators should be tested and maintained weekly.	Important	Records, documents generator test.		
1.4	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly.	Important	Good overall condition of tanks and equipment. e.g. hand nets.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist advice. Maximum range: 12:12 to 8:16 L:D.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		

1.6	Additional lighting either fixed or portable must be available, but only should be switched to allow examination of the animals and equipment.	Important	Stock inspection all times.		
1.7	Any pest control substances or equipment must be enclosed in a secure location, so there is no risk of water contamination or accidental access by non-target species.	Important	There must be a system of regular documented monitoring these baits points and recording results.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. The maximum sound pressure level should be under 150 dB re 1 µPa rms in the 0.2-2kHz frequency range in any point of the tank at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

40 – WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be between 0 to 20º C, preferably under 16º C.	Important	Regular records of temperature.		

2.3	Oxygen levels should be verifiable at all times, and must be > 7 mg/L.	Important	Regular records of oxygen.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish veterinarian or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have access to one regularly.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plan.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments of feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding, and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact on fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only or/and thrown.	Important	Records, documents, videos or on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected upon each use and replaced when damaged. Their design must not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

120 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	The use of vaccines is encouraged for the prevention of disease, rather than relying on treatment.	Important	Records, documents, SOP, on-site observation.		
6.2	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		

6.3	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		
6.4	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.5	There must be back-up systems and contingency plans in place in order to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

121 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation. (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or causing stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation. (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all times.	Important	Records, SOP, documents.		

7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

122 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		

8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		
8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems.	Important	Records, documents.		

8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

123 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, this must always be ≤ 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate, feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

124 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, on-site observation.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale.	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (the critical point will vary between species and with environmental factors). Critical level for Brook trout: > 7 mg/L for early stages.	Important	Records, documents, videos, on-site measurements.		

125 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using overdose of anesthetic.	Important	Documents, on-site observations.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Documents.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviour (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated in order to identify the cause of the issue and prevent reocccurence by implementing effective prevention strategies.	Important	on-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	on-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum)	Important	on-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviour should be absent in 5 consecutive mins of observation (minimum)	Important	on-site observation.		
12.7	Anticipatory behaviour must be apparent prior to feeding routines	Important	on-site observation.		
12.8	If individual observation is possible in detail, ventilatory activity should be normal (50-70 opercular beats per min. (bpm)); hyperventilation (>90 bpm) should be absent at all times. Abnormal values must be reported to the welfare specialist.	Important	on-site observation.		
12.9	Swimming activity should be regular, without major or sudden changes.	Important	on-site observation.		

12.10	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Important	on-site observation		
12.11	Farmers should be aware of, and consider the use of, new technology that improves the welfare of fish.	Recommended			
12.12	Farmers should have access to reliable and relevant information on fish welfare.	Recommended			
12.13	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 3 Animal Health and Welfare and Section 12 Welfare Assessment). Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the water immediately. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate their proficiency in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease.	Important			

14- BROODSTOCK AND EGGS

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Density of spawners must be kept <25kg/m3 for stocking.	Important			
14.2	Tank sizes must be > $5m^3$ and > 1m deep, rounded or avoiding angles and contain structural enrichment, provided that it does not hinder fish swimming activities or tank cleaning operations.	Important			
14.3	Environmental parameters (temperature and photoperiod) of broodstock tanks should follow the natural rhythms, variation and ranges as the original habitat: temperature of broodstock tanks must never rise above 16º C and photoperiod must vary from 8:16 to 16:8 L:D respecting seasons.	Important	Records, documents.		
14.4	Natural spawning methods, i.e. without handling or manipulation, should be implemented. In the absence of such, all handling procedures (e.g. stripping) must be performed under anesthesia by a trained staff member or team. Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important	Records, documents.		

14.5	Developing eggs may be maintained in dim light or darkness to reduce mortality and must not be handled after placement for 40-45 degree days (e.g. 4 days at 10º C).	Important	Records, documents.		

ON-GROWING REQUIREMENTS

20 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimising fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the fish.	Important	Absence of dangerous protrusions.		
1.3	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly and records must be ready for inspection.	Important	Good overall condition of nets and infrastructures. Records of periodicity and methods as assessment.		
1.4	Farm design should be such that inspection of all stock is possible.	Important	Water visibility, ROVs, divers, cameras etc.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist advice. Maximum range: 8:16 to 16:8 L:D.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Production units must be of adequate depth to prevent damage from ultraviolet radiation (> 45 cm) or shadows must be provided if considered appropriate.	Important	Depth of net-pen.		

1.7	Additional lighting, either fixed or portable, must be available, but only should be switched on to allow examination of the animals and equipment.	Important	Stock inspection at all times.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. The maximum sound pressure level should be under 150 dB re 1 µPa rms in the 0.2-2kHz frequency range in any point of the tank at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

2– WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be between 0 to 20º C, preferably under 16º C.	Important	Regular records of temperature.		

2.3	Oxygen levels should be verifiable at all times, and must be > 7 mg/L.	Important	Regular records of oxygen.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish vet or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have regular access to one.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plans.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are carried out according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments to feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact to fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only and/or thrown.	Important	Records, documents, videos, on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected after use and replaced when damaged. Their design must be as to not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

120 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		
6.2	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		

6.3	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.4	There must be back-up systems and contingency plans in place to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

121 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or cause stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all time.	Important	Records, SOP, documents.		
7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, on-site observation (grading system).		

122 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		
8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		

8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems	Important	Records, documents.		
8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

123 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, must always be < 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

124 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, observation on site.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (the critical point will vary between species and with environmental factors). Critical level for Brook trout: > 7 mg/L.	Important	Records, documents, videos, on-site measurements.		

125 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using an overdose of anesthetic.	Important	Documents, on-site observation.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Records, documents, on-site observation, training.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm, schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviours (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated to identify the cause of the issue and be prevented from reoccuring by implementing effective prevention strategies.	Important	On-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	On-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviours should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.7	Anticipatory behaviour must appear prior to feeding routines.	Important	On-site observation.		
12.8	Swimming activity should be regular, without major or sudden changes.	Important	On-site observation.		

12.9	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Recommended			
12.10	Farmers should be aware of, and consider, the use of new technology that improves the welfare of fish.	Recommended			
12.11	Farmers should have access to reliable and relevant information on fish welfare.	Important	On-site observation.		
12.12	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation.		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 12 Welfare Assessment). Density must be below 30 kg/m^3.	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the production units. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate that they received training and that they are proficient in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease (see Section 12 Welfare Assessment).	Important			

14- HARVESTING, STUNNING AND SLAUGHTER

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Harvesting can only be performed using fish pumps. The dimensions of pumps and tubes must be scaled to the operation and approved by an engineer. The maximum flow rate should be 3m/s.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.2	The only permitted stunning and subsequent killing methods are: a) an effectively applied percussive blow, b) electronarcosis followed by bleeding, asphyxia or other slaughter method that must be applied while the fish are unconscious, c) electrocution (i.e. killing by electrical current).	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.3	A backup system e.g. 'priest' must be available throughout the killing process.	Important	Documents, videos, on-site observation.		
14.4	Any fish which fall to the ground during the process must be humanely killed with the main or back up system.	Important	Documents, videos, on-site observation.		

14.5	External damage such as scale loss, fin erosion, predator bites, lesions resulting from aggression, handling scares, parasite lesions and deformities must be noted at slaughter or upon arrival to the processing station.	Important	Documents, videos, on-site observation.		
14.6	All staff involved with the stunning and killing process must have received full training.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.7	There must be a named person responsible for fish welfare throughout the killing process. This person is responsible for harvest records including stunning and slaughtering efficiency.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.8	A written procedure for fish humane stunning and (see Section 14.1 – 4 Harvesting, stunning and slaughter) must be in place and carried out all time.	Important	Documents, videos, on-site observation.		
14.9	Video recordings of harvesting, stunning and slaughtering must be performed regularly (once per month or every time there is any change in protocols)	Important	Documents, videos, on-site observation.		

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HATCHERY REQUIREMENTS

41 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimizing fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the larvae and young.	Important	Absence of dangerous protrusions.		
1.3	Back-up power generators must exist, must be functional and must be ready to support essential equipment in case of a power failure. Generators should be tested and maintained weekly.	Important	Records, documents generator test.		
1.4	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly.	Important	Good overall condition of tanks and equipment. e.g. hand nets.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis, matching natural limits and using practical experience, research and welfare specialist advice. Temperate waters photoperiod max.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		

	range: 16L:8D-8L:16D. Intensity at water surface: about 200 lux. Blue/green lights recommended for juveniles.				
1.6	Additional lighting either fixed or portable must be available, but only should be switched to allow examination of the animals and equipment.	Important	Stock inspection all times.		
1.7	Any pest control substances or equipment must be enclosed in a secure location, so there is no risk of water contamination or accidental access by non-target species.	Important	There must be a system of regular documented monitoring these baits points and recording results.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. The maximum sound pressure level should be under 128 dB re 1 µPa rms in the 0.1-3kHz frequency range in any point of the tank at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

42 – WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		

2.2	Temperature should be verifiable at all times, and must be between 13 and 20 ºC.	Important	Regular records of temperature.		
2.3	Oxygen levels must be verifiable at all times, and must be > 70% oxygen saturation.	Important	Regular records of oxygen.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish veterinarian or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have access to one regularly.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plan.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments of feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	**Requirement**	**Level**	**Parameters and information**	**Y/N**	**Comments**
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact on fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only or/and thrown.	Important	Records, documents, videos or on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected upon each use and replaced when damaged. Their design must not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

126 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	The use of vaccines is encouraged for the prevention of disease, rather than relying on treatment.	Important	Records, documents, SOP, on-site observation.		
6.2	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		

6.3	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		
6.4	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.5	There must be back-up systems and contingency plans in place in order to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

127 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation. (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or causing stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation. (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all times.	Important	Records, SOP, documents.		

7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		
7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, observation on site (grading system)		

128 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		

8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		
8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems.	Important	Records, documents.		

8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

129 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, must always be < 50 degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate, feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

130 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, on-site observation.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale.	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point. Recommended oxygen saturation for Turbot: > 70%.	Important	Records, documents, videos, on-site measurements.		

131 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using overdose of anesthetic.	Important	Documents, on-site observations.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Documents.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviour (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated in order to identify the cause of the issue and prevent reocccurence by implementing effective prevention strategies.	Important	on-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	on-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins. of observation (minimum).	Important	on-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviour should be absent in 5 consecutive mins. of observation (minimum).	Important	on-site observation.		
12.7	Anticipatory behaviour must be apparent prior to feeding routines.	Important	on-site observation.		
12.8	If individual observation is possible in detail, ventilatory activity should be normal (50-70 opercular beats per min. (bpm)); hyperventilation (>90 bpm) should be absent at all times. Abnormal values must be reported to the welfare specialist.	Important	on-site observation.		
12.9	Swimming activity should be regular, without major or sudden changes.	Important	on-site observation.		

12.10	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Important	on-site observation		
12.11	Farmers should be aware of, and consider the use of, new technology that improves the welfare of fish.	Recommended			
12.12	Farmers should have access to reliable and relevant information on fish welfare.	Recommended			
12.13	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, *i.e*. an internal evaluation based on welfare indicators.	Important	On-site observation		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 3 Animal Health and Welfare and Section 12 Welfare Assessment). Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the water immediately. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate their proficiency in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease.	Important			

14- BROODSTOCK AND EGGS

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Stocking of broodstock should match the natural sex ratio of the species (1M: 1F).	Important	Records, documents.		
14.2	Density of spawners must be kept <5 kg/m3 for stocking and <3kg/m3 for spawning.	Important			
14.3	Tank sizes must be > 30m3 and > 1m deep, rounded or avoiding angles and contain structural enrichment, provided that it does not hinder fish swimming activities or cleaning.	Important			
14.4	Environmental parameters (temperature and photoperiod) of broodstock tanks should follow the natural rhythms, variation and ranges as the original habitat.	Important	Records, documents.		
14.5	Natural spawning methods, *i.e.* without handling or manipulation, should be implemented. In the absence of such, all handling procedures (*e.g.* stripping) must be performed under anesthesia by a trained staff member or team.	Important	Records, documents.		

14.6	Developing eggs may be mantained in dim light or darkness to reduce mortality and must not be handled after placement for 40-45 degree days (about 2 days at 19-20 degree Celsius).	Important	Records, documents.		

ON-GROWING REQUIREMENTS

21 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimising fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the fish.	Important	Absence of dangerous protrusions.		
1.3	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly and records must be ready for inspection.	Important	Good overall condition of nets and infrastructures. Records of periodicity and methods as assessment.		
1.4	Farm design should be such that inspection of all stock is possible.	Important	Water visibility, ROVs, divers, cameras etc.		

1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis, matching natural limits and using practical experience, research and welfare specialist advice. Temperate waters photoperiod max. range: 16L:8D-8L:16D.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Production units must be of adequate depth to prevent damage from ultraviolet radiation or shade must be provided if considered appropriate.	Important	Depth of net-pen.		
1.7	Additional lighting, either fixed or portable, must be available, but only should be switched on to allow examination of the animals and equipment.	Important	Stock inspection at all times.		
1.8	Covers should be provided, as well as other structural enrichment. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The cages/tanks should be located in a site protected from human induced noise. The maximum sound pressure level should be under 128 dB re 1 µPa rms in the 0.1-3kHz frequency range in any point of the cage at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

2– WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments

2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be between 13 and 18˚C.	Important	Regular records of temperature.		
2.2	Oxygen levels must be verifiable at all times, and must be > 70% oxygen saturation.	Important	Regular records of oxygen.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish vet or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have regular access to one.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plans.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are carried out according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments to feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact to fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only and/or thrown.	Important	Records, documents, videos, on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected after use and replaced when damaged. Their design must be as to not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

126 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		
6.2	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		

6.3	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.4	There must be back-up systems and contingency plans in place to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

127 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary, *e.g.* before vaccination, to avoid cannibalism or before slaughtering.	Important	Records, documents, SOP, on-site observation (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or cause stress to the fish (*e.g*. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all time.	Important	Records, SOP, documents.		
7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, on-site observation (grading system).		

128 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max. 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		
8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		

8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems	Important	Records, documents.		
8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

129 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, must always be < 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

130 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, observation on site.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (the critical point will vary between species and with environmental factors). Critical level for Turbot: > 6 mg/L.	Important	Records, documents, videos, on-site measurements.		

131 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using an overdose of anesthetic.	Important	Documents, on-site observation.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Records, documents, on-site observation, training.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm, schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviours (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 13 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated to identify the cause of the issue and be prevented from reoccuring by implementing effective prevention strategies.	Important	On-site observation.		

12.4	Fish should be shoaling or schooling (*i.e.* group swimming with polarized orientation)	Important	On-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviours should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.7	Anticipatory behaviour must appear prior to feeding routines.	Important	On-site observation.		
12.8	Swimming activity should be regular, without major or sudden changes.	Important	On-site observation.		

12.9	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Recommended			
12.10	Farmers should be aware of, and consider, the use of new technology that improves the welfare of fish.	Recommended			
12.11	Farmers should have access to reliable and relevant information on fish welfare.	Important	On-site observation.		
12.12	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, *i.e.* an internal evaluation based on welfare indicators.	Important	On-site observation.		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators. Limit stocking to below 15 kg/m^2 max. Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the production units. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate that they received training and that they are proficient in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease (see Section 12 Welfare Assessment).	Important			

14- HARVESTING, STUNNING AND SLAUGHTER

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Harvesting can only be performed using fish pumps. The dimensions of pumps and tubes must be scaled to the operation and approved by an engineer. The maximum flow rate should be 3m/s.	Important during the transition period, after must be IMPORTANT	Documents, videos, on-site observation.		
14.2	The only permitted stunning and subsequent killing methods are: a) an effectively applied percussive blow, b) electronarcosis followed by bleeding, asphyxia or other slaughter method that must be applied while the fish are unconscious, c) electrocution (*i.e.* killing by electrical current).	Important during the transition period, after must be IMPORTANT	Documents, videos, on-site observation.		
14.3	A backup system *e.g.* 'priest' must be available throughout the killing process.	Important	Documents, videos, on-site observation.		
14.4	Any fish which fall to the ground during the process must be humanely killed with the main or back up system.	Important	Documents, videos, on-site observation.		

14.5	External damage such as scale loss, fin erosion, predator bites, lesions resulting from aggression, handling scares, parasite lesions and deformities must be noted at slaughter or upon arrival to the processing station.	Important	Documents, videos, on-site observation.		
14.6	All staff involved with the stunning and killing process must have received full training.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.7	There must be a named person responsible for fish welfare throughout the killing process. This person is responsible for harvest records including stunning and slaughtering efficiency.	IMPORTANT (but w/ transition period)	Documents, videos, on-site observation.		
14.8	A written procedure for fish humane stunning and slaughtering (see Section 14.1 to 14.4 Harvesting, stunning and slaughter) must be in place and carried out all time.	Important	Documents, videos, on-site observation.		
14.9	Video recordings of harvesting, stunning and slaughtering must be performed regularly (once per month or every time there is any change in protocols).	Important	Documents, videos, on-site observation.		

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HATCHERY REQUIREMENTS

43 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimizing fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the larvae and young.	Important	Absence of dangerous protrusions.		
1.3	Back-up power generators must exist, must be functional and must be ready to support essential equipment in case of a power failure. Generators should be tested and maintained weekly.	Important	Records, documents generator test.		
1.4	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly.	Important	Good overall condition of tanks and equipment. e.g. hand nets.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis, matching natural limits and using practical experience, research	Important	Facility allocated within the natural photoperiod and geographical range		

	and welfare specialist advice. Subtropical photoperiod max. range: 14L:10D-10L:14D; Intensity range: 200-800 lux.		of the species.		
1.6	Additional lighting either fixed or portable must be available, but only should be switched to allow examination of the animals and equipment.	Important	Stock inspection all times.		
1.7	Any pest control substances or equipment must be enclosed in a secure location, so there is no risk of water contamination or accidental access by non-target species.	Important	There must be a system of regular documented monitoring these baits point and recording results.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. The maximum sound pressure level should be under 128 dB re 1 µPa rms in the 0.1-3kHz frequency range in any point of the cage at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

44 – WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		

2.2	Temperature should be verifiable at all times and must be between 20 and 26º C.	Important	Regular records of temperature.		
2.3	Oxygen levels must be verifiable at all times and must be > 70% oxygen saturation.	Important	Regular records of oxygen.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish veterinarian or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have access to one regularly.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plan.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments of feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact on fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only or/and thrown.	Important	Records, documents, videos or on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected upon each use and replaced when damaged. Their design must not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

132 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	The use of vaccines is encouraged for the prevention of disease, rather than relying on treatment.	Important	Records, documents, SOP, on-site observation.		
6.2	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		

6.3	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		
6.4	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.5	There must be back-up systems and contingency plans in place in order to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

133 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation. (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or causing stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation. (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all times.	Important	Records, SOP, documents.		

7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		
7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, on-site observation (grading system)		

134 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		

8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		
8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems.	Important	Records, documents.		

8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

135 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, this must always be ≤ 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate, feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

136 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, on-site observation.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale.	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point. Recommended oxygen saturation > 70%.	Important	Records, documents, videos, on-site measurements.		

137 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using overdose of anesthetic.	Important	Documents, on-site observations.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Documents.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviour (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated in order to identify the cause of the issue and prevent reocccurence by implementing effective prevention strategies.	Important	on-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	on-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum).	Important	on-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviour should be absent in 5 consecutive mins of observation (minimum).	Important	on-site observation.		
12.7	Anticipatory behaviour must be apparent prior to feeding routines.	Important	on-site observation.		
12.8	If individual observation is possible in detail, ventilatory activity should be normal (50-70 opercular beats per min. (bpm)); hyperventilation (>90 bpm) should be absent at all times. Abnormal values must be reported to the welfare specialist.	Important	on-site observation.		
12.9	Swimming activity should be regular, without major or sudden changes.	Important	on-site observation.		

12.10	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Important	on-site observation		
12.11	Farmers should be aware of, and consider the use of, new technology that improves the welfare of fish.	Recommended			
12.12	Farmers should have access to reliable and relevant information on fish welfare.	Recommended			
12.13	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 3 Animal Health and Welfare and Section 12 Welfare Assessment). Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the water immediately. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate their proficiency in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease.	Important			

14- BROODSTOCK AND EGGS

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Stocking of broodstock should match the natural sex ratio of the species (1M:1F).	Important	Records, documents.		
14.2	Density of spawners must be kept <5kg/m^3 for stocking and <0.5kg/m^3 for spawning.	Important	Records, documents.		
14.3	Tank sizes must be > 5m^3 and > 1m deep, rounded or avoiding angles and contain structural enrichment, provided that it does not hinder fish swimming activities or tank cleaning operations.	Important			
14.4	Environmental parameters (temperature and photoperiod) of broodstock tanks should follow the natural rhythms, variation and ranges as the original habitat.	Important	Records, documents.		
14.5	Natural spawning methods, i.e. without handling or manipulation should be implemented. In the absence of such, all handling procedures (e.g. stripping) must be performed under proven humane alternatives by a trained staff	Important	Records, documents.		

14.6	Developing eggs may be maintained in dim light or darkness to reduce mortality and must not be handled after placement for 40-45 degree days (about 2 days at 19-20 º C).	Important	Records, documents.		

ON-GROWING REQUIREMENTS

22 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimising fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the fish.	Important	Absence of dangerous protrusions.		
1.3	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly and records must be ready for inspection.	Important	Good overall condition of nets and infrastructures. Records of periodicity and methods as assessment.		
1.4	Farm design should be such that inspection of all stock is possible.	Important	Water visibility, ROVs, divers, cameras etc.		

1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis matching natural limits and using practical experience, research and welfare specialist advice. Subtropical photoperiod max. range: 14L:10D-10L:14D.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Production units must be of adequate depth to prevent damage from ultraviolet radiation (> 45 cm) or shadows must be provided if considered appropriate.	Important	Depth of net-pen.		
1.7	Additional lighting, either fixed or portable, must be available, but only should be switched on to allow examination of the animals and equipment.	Important	Stock inspection at all times.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The cages should be located in a site protected from human induced noise. The maximum sound pressure level should be under 128 dB re 1 µPa rms in the 0.1-3kHz frequency range in any point of the cage at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

2– WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments

2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times and must be between 14 and 30º C.	Important	Regular records of temperature.		
2.3	Oxygen levels must be verifiable at all times and must be > 70% oxygen saturation.	Important	Regular records of oxygen.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish vet or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have regular access to one.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plans.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are carried out according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments to feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact to fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only and/or thrown.	Important	Records, documents, videos, on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected after use and replaced when damaged. Their design must be as to not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

132 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		
6.2	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		

6.3	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.4	There must be back-up systems and contingency plans in place to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

133 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or cause stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all time.	Important	Records, SOP, documents.		
7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, on-site observation (grading system).		

134 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		
8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		

8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems	Important	Records, documents.		
8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

135 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, must always be < 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

136 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, observation on site.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (the critical point will vary between species and with environmental factors). Critical level for Amberjack: > 6 mg/L. See Section 2 Water.	Important	Records, documents, videos, on-site measurements.		

137 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using an overdose of anesthetic.	Important	Documents, on-site observation.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Records, documents, on-site observation, training.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm, schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviours (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 13 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated to identify the cause of the issue and be prevented from reoccuring by implementing effective prevention strategies.	Important	On-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	On-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviours should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.7	Anticipatory behaviour must appear prior to feeding routines.	Important	On-site observation.		
12.8	Swimming activity should be regular, without major or sudden changes.	Important	On-site observation.		

12.9	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Recommended			
12.10	Farmers should be aware of, and consider, the use of new technology that improves the welfare of fish.	Recommended			
12.11	Farmers should have access to reliable and relevant information on fish welfare.	Important	On-site observation.		
12.12	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation.		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 12 Welfare Assessment). Limit stocking to 10 kg/m^3 max. Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the production units. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		

13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			
13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate that they received training and that they are proficient in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			

13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease (see Section 12 Welfare Assessment).	Important			

14- HARVESTING, STUNNING AND SLAUGHTER

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Harvesting can only be performed using fish pumps. The dimensions of pumps and tubes must be scaled to the operation and approved by an engineer. The maximum flow rate should be 3m/s.	Important during the transition period, after must be IMPORTANT	Documents, videos, on-site observation.		
14.2	The only permitted stunning and subsequent killing methods are: a) an effectively applied percussive blow, b) electronarcosis followed by bleeding, asphyxia or other slaughter method that must be applied while the fish are unconscious, c) electrocution (i.e. killing by electrical current).	Important during the transition period, after must be IMPORTANT	Documents, videos, on-site observation.		

14.3	A backup system e.g. 'priest' must be available throughout the killing process.	Important	Documents, videos, on-site observation.		
14.4	Any fish which fall to the ground during the process must be humanely killed with the main or back up system.	Important	Documents, videos, on-site observation.		
14.5	External damage such as scale loss, fin erosion, predator bites, lesions resulting from aggression, handling scares, parasite lesions and deformities must be noted at slaughter or upon arrival to the processing station.	Important	Documents, videos, on-site observation.		
14.6	All staff involved with the stunning and killing process must have received full training.	Important during the transition period, after must be IMPORTANT	Documents, videos, on-site observation.		
14.7	There must be a named person responsible for fish welfare throughout the killing process. This person is responsible for harvest records including stunning and slaughtering efficiency.	Important during the transition period, after must be IMPORTANT	Documents, videos, on-site observation.		

14.8	A written procedure for fish humane stunning and slaughtering (see Section 14.1 to 14.4 Harvesting, stunning and slaughter) must be in place and carried out all time.	Important	Documents, videos, on-site observation.		
14.9	Video recordings of harvesting, stunning and slaughtering must be performed regularly (once per month or every time there is any change in protocols)	Important	Documents, videos, on-site observation.		

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HATCHERY REQUIREMENTS

45 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimizing fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		

1.2	Production units must not have sharp protrusions which may be injurious to the larvae and young.	Important	Absence of dangerous protrusions.		
1.3	Back-up power generators must exist, must be functional and must be ready to support essential equipment in case of a power failure. Generators should be tested and maintained weekly.	Important	Records, documents generator test.		
1.4	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly.	Important	Good overall condition of tanks and equipment. e.g. hand nets.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis, matching natural limits and using practical experience, research and welfare specialist advice. Subtropical photoperiod max. range: 14L:10D-10L:14D; Intensity range: 200-800 lux.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Additional lighting either fixed or portable must be available, but only should be switched to allow examination of the animals and equipment.	Important	Stock inspection all times.		
1.7	Any pest control substances or equipment must be enclosed in a secure location, so there is no risk of water contamination or accidental access by non-target species.	Important	There must be a system of regular documented monitoring these baits point and recording results.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. The maximum sound pressure level should be under 128 dB re 1 µPa rms in the 0.1-3kHz frequency range in any point of the cage at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

46 – WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times and must be between 20 and 26º C.	Important	Regular records of temperature.		
2.3	Oxygen levels must be verifiable at all times and must be > 70% oxygen saturation.	Important	Regular records of oxygen.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish veterinarian or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have access to one regularly.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plan.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments of feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact on fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only or/and thrown.	Important	Records, documents, videos or on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected upon each use and replaced when damaged. Their design must not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

138 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	The use of vaccines is encouraged for the prevention of disease, rather than relying on treatment.	Important	Records, documents, SOP, on-site observation.		
6.2	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		

6.3	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		
6.4	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.5	There must be back-up systems and contingency plans in place in order to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

139 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation. (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or causing stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation. (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all times.	Important	Records, SOP, documents.		

7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		
7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, on-site observation (grading system)		

140 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		

8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		
8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems.	Important	Records, documents.		

8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

141 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, this must always be ≤ 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate, feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

142 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, on-site observation.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale.	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point. Recommended oxygen saturation > 70%.	Important	Records, documents, videos, on-site measurements.		

143 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using overdose of anesthetic.	Important	Documents, on-site observations.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Documents.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviour (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated in order to identify the cause of the issue and prevent reocccurence by implementing effective prevention strategies.	Important	on-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	on-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum).	Important	on-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviour should be absent in 5 consecutive mins of observation (minimum).	Important	on-site observation.		
12.7	Anticipatory behaviour must be apparent prior to feeding routines.	Important	on-site observation.		
12.8	If individual observation is possible in detail, ventilatory activity should be normal (50-70 opercular beats per min. (bpm)); hyperventilation (>90 bpm) should be absent at all times. Abnormal values must be reported to the welfare specialist.	Important	on-site observation.		
12.9	Swimming activity should be regular, without major or sudden changes.	Important	on-site observation.		

12.10	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Important	on-site observation		
12.11	Farmers should be aware of, and consider the use of, new technology that improves the welfare of fish.	Recommended			
12.12	Farmers should have access to reliable and relevant information on fish welfare.	Recommended			
12.13	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 3 Animal Health and Welfare and Section 12 Welfare Assessment). Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the water immediately. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate their proficiency in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease.	Important			

14- BROODSTOCK AND EGGS

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Stocking of broodstock should match the natural sex ratio of the species (1M:1F).	Important	Records, documents.		
14.2	Density of spawners must be kept <5kg/m^3 for stocking and <0.5kg/m^3 for spawning.	Important	Records, documents.		
14.3	Tank sizes must be > 5m^3 and > 1m deep, rounded or avoiding angles and contain structural enrichment, provided that it does not hinder fish swimming activities or tank cleaning operations.	Important			
14.4	Environmental parameters (temperature and photoperiod) of broodstock tanks should follow the natural rhythms, variation and ranges as the original habitat.	Important	Records, documents.		
14.5	Natural spawning methods, i.e. without handling or manipulation should be implemented. In the absence of such, all handling procedures (e.g. stripping) must be performed under proven humane alternatives by a trained staff	Important	Records, documents.		

14.6	Developing eggs may be maintained in dim light or darkness to reduce mortality and must not be handled after placement for 40-45 degree days (about 2 days at 19-20 º C).	Important	Records, documents.		

ON-GROWING REQUIREMENTS

23 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimising fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the fish.	Important	Absence of dangerous protrusions.		
1.3	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly and records must be ready for inspection.	Important	Good overall condition of nets and infrastructures. Records of periodicity and methods as assessment.		
1.4	Farm design should be such that inspection of all stock is possible.	Important	Water visibility, ROVs, divers, cameras etc.		

1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis matching natural limits and using practical experience, research and welfare specialist advice. Subtropical photoperiod max. range: 14L:10D-10L:14D.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Production units must be of adequate depth to prevent damage from ultraviolet radiation (> 45 cm) or shadows must be provided if considered appropriate.	Important	Depth of net-pen.		
1.7	Additional lighting, either fixed or portable, must be available, but only should be switched on to allow examination of the animals and equipment.	Important	Stock inspection at all times.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The cages should be located in a site protected from human induced noise. The maximum sound pressure level should be under 128 dB re 1 µPa rms in the 0.1-3kHz frequency range in any point of the cage at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

2– WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments

2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times and must be between 14 and 30º C.	Important	Regular records of temperature.		
2.3	Oxygen levels must be verifiable at all times and must be > 70% oxygen saturation.	Important	Regular records of oxygen.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish vet or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have regular access to one.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plans.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are carried out according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments to feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact to fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only and/or thrown.	Important	Records, documents, videos, on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected after use and replaced when damaged. Their design must be as to not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

138 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		
6.2	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		

6.3	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.4	There must be back-up systems and contingency plans in place to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

139 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or cause stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all time.	Important	Records, SOP, documents.		
7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, on-site observation (grading system).		

140 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		
8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		

8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems	Important	Records, documents.		
8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

141 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, must always be < 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

142 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, observation on site.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (the critical point will vary between species and with environmental factors). Critical level for Amberjack: > 6 mg/L. See Section 2 Water.	Important	Records, documents, videos, on-site measurements.		

143 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using an overdose of anesthetic.	Important	Documents, on-site observation.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Records, documents, on-site observation, training.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm, schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviours (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 13 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated to identify the cause of the issue and be prevented from reoccuring by implementing effective prevention strategies.	Important	On-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	On-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviours should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.7	Anticipatory behaviour must appear prior to feeding routines.	Important	On-site observation.		
12.8	Swimming activity should be regular, without major or sudden changes.	Important	On-site observation.		

12.9	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Recommended			
12.10	Farmers should be aware of, and consider, the use of new technology that improves the welfare of fish.	Recommended			
12.11	Farmers should have access to reliable and relevant information on fish welfare.	Important	On-site observation.		
12.12	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation.		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 12 Welfare Assessment). Limit stocking to 10 kg/m^3 max. Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the production units. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		

13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			
13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate that they received training and that they are proficient in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			

13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease (see Section 12 Welfare Assessment).	Important			

14- HARVESTING, STUNNING AND SLAUGHTER

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Harvesting can only be performed using fish pumps. The dimensions of pumps and tubes must be scaled to the operation and approved by an engineer. The maximum flow rate should be 3m/s.	Important during the transition period, after must be IMPORTANT	Documents, videos, on-site observation.		
14.2	The only permitted stunning and subsequent killing methods are: a) an effectively applied percussive blow, b) electronarcosis followed by bleeding, asphyxia or other slaughter method that must be applied while the fish are unconscious, c) electrocution (i.e. killing by electrical current).	Important during the transition period, after must be IMPORTANT	Documents, videos, on-site observation.		

14.3	A backup system e.g. 'priest' must be available throughout the killing process.	Important	Documents, videos, on-site observation.		
14.4	Any fish which fall to the ground during the process must be humanely killed with the main or back up system.	Important	Documents, videos, on-site observation.		
14.5	External damage such as scale loss, fin erosion, predator bites, lesions resulting from aggression, handling scares, parasite lesions and deformities must be noted at slaughter or upon arrival to the processing station.	Important	Documents, videos, on-site observation.		
14.6	All staff involved with the stunning and killing process must have received full training.	Important during the transition period, after must be IMPORTANT	Documents, videos, on-site observation.		
14.7	There must be a named person responsible for fish welfare throughout the killing process. This person is responsible for harvest records including stunning and slaughtering efficiency.	Important during the transition period, after must be IMPORTANT	Documents, videos, on-site observation.		

14.8	A written procedure for fish humane stunning and slaughtering (see Section 14.1 to 14.4 Harvesting, stunning and slaughter) must be in place and carried out all time.	Important	Documents, videos, on-site observation.		
14.9	Video recordings of harvesting, stunning and slaughtering must be performed regularly (once per month or every time there is any change in protocols)	Important	Documents, videos, on-site observation.		

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HATCHERY REQUIREMENTS

47 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimizing fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		

1.2	Production units must not have sharp protrusions which may be injurious to the larvae and young.	Important	Absence of dangerous protrusions.		
1.3	Back-up power generators must exist, must be functional and must be ready to support essential equipment in case of a power failure. Generators should be tested and maintained weekly.	Important	Records, documents generator test.		
1.4	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly.	Important	Good overall condition of tanks and equipment. e.g. hand nets.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis, matching natural limits and using practical experience, research and welfare specialist advice. Subtropical photoperiod max. range: 14L:10D-10L:14D.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Additional lighting either fixed or portable must be available, but only should be switched to allow examination of the animals and equipment.	Important	Stock inspection all times.		
1.7	Any pest control substances or equipment must be enclosed in a secure location, so there is no risk of water contamination or accidental access by non-target species.	Important	There must be a system of regular documented monitoring these baits points and recording results.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human induced noise. The maximum sound pressure level should be under 128 dB re 1 µPa rms in the 0.1-3kHz frequency range in any point of the cage at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

48 – WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times and must be between 18 and 24º C.	Important	Regular records of temperature.		
2.3	Oxygen levels must be verifiable at all times and must be > 70% oxygen saturation.	Important	Regular records of oxygen.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish veterinarian or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have access to one regularly.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plan.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments of feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact on fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only or/and thrown.	Important	Records, documents, videos or on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected upon each use and replaced when damaged. Their design must not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

144 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	The use of vaccines is encouraged for the prevention of disease, rather than relying on treatment.	Important	Records, documents, SOP, on-site observation.		
6.2	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		

6.3	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		
6.4	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.5	There must be back-up systems and contingency plans in place in order to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

145 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation. (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or causing stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation. (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all times.	Important	Records, SOP, documents.		

7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		
7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, on-site observation (grading system)		

146 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		

8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		
8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems.	Important	Records, documents.		

8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

147 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, this must always be ≤ 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate, feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

148 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, on-site observation.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale.	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point. Recommended oxygen saturation > 70%.	Important	Records, documents, videos, on-site measurements.		

149 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using overdose of anesthetic.	Important	Documents, on-site observations.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Documents.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviour (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated in order to identify the cause of the issue and prevent reocccurence by implementing effective prevention strategies.	Important	on-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	on-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum).	Important	on-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviour should be absent in 5 consecutive mins of observation (minimum).	Important	on-site observation.		
12.7	Anticipatory behaviour must be apparent prior to feeding routines.	Important	on-site observation.		
12.8	If individual observation is possible in detail, ventilatory activity should be normal (50-70 opercular beats per min. (bpm)); hyperventilation (>90 bpm) should be absent at all times. Abnormal values must be reported to the welfare specialist.	Important	on-site observation.		
12.9	Swimming activity should be regular, without major or sudden changes.	Important	on-site observation.		

12.10	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Important	on-site observation		
12.11	Farmers should be aware of, and consider the use of, new technology that improves the welfare of fish.	Recommended			
12.12	Farmers should have access to reliable and relevant information on fish welfare.	Recommended			
12.13	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 3 Animal Health and Welfare and Section 12 Welfare Assessment). Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the water immediately. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate their proficiency in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease.	Important			

14- BROODSTOCK AND EGGS

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Stocking of broodstock should match the natural sex ratio of the species (1M: 1-1.5F).	Important	Records, documents.		
14.2	Density of spawners must be kept <5kg/m^3 for stocking and <3kg/m^3 for spawning.	Important	Records, documents.		
14.3	Tank sizes must be > 5m^3 and > 5m deep, rounded or avoiding angles and contain structural enrichment, provided that it does not hinder fish swimming activities or cleaning operations.	Important			
14.4	Environmental parameters (temperature and photoperiod) of broodstock tanks should follow the natural rhythms, variation and ranges as the original habitat.	Important	Records, documents.		
14.5	Natural spawning methods, i.e. without handling or manipulation should be implemented. In the absence of such, all handling procedures (e.g. stripping) must be performed under proven humane alternatives by a trained staff	Important	Records, documents.		

14.6	Developing eggs may be maintained in dim light or darkness to reduce mortality and must not be handled after placement for 40-45 degree days (about 2 days at 19-20 º C).	Important	Records, documents.		

ON-GROWING REQUIREMENTS

24 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimising fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the fish.	Important	Absence of dangerous protrusions.		
1.3	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly and records must be ready for inspection.	Important	Good overall condition of nets and infrastructures. Records of periodicity and methods as assessment.		

1.4	Farm design should be such that inspection of all stock is possible.	Important	Water visibility, ROVs, divers, cameras etc.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis, matching natural limits and using practical experience, research and welfare specialist advice. Subtropical photoperiod max. range: 14L:10D-10L:14D.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Production units must be of adequate depth to prevent damage from ultraviolet radiation (> 45 cm) or shadows must be provided if considered appropriate.	Important	Depth of net-pen.		
1.7	Additional lighting, either fixed or portable, must be available, but only should be switched on to allow examination of the animals and equipment.	Important	Stock inspection at all times.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The cages should be located in a site protected from human induced noise. The maximum sound pressure level should be under 128 dB re 1 µPa rms in the 0.1-3kHz frequency range in any point of the cage at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

2– WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments

2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be between 18 and 24º C.	Important	Regular records of temperature.		
2.3	Oxygen levels must be verifiable at all times and must be > 70% oxygen saturation.	Important	Regular records of oxygen.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish vet or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have regular access to one.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plans.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are carried out according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments to feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact to fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only and/or thrown.	Important	Records, documents, videos, on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected after use and replaced when damaged. Their design must be as to not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

144 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		
6.2	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		

6.3	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.4	There must be back-up systems and contingency plans in place to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

145 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or cause stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all time.	Important	Records, SOP, documents.		
7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, on-site observation (grading system).		

146 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		
8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		

8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems	Important	Records, documents.		
8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

147 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, must always be < 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

148 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, observation on site.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (the critical point will vary between species and with environmental factors). Critical level for Yellowtail Amberjack: > 6 mg/L. See Section 2 Water.	Important	Records, documents, videos, on-site measurements.		

149 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using an overdose of anesthetic.	Important	Documents, on-site observation.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Records, documents, on-site observation, training.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm, schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviours (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 13 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated to identify the cause of the issue and be prevented from reoccuring by implementing effective prevention strategies.	Important	On-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	On-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviours should be absent in 5 consecutive mins of observation (minimum).	Important	On-site observation.		
12.7	Anticipatory behaviour must appear prior to feeding routines.	Important	On-site observation.		
12.8	Swimming activity should be regular, without major or sudden changes.	Important	On-site observation.		

12.9	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Recommended			
12.10	Farmers should be aware of, and consider, the use of new technology that improves the welfare of fish.	Recommended			
12.11	Farmers should have access to reliable and relevant information on fish welfare.	Important	On-site observation.		
12.12	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation.		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators. Limit stocking to 10 kg/m^3 max. Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the production units. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			

13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate that they received training and that they are proficient in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease (see Section 12 Welfare Assessment).	Important			

14- HARVESTING, STUNNING AND SLAUGHTER

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Harvesting can only be performed using fish pumps. The dimensions of pumps and tubes must be scaled to the operation and approved by an engineer. The maximum flow rate should be 3m/s.	Important during the transition period, after must be IMPORTANT	Documents, videos, on-site observation.		
14.2	The only permitted stunning and subsequent killing methods are: a) an effectively applied percussive blow, b) electronarcosis followed by bleeding, asphyxia or other slaughter method that must be applied while the fish are unconscious, c) electrocution (i.e. killing by electrical current).	Important during the transition period, after must be IMPORTANT	Documents, videos, on-site observation.		
14.3	A backup system e.g. 'priest' must be available throughout the killing process.	Important	Documents, videos, on-site observation.		
14.4	Any fish which fall to the ground during the process must be humanely killed with the main or back up system.	Important	Documents, videos, on-site observation.		

14.5	External damage such as scale loss, fin erosion, predator bites, lesions resulting from aggression, handling scares, parasite lesions and deformities must be noted at slaughter or upon arrival to the processing station.	Important	Documents, videos, on-site observation.		
14.6	All staff involved with the stunning and killing process must have received full training.	Important during the transition period, after must be IMPORTANT	Documents, videos, on-site observation.		
14.7	There must be a named person responsible for fish welfare throughout the killing process. This person is responsible for harvest records including stunning and slaughtering efficiency.	Important during the transition period, after must be IMPORTANT	Documents, videos, on-site observation.		
14.8	A written procedure for fish humane stunning and slaughtering (see Section 14 - 4 Harvesting, stunning and slaughter) must be in place and carried out all time.	Important	Documents, videos, on-site observation.		
14.9	Video recordings of harvesting, stunning and slaughtering must be performed regularly (once per month or every time there is any change in protocols)	Important	Documents, videos, on-site observation.		

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HATCHERY REQUIREMENTS

49 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimizing fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the larvae and young.	Important	Absence of dangerous protrusions.		
1.3	Back-up power generators must exist, must be functional and must be ready to support essential equipment in case of a power failure. Generators should be tested and maintained weekly.	Important	Records, documents generator test.		
1.4	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly.	Important	Good overall condition of tanks and equipment. e.g. hand nets.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist advice.	Important	Facility allocated within the natural photoperiod of the species.		

1.6	Additional lighting either fixed or portable must be available, but only should be switched to allow examination of the animals and equipment.	Important	Stock inspection all times.		
1.7	Any pest control substances or equipment must be enclosed in a secure location, so there is no risk of water contamination or accidental access by non-target species.	Important	There must be a system of regular documented monitoring these baits point and recording results.		
1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The tanks should be located in a site protected from human-induced noise. The maximum sound pressure level should be under 128 dB re 1 µPa rms in the 0.1-3kHz frequency range in any point of the tank at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

50 – WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times and must be between 11 and 30º C.	Important	Regular records of temperature.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish veterinarian or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have access to one regularly.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plan.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments of feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	**Requirement**	**Level**	**Parameters and information**	**Y/N**	**Comments**
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact on fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled when absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only or/and thrown.	Important	Records, documents, videos or on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected upon each use and replaced when damaged. Their design must not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

150 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	The use of vaccines is encouraged for the prevention of disease, rather than relying on treatment.	Important	Records, documents, SOP, on-site observation.		
6.2	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		

6.3	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		
6.4	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.5	There must be back-up systems and contingency plans in place in order to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

151 - GRADING

No.	Requirement	Level	Parameters and	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation. (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or causing stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation. (grading system).		
7.3	A written protocol/working procedure for grading must be in place and carried out at all times.	Important	Records, SOP, documents.		

7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		

152 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		
8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		

8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems.	Important	Records, documents.		
8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

153 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, this must always be ≤ 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate, feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

154 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, on-site observation.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale.	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (the critical point will vary between species and with environmental factors). Critical level for Gilthead sea bream: > 6 mg/L. See Section 2 Water.	Important	Records, documents, videos, on-site measurements.		

155 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using overdose of anesthetic.	Important	Documents, on-site observations.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Documents.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviour (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated in order to identify the cause of the issue and prevent reocccurence by implementing effective prevention strategies.	Important	on-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation).	Important	on-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins. of observation (minimum).	Important	on-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviour should be absent in 5 consecutive mins. of observation (minimum).	Important	on-site observation.		
12.7	Anticipatory behaviour must be apparent prior to feeding routines.	Important	on-site observation.		
12.8	If individual observation is possible in detail, ventilatory activity should be normal (50-70 opercular beats per min. (bpm)); hyperventilation (>90 bpm) should be absent at all times. Abnormal values must be reported to the welfare specialist.	Important	on-site observation.		
12.9	Swimming activity should be regular, without major or sudden changes.	Important	on-site observation.		

12.10	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Important	on-site observation		
12.11	Farmers should be aware of, and consider the use of, new technology that improves the welfare of fish.	Recommended			
12.12	Farmers should have access to reliable and relevant information on fish welfare.	Recommended			
12.13	Farmers must implement a protocol to perform routine monitoring and assessment of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important			

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 3 Animal Health and Welfare and Section 12 Welfare Assessment). Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the water immediately. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		
13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			
13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			

13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate their proficiency in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			
13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease.	Important			

14- BROODSTOCK AND EGGS

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Stocking of broodstock should match the natural sex ratio of the species.	Important	Records, documents.		
14.2	Density of spawners must be kept <3kg/m^3 both for stocking and spawning.	Important			
14.3	Tank sizes must be > 5m^3 and > 1m deep, rounded or avoiding angles and contain structural enrichment, provided that it does not hinder fish swimming activities or tank cleaning operations.	Important			
14.4	Environmental parameters (temperature and photoperiod) of broodstock tanks should follow the natural rhythms, variations and ranges as their original habitat.	Important	Records, documents.		
14.5	Apart from natural spawning, other methods to promote spawning are not allowed.	Important	Records, documents.		

14.6	Developing eggs may be maintained in dim light or darkness to reduce mortality and must not be handled after placement for 40-45 degree days (about 2 days at 19-20º C).	Important	Records, documents.		

ON-GROWING REQUIREMENTS

25 – CAPTIVE ENVIRONMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
1.1	Production units should provide horizontal and vertical withdrawal space, optimising fish welfare conditions regarding spatial constraints.	Important	There must always be horizontal and vertical empty space.		
1.2	Production units must not have sharp protrusions which may be injurious to the fish.	Important	Absence of dangerous protrusions.		
1.3	Production units and equipment must be checked for holes, faults and fouling. All equipment must be maintained regularly and records must be ready for inspection.	Important	Good overall condition of nets and infrastructures. Records of periodicity and methods as assessment.		
1.4	Farm design should be such that inspection of all stock is possible.	Important	Water visibility, ROVs, divers, cameras etc.		
1.5	Optimal photoperiod for fish welfare must be determined on a site-by-site basis using practical experience, research and welfare specialist advice.	Important	Facility allocated within the natural photoperiod and geographical range of the species.		
1.6	Production units must be of adequate depth to prevent damage from ultraviolet radiation or shade must be provided if considered appropriate.	Important	Depth of net-pen.		
1.7	Additional lighting, either fixed or portable, must be available, but only should be switched on to allow examination of the animals and equipment.	Important	Stock inspection at all times.		

1.8	Structural enrichment should be provided. If deemed impossible or harmful, other type of enrichment should be implemented (occupational, dietary, social, sensorial).	Recommended	Presence of enrichment – but observing Section 1.2 Captive Environment.		
1.9	The cages should be located in a site protected from human induced noise. The maximum sound pressure level should be under 128 dB re 1 µPa rms in the 0.1-3kHz frequency range in any point of the cage at all times.	Recommended	Absence of noise, recorded with a hydrophone and analysed with appropriate software.		

2– WATER

No.	Requirement	Level	Parameters and information	Y/N	Comments
2.1	A contingency plan must exist to correct water quality parameters when they deviate from reference values.	Important	Water transparency, absence of foam, food or other items in the surface or in suspension, overall good water quality.		
2.2	Temperature should be verifiable at all times, and must be between 11 and 30º C.	Important	Regular records of temperature.		

3 – ANIMAL HEALTH AND ANIMAL WELFARE

No.	Requirement	Level	Parameters and information	Y/N	Comments
3.1	Each site must either employ a qualified fish vet or have access to one.	Important	Records, documents, contracts.		
3.2	Each site must either employ a qualified fish welfare specialist or have regular access to one.	Important	Records, documents.		
3.3	All sites must have a documented fish health and welfare plan.	Important	Records, documents.		
3.4	The documented fish health and welfare plan must be reviewed on at least an annual basis by an experienced fish veterinary and welfare specialist.	Important	Records, documents.		

4 - FEEDING

No.	Requirement	Level	Parameters and information	Y/N	Comments
4.1	The farm must implement a system that ensures appropriate feed logistics (storage, transport, distribution, traceability), records, and contingency plans.	Important	Records, documents.		

4.2	The farm must ensure that feeding regimes are carried out according to manufacturer's guidelines, farmer experience, and feeding behaviour. Adjustments to feeding regimes should be based on fish behaviour, appetite, expected biomass, and minimisation of feed waste.	Important	Records, documents.		
4.3	Feed must be dispensed and spread throughout the rearing space to minimise the risk of over- and under-feeding and to reduce feeding competition.	Important	Records, feeding technique and protocol.		
4.4	Fish must be observed at least once per day during feeding and feeding behaviour should be registered. Records must be available for inspection.	Important	Records, documents.		

5 – HANDLING AND MANIPULATION PROCEDURES

No.	Requirement	Level	Parameters and information	Y/N	Comments
5.1	Fish must be protected at all times from avoidable injuries, pain and stress. Farm operators must be able to demonstrate awareness at inspection.	Important	Records, documents, SOP, on-site observation, training.		
5.2	Cleaning and maintenance operations must be carried out with minimal impact to fish welfare and health.	Important	Records, documents, on-site observation, training.		

5.3	Live fish must only be removed from water and handled where absolutely necessary. The maximum emersion time without anesthesia is 15 seconds.	Important	Records, documents, on-site observation, training.		
5.4	When fish are handled, adequate support must be given to the body: live fish should never be held by the gills, tail only and/or thrown.	Important	Records, documents, videos, on-site observation.		
5.5	Handling nets must be of a suitable size and ideally knotless. They must be kept clean, disinfected after use and replaced when damaged. Their design must be as to not risk injuring the fish. In case other equipment apart from nets is used, they must be in good conditions and without protrusions.	Important	Net design, size and condition.		

150 – VACCINATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
6.1	All vaccination procedures must be conducted with care and with the minimum possible distress caused to the fish.	Important	Records, documents, SOP, on-site observation.		

6.2	All fish must be sedated before being injected, unless there are clear health and welfare reasons not to.	Important	Records, documents, on-site observation.		
6.3	Vaccines and anesthetics must be used according to the manufacturer's data sheet, unless otherwise specified by a vet. Vaccine use must be recorded in the Veterinary Health and Welfare Plan.	Important	Records, documents, on-site observation.		
6.4	There must be back-up systems and contingency plans in place to deal with vaccination system malfunctions and breakdowns in order to safeguard the welfare of the fish.	Important	Records, documents.		

151 - GRADING

No.	Requirement	Level	Parameters and information	Y/N	Comments
7.1	Grading must be minimised and only be performed when absolutely necessary e.g. before vaccination, to avoid cannibalism, before slaughtering.	Important	Records, documents, SOP, on-site observation (grading system).		
7.2	All grading equipment must be designed and maintained in order to prevent damage or cause stress to the fish (e.g. absence of protrusions to avoid injuries, fish should be kept submerged at all times).	Important	Records, documents, on-site observation (grading system).		

7.3	A written protocol/working procedure for grading must be in place and carried out at all time.	Important	Records, SOP, documents.		
7.4	Fish must be monitored throughout the operation by a designated person who is responsible for identifying welfare issues and taking appropriate action if necessary.	Important	Records, documents.		
7.5	If passive grading is used, the size and design of the grading panel must be appropriate for the size of fish that are to be graded, and the enclosure they are contained within.	Important	Records, documents, on-site observation (grading system).		

152 - TRANSPORTATION

No.	Requirement	Level	Parameters and information	Y/N	Comments
8.1	Transport must be planned in order to minimise possible adverse effects on fish welfare. Transport on land: max 8h.	Important	Records, documents.		
8.2	Water quality parameters (oxygenation, ammonia levels, pH, temperature) must be monitored during transport and match with arrival tanks. A surface skimmer must be present in all transport containers.	Important	Records, documents.		
8.3	Biosecurity and fish welfare should be considered before transporting fish populations.	Important	Records, documents.		
8.4	All equipment that the fish rely on for life support must be constantly monitored throughout the journey. Absence of protrusions (to avoid injuries) in the equipment is requested.	Important	Records, documents, on-site observation.		
8.5	Water quality parameters must always comply with those described in the requirement FOS Aqua-inland rev 3 (requirements 8.1.1 to 8.1.11) and FOS Aqua Inland-Marine Rev. 4 (requirements 8.1.1 to 8.1.7)	Important	Records, documents.		
8.6	Supplementary oxygen or air supply must be sufficient to last 50% longer than the anticipated length of the journey (see Section 8.1 Transportation).	Important	Records, documents.		

8.7	Excessive or rapid changes in water temperature or pH during transport must be avoided, unless there are clear health and welfare reasons to do it.	Important	Records, documents.		
8.8	Any fish that die during transportation must be separated from live fish as soon as possible after arrival. The cause of death must be determined by a competent person.	Important	Records, documents.		
8.9	Records of any deaths or injuries that occur during transportation must be kept.	Important	Records, documents.		
8.10	Contingency plans must exist for all frequent transport problems.	Important	Records, documents.		
8.11	Starvation prior to transport should not be longer than 50-degree days and preferably just enough to achieve gut clearance (see Section 9 Starvation).	Important	Records, documents.		

153 - STARVATION

No.	Requirement	Level	Parameters and	Y/N	Comments
9.1	Starvation periods must be justified.	Important	Records, documents.		
9.2	The period during which fish are deprived of food to achieve gut clearance prior to certain procedures or harvesting must be appropriate and as minimal as possible. Unless justified, must always be < 50-degree days.	Important	Records, documents, on-site observation.		
9.3	Feed withdrawal may form part of the response to the onset of adverse environmental conditions and in the treatment of certain diseases. Veterinary and welfare specialist advice should be sought and appropriate feed withdrawal protocols should be included if deviation periods from above.	Important	Records, documents.		

154 - CROWDING

No.	Requirement	Level	Parameters and	Y/N	Comments
10.1	A written procedure for fish crowding must be validated by a welfare specialist and carried out every time.	Important	SOP		
10.2	Operators must be trained in the appropriate crowding techniques.	Important	SOP		
10.3	The frequency and duration of crowding should be kept to the minimum and clearly justified. The period for fish crowding on any occasion must not exceed 1.5 hour for grading or treatments and 2 hours for harvest.	Important	Records, SOP, videos, observation on site.		

10.4	Operators must monitor fish behaviour during crowding and take actions if fish show signs of stress or damage. Surface activity should never reach stage 4 on the crowd intensity scale.	Important	Crowd intensity scale: A simple fish behaviour scale from 1–5 may be used as a guide to managing acute stress, i.e.: 1(optimum). Importantly no fins breaking the surface of the water. 2 (Acceptable). Fins above the water over a small part of the surface of the crowd. 3 (Undesirable). Fins and part of the fish above the water over the whole surface of the crowd. Some burrowing, gasping and vigorous activity in parts of the crowd. 4 (Unacceptable). The whole surface of the crowd vigorously burrowing, gasping and splashing. 5. Whole surface of the pen boiling with violent splashing.		

10.5	Oxygen levels during crowding must be monitored and corrective action must be taken if levels fall below a critical point (the critical point will vary between species and with environmental factors). Critical level for Gilthead sea bream: > 6 mg/L. See Section 2 Water.	Important	Records, documents, videos, on-site measurements.		

155 - CULLING

No.	Requirement	Level	Parameters and information	Y/N	Comments
11.1	Any seriously sick or injured fish, or fish found not to be recovering, must be immediately removed and humanely killed without delay.	Important	Records, documents.		
11.2	Fish must only be culled using an overdose of anesthetic.	Important	Documents, on-site observation.		
11.3	Culling of any fish must only be conducted by suitably trained and competent people.	Important	Records, documents, on-site observation, training.		

12- WELFARE ASSESSMENT

No.	Requirement	Level	Parameters and information	Y/N	Comments
12.1	Appropriate systems for on-site or remote behavioural observations must be implemented: fixed or mobile live cameras underwater (preferred), live surface observations (if the previous is not possible), surface windows, or others. Behavioural observations should be regularly recorded during routine procedures or any other action which can cause stress or discomfort to fish, in order to identify caveats and improve protocols.	Important	Documents, videos, on-site observation of major behaviour patterns: swimming behaviour should be calm, schooling, no panic reactions, no isolated individuals, no aggression, no abnormal behaviour (see points below).		
12.2	Fish must be inspected on a daily basis and dead or moribund fish should be removed, minimising handling to avoid stress to the live fish within the enclosure (see Section 11 Culling).	Important	Documents, videos, on-site observation.		
12.3	Abnormal behaviour must be investigated to identify the cause of the issue and be prevented from reoccuring by implementing effective prevention strategies.	Important	On-site observation.		

12.4	Fish should be shoaling or schooling (i.e. group swimming with polarized orientation)	Important	On-site observation.		
12.5	Aggression events should be absent in 5 consecutive mins. of observation (minimum).	Important	On-site observation.		
12.6	Abnormal, vacuum or stereotypical behaviours should be absent in 5 consecutive mins. of observation (minimum).	Important	On-site observation.		
12.7	Anticipatory behaviour must appear prior to feeding routines.	Important	On-site observation.		
12.8	Swimming activity should be regular, without major or sudden changes.	Important	On-site observation.		

12.9	Before transfer to on-growing sites, a sample of ca. 100 fish must be examined at the point of weight sampling for the following outcomes: a) fin damage, b) opercular damage, c) eye damage, d) spine or jaw deformities, e) poor skin condition.	Recommended			
12.10	Farmers should be aware of, and consider, the use of new technology that improves the welfare of fish.	Recommended			
12.11	Farmers should have access to reliable and relevant information on fish welfare.	Important	On-site observation.		
12.12	Farmers must implement a protocol to perform routine monitoring and assessments of fish welfare status in their facilities, i.e. an internal evaluation based on welfare indicators.	Important	On-site observation.		

13- STOCKING AND MORTALITY

No.	Requirement	Level	Parameters and information	Y/N	Comments
13.1	Fish stock numbers, average weight and total biomass must be monitored weekly. Records for monitoring and documentation must be available for inspection.	Important	Records, documents.		
13.2	Stocking density should be monitored in relation to fish health and behaviour indicators (see Section 12 Welfare Assessment). Limit stocking to 20 kg/m^3 max. Water quality must be monitored frequently and on demand (see Aqua-inland point 8 and Section 2 Water).	Important	Records, documents.		
13.3	Mortality must be checked daily and dead fish should be removed from the production units. Mortality records must be available at inspection.	Important	Monthly mortality rate >1%.		

13.4	Deviation from expected mortalities (included in the Veterinary Health Plan) must be discussed with a Veterinary and a Welfare specialist.	Important			
13.5	Records for mortality causes must be in place per production unit. Operators must show awareness for mortality causes at inspection.	Important			
13.6	When unexplained mortalities exceed ⩾0.5% per day, samples are submitted for analysis by a veterinarian.	Important			
13.7	Managers must: a) ensure that all staff working with stock are trained and competent in aspects of fish husbandry and welfare, relevant to their duties b) ensure that staff working with stock must have attended a recognised fish welfare course.	Important			
13.8	Operators must be able to demonstrate that they received training and that they are proficient in procedures that have the potential to cause pain or distress including, handling, crowding and culling.	Important			

13.9	Stock-keepers must be able to recognise indicators of poor welfare in fish including abnormal behaviour, physical injury and symptoms of disease (see Section 12 Welfare Assessment).	Important			

14- HARVESTING, STUNNING AND SLAUGHTER

No.	Requirement	Level	Parameters and information	Y/N	Comments
14.1	Harvesting can only be performed using fish pumps. The dimensions of pumps and tubes must be scaled to the operation and approved by an engineer. The maximum flow rate should be 3m/s.	Important	Documents, videos, on-site observation.		
14.2	The only permitted stunning and subsequent killing methods are: a) an effectively applied percussive blow, b) electronarcosis followed by bleeding, asphyxia or other slaughter method that must be applied while the fish unconscious, c) electrocution (i.e. killing by electrical current).	Important	Documents, videos, on-site observation.		

14.3	A backup system e.g. 'priest' must be available throughout the killing process.	Important	Documents, videos, on-site observation.		
14.4	Any fish which fall to the ground during the process must be humanely killed with the main or back up system.	Important	Documents, videos, on-site observation.		
14.5	External damage such as scale loss, fin erosion, predator bites, lesions resulting from aggression, handling scares, parasite lesions and deformities must be noted at slaughter or upon arrival to the processing station.	Important	Documents, videos, on-site observation.		
14.6	All staff involved with the stunning and killing process must have received full training.	Important	Documents, videos, on-site observation.		
14.7	There must be a named person responsible for fish welfare throughout the killing process. This person is responsible for harvest records including stunning and slaughtering efficiency.	Important	Documents, videos, on-site observation.		

14.8	A written procedure for fish humane stunning and slaughtering (see Section 14.1 – 4 Harvesting, stunning and slaughter) must be in place and carried out all time.	Important	Documents, videos, on-site observation.		
14.9	Video recordings of harvesting, stunning and slaughtering must be performed regularly (once per month or every time there is any change in protocols).	Important	Documents, videos, on-site observation.		

Further comments:

The Auditor shall also fill-in the following fields:

□ **The products of Organisation come from an aquaculture system which COMPLIES with Friend of the Sea requirements.**

□ **The products of Organisation come from an aquaculture system which DOES NOT COMPLY with Friend of the Sea requirements.**

The Auditor found the following non-conformities:

MAJOR NON-CONFORMITIES (to be conformed to within 3 months)

Specify the points (e.g. Hatchery 1.1, On-growing 3.1, …)

MINOR NON-CONFORMITIES (to be reported within 3 weeks and conformed to within 1 year)

Specify the points

RECOMMENDATIONS (to be communicated within the next inspection)

Specify the points