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Public attitude towards cow-calf separation and other common practices of calf rearing in dairy farming—a review

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Abstract Public demand for food produced in systems with high animal welfare standards is rising. In terms of animal welfare, the dairy industry has a positive reputation in European countries. However, there are many practices in the dairy industry of which the public is unaware, e.g., zero-grazing, tethering, dehorning, disposal of male calves, and early cow-calf separation. We focused on the latter and reviewed studies addressing public opinions about dealing with calves in dairy farming. We show that most respondents in studies are unaware or reject these practices. During the last years, more and more attention was paid to cow-calf separation. This practice is mainly rejected because it is considered to be unnatural and associated with stress for the animals. However, there is a lack of scientific surveys that explore the public opinion about how much stress is tolerable in animals that have been allowed to live up to their needs for a period of time. On the other hand, the economic aspects of management practices enabling the animals to express their natural behavior to a greater extent than in the current husbandry systems should be investigated comprehensively. The amount of sales and the willingness to pay a higher price for milk and meat produced in such systems might be the key factors to a wider acceptance of such systems by dairy farmers, who will expect to be compensated for their increased efforts.

Keywords Cow-calf contact · Animal welfare · Public opinion · Consumer's opinion · Husbandry practices

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Introduction

Over the last years, consumers' interest in animal welfare, in particular in products from animal-friendly husbandry systems, has increased (e.g., for Germany: Risius and Hamm 2017). This is reflected by a higher willingness to pay (WTP) for foods from such production systems (Clark et al. 2017; Janssen et al. 2016). That also applies to consumers in other countries like Sweden (Carlsson et al. 2005), Spain (Gracia et al. 2011), USA (McKendree et al. 2013; Wolf and Tonsor 2017), the Netherlands (Mulder and Zomer 2017), and Portugal (Viegas et al. 2014). For German consumers, who regularly buy organic products, an animal-friendly husbandry system is the most important reason for their purchasing decisions (BMEL 2017). In general, the milk industry has a relatively good reputation for animal welfare among the population of European countries like the UK and Spain (Ellis et al. 2009; María 2006). In Germany, dairy cows are perceived to have even the best living conditions compared with other animals like chicken or pigs (Christoph-Schulz et al. 2019). Although, consumers advocate natural animal husbandry,

they are not aware of many practices, especially in dairy farming.

This review aims to give an overview of the opinions of citizens and consumers towards specific husbandry practices concerning calves in dairy farming from an international viewpoint and to highlight the gaps of knowledge that should be addressed by future studies, to advance calves' welfare in dairy production. As the early separation of cow and calf attracts more and more attention, this formed the focus of the study.

Material and method

The two scientific databases Web of Science and Google Scholar were used applying the following search terms:

(management practice) AND (public* OR consumer* OR citizen*) for Web of Science

"management practice" AND "public" OR "consumer" OR "citizen" for Google Scholar

The term "management practice" was then replaced by "cow calf separation" or "disbudding" or "tail docking" or "disposal male calves" or "culling male calves."

In addition, the reference lists in the identified scientific articles were reviewed for relevant studies. The given combinations resulted in 14 exploitable publications which are based on different methods (Table 1).

Results and discussion

Disposal of male calves

In dairy farming, most of the cows belong to breeds that have high genetic merits for milk but not meat. Compared with beef cattle or crossbreeds, bulls of dairy breeds have lower slaughter weights and the meat has a lower intramuscular fat content. Thus, in many countries, male dairy calves are seen as not profitable and therefore they are culled and disposed or sold and slaughtered shortly after birth as "baby calves" (Appleby et al. 2014; Cave et al. 2005; Renaud et al. 2017). Cave et al. (2005) analyzed the mortality data of abattoir records in the state of Victoria in Australia from 1998 to 2000. They showed that, only in this state, about 600,000 male calves that are less than a week old were culled each year. Renaud et al. (2017) studied the management of male calves on Canadian dairy farms. Forty-nine farmers (5% of all participators) answered that during the previous year, they had euthanized at least one bull at birth. The proportion of male calves euthanized on the farms ranged from 1 to 100%, with an average of 19% being euthanized at birth. A lack of infrastructure for rearing male calves for beef production is one reason for the disposal of these animals (Cave et al. 2005). Renaud et al. (2017) suspected economic reasons for the disposal of the bull calves. They assumed a correlation between culling male calves and the price per male calf that was paid to the farmers. Cardoso et al. (2017) questioned 296 participants about their awareness and acceptance towards the disposal of male calves; 79% of the participants were unaware of this practice, and 90% of them rejected it after they were informed about it, whereas 9% were indifferent.

According to Denmark's Radio (DR) 2018, around 23,500 male Jersey calves were slaughtered in Denmark shortly after birth in 2017 (including around 700 organic calves). This corresponds to about 80% of all born male jersey calves. Since this was criticized by an animal welfare organization, the umbrella organization of Danish dairies (Danish Agriculture & Food Council) prohibited the early killing of calves in organic farms. A recommendation against the killing of conventional male calves should follow (DR 2018).

In Germany, the killing of an animal without reasonable cause is prohibited by law, and thus, the disposal of male healthy calves right after birth for reasons of inefficiency is not allowed (BMJV 1972). At the end of the year 2019, various German media (e.g., Von Blazekovic 2019) reported on the very low prices that farmers realized for dairy male calves, but yet, there is no scientific study available how these reports were received by the consumers.

Although the species is different, the efforts to avoid the killing of millions of male layer chickens might be transferable to the dairy farming sector. A few years ago, only a small number of people in Germany and the Netherlands knew that every year, millions of male layer chicks are killed right after hatching (Hörning and Häde 2015; Leenstra et al. 2011). However, the high level of reporting made consumers aware of this practice. Actually, most of the German citizens know about this practice (Brümmer et al. 2018). Initiatives were set up in many places to avoid the killing of day-old chicks, and now, it is possible to buy eggs from chickens whose male "siblings" were not disposed of right after birth. The meat of these animals is marketed under the name

Table 1 Characteristics of identified literature on public attitudes and perceptions towards management practices in dairy farming (Publications are listed in chronological order, starting with the most recent.)

Authors	Title	Topic	Methodology	Participants	Countries
Rovers et al. (2019)	Citizens' Perception of Different Aspects Regarding German Livestock Production	Amputation, surgeries	Online survey	400	Germany
Christoph-Schulz et al. (2018)	German citizens' different perceptions regarding dairy and cattle husbandry	Disbudding	Focus group discussions	6 groups with 4 to 11	Germany
Busch et al. (2017)	American and German attitudes towards cow-calf separation on dairy farms	Cow calf separation	Online survey	967	USA Germany
Cardoso et al. (2017)	Brazilian Citizens: Expectations Regarding Dairy Cattle Welfare and Awareness of Contentious Practices	Cow calf separation, disposal of male calves, disbudding	Mixed methods approach	Interview: 40 Survey: 296	Brazil
Hötzel et al. (2017)	Citizens' views on the practices of zero-grazing and cow-calf separation in the dairy industry: Does providing information increase acceptability?	Cow calf separation	Questionnaire	400	Brazil
Olynk Widmar et al. (2017)	US Resident Perceptions of Dairy Cattle Management Practices	Disbudding, tail docking	Online survey	1201	USA
Ventura et al. (2016)	What Difference Does a Visit Make? Changes in Animal Welfare Perceptions after Interested Citizens Tour a Dairy Farm	Cow calf separation	Questionnaire before and after farm visit	50	Canada
Christoph-Schulz et al. (2015)	What about the calves? How society perceives dairy farming	Cow calf separation	Focus group discussions	6 groups with 6 to 11 partici-pants	Germany
Robbins et al. (2015)	Stakeholder views on treating pain due to dehorning dairy calves	Disbudding	Online platform	354	USA Canada others
Ventura et al. (2013)	Views on contentious practices in dairy farming: The case of early cow-calf sepa-ration	Cow calf separation	Web-based forum	163	Canada USA
Boogaard et al. (2011)	Social Acceptance of Dairy Farming: The Ambivalence Between the Two Faces of Modernity	Cow calf separation	Online survey	1178	Netherlands
Weary et al. (2011)	Tail docking dairy cattle: Responses from an online engagement	Tail docking	Online platform	178	USA Canada others
Boogaard et al. (2010)	Visiting a Farm: An Exploratory Study of the Social Construction of Animal Farming in Norway and the Netherlands Based on Sensory Perception	Cow calf separation	Questionnaire during farm visit	63	Norway Netherlands
Boogaard et al. (2008)	Defining sustainability as a socio-cultural concept: Citizen panels visiting dairy farms in the Netherlands	Cow calf separation	Questionnaire during farm visit; online questionnaire after farm visit	39	Netherlands

"Bruderhahn" (in English: brother cock) (Hörning and Häde 2015). Some of the dairy farmers practicing cow-calf contact also try to keep and fatten the male calves on their farms and then market this meat directly. A few dairy farmers who market their bulls started to call the meat of bulls of dairy breeds "Bruderkalb" (in English: brother calf) following the model established in poultry farming (van der Lann 2016). This German marketing approach could be an alternative option to increase the value of male calves, especially for countries in which

the disposal of male calves right after calving is still common.

Disbudding

Disbudding of dairy calves is considered to reduce the risk of injuries to the handlers and other animals (Faulkner and Weary 2000; Misch et al. 2007; Stewart et al. 2009). This is a common practice in the EU. Cozzi et al. (2015) ascertain in a survey ($n = 652$ participants, 64% dairy farmers, EU) that 81% of the participating dairy farmers keep disbudded/dehorned animals. An economic reason for this practice is the reduced space in barns and during transportation dehorned cattle require compared with cattle with horns (Faulkner and Weary 2000). The horn buds of the young calves are usually removed using caustic paste or hot iron, both being very painful experiences for the animal (Faulkner and Weary 2000; Stafford and Mellor 2011; Stewart et al. 2009). Throughout the world, this practice is implemented without the use of an anesthetic (Faulkner and Weary 2000; Misch et al. 2007; Stewart et al. 2009). This is also stated explicitly in the German Animal Protection Act (BMJV 1972). In the study by Cardoso et al. (2017), the participating citizens were asked about their awareness and acceptance of dehorning calves without pain control. Most of the participants (85%) were unaware of the practice of disbudding before the survey, and 89% of these participants rejected the practice after they were informed about it. Similar results were shown in a study in the USA carried out by Olynk Widmar et al. (2017) and in Germany (Christoph-Schulz et al. 2018). Asked to rank different aspects of dairy husbandry (e.g., medication only in cases of illness, no genetically modified food), 35% of the asked respondents stated that waiving surgeries and amputations is important for them and even 10% stated that it is the most important aspect for them (Rovers et al. 2019).

In an online survey by Robbins et al. (2015) about the provision of pain relief in disbudding and dehorning of dairy calves, 90% of the participants from the USA and Canada ($n = 354$) supported the provision. The most common themes in the participants' comments were as follows: pain intensity and duration, concerns about drug use, cost, ease and practicality, and availability of alternatives. Robbins et al. (2015) wanted to recruit people who are involved in the dairy sector and thus advertised the study at producer meetings, by the US Department of Agriculture and livestock feed companies as well as a livestock pharmaceutical company. In addition, the newsletter of the British Columbia Society for the Prevention of Cruelty to Animals informed about the study. Due to the high participation of agricultural professionals, it can be assumed that most of them are willing to apply pain treatment.

Although the WTP higher prices for antibiotic free or pasture based produced Cheddar cheese was higher, the respondents ($n = 749$) of a nationally representative survey and WTP choice experiment conducted in the USA showed also an increased WTP for cheese labeled as verified polled or disbudding with pain relief (Bir et al. 2020).

In addition to dehorning under anesthetics—or at least the application of pain relief—and breeding of polled cattle, promoting the keeping of horned cows is another approach to meet consumers' expectations. However, a popular vote in Switzerland about the "Hornkuh-Initiative" (in English: Initiative for cows with horns) that postulated financial support for farmers who would abstain from disbudding was rejected (Swiss Confederation 2016). In Switzerland, as well as in Germany, milk and milk products of cows keeping their horns are available. A variety of direct marketers and smaller dairies offer such products. One internationally present organic farming association even prohibits its members to remove horns or horn buds (Demeter e. V. 2018).

Tail docking

Tail docking is still a common practice on dairy farms in many areas in the USA, even if it is prohibited in some states, and Australia (Barnett et al. 1999; Olynk Widmar et al. 2017; AVMA 2019; Weary et al. 2011). Farmers remove calves' tails by using a band (e.g., rubber ring) or a surgical method (Barnett et al. 1999; NAHMS 2007). Farmers who advocate for the implementation of this practice provide the following reasons: milking is done more quickly, reduced risk of leptospirosis and mastitis, easier handling of cows, reduced number of flies, and better milk quality due to cleaner cows (Barnett et al. 1999). Other reasons include increased hygiene in tie stalls because cows' tails often lay in urine and manure (Weary et al. 2011). Tail docking in calves intended for fattening aims to prevent tail tip necrosis under housing conditions with limited space or fully slatted floors (EFSA Panel on Animal Health and

Welfare 2012). Tail tip necrosis might lead to pyemia or even to death (Schrader et al. 2001). However, farmers implementing tail docking are aware that this is a painful procedure (Barnett et al. 1999). In contrast to the assumptions, Kroll et al. (2014) were not able to detect significant differences between tail docked and undocked cattle regarding performance parameters, health events, or carcass quality raised in a slatted floor facility. In an online survey by Weary et al. (2011) with agricultural operators, veterinarians, persons without agricultural background, and academics, 79% of the participants were opposed to tail docking, although so many professional participants were involved (30% were producers, 23% were veterinarians, and 22% included a mixture of teachers, students, and industry professionals). However, the rejection of the controversial practice of tail docking was comparatively similar to that of the other studies, but only participants from the group of the professionals spoke out in favor of the practice.

According to an online study by Olynk Widmar et al. (2017) with 1201 US residents, the respondents perceived tail docking and dehorning as the most negative implications for cattle welfare. In Germany, amputations are only allowed in individual cases according to veterinary indications. Amputating with elastic rubber rings for management reasons is prohibited. The use of rubber rings can be requested from the authority only in the case of male calves under 3 months of age if the intervention is essential to protect the animals (BMJV 1972). In Austria, the docking of tails of calves is explicitly prohibited (BMGF 2004). According to the Council Regulation (EC 2007) No. 834/2007 and the follow-up regulation 2018/848 on organic production and labelling of organic products with regard to organic production, labelling, and control, the routine docking of tails in organic livestock farming in Europe is prohibited.

Early cow-calf separation

New-born dairy calves are usually permanently separated from their dams within a few hours after birth. This is a typical practice in dairy farming and applies both to organic and conventional production systems (Kälber and Barth 2014). In dairy farming, cows are kept for the production of milk which is the source of income. According to the farmers in the study of Wagenaar and Langhout (2007), without early separation, the cows would feed uncontrollable amounts of milk to their calves, which would reduce the amount of produced milk and, consequently, farmers' income. The use of a controlled amount of milk replacer or whole milk is considered more economical (Godden et al. 2005). In addition to the reduced amount of saleable milk, farmers point out that leaving mother and calf together for a longer time increases the stress in both when they are finally separated (Loberg et al. 2008). Nevertheless, the public view on the early separation of cow and calf remains critical (Busch et al. 2017).

Today, many consumers are unaware of cow-calf separation. Hötzel et al. (2017) reported that 67% of citizens participating in their study ($n = 400$) were unaware of this practice. This result coincides with the studies of Cardoso et al. (2017) and Ventura et al. (2016), who reported that 65% ($n = 296$) and 37 out of 50 participants respectively were uninformed of cow-calf separation.

Besides the knowledge about consumer awareness of the practice of cow-calf separation, it is important to know whether consumers accept or reject this practice. This question was asked in four of the reviewed articles. In studies with citizens who had little or no agricultural background, in which it was explicitly asked for acceptance or rejection of the practice, most people rejected it. Cardoso et al. (2017) reported that 84% of their participants rejected the practice (14% were indifferent). In the study by Hötzel et al. (2017), participants received information about cow-calf separation. In the informed group, the rate of the separation rejection was 69.2%, while in the group which received less information, this rate was 61.7%. In the first group, 17.3% of participants were indifferent and in the second, 32.8%.

Busch et al. (2017) examined how the acceptance and rejection rates differ between Germany and the USA. After being informed about it, 56.5% of the surveyed Americans rejected the practice. In the same survey, 21.8% took a neutral position and 21.7% advocated for an early separation. By contrast, the rejection rate among German participants was 67.7%, while 18.5% of respondents took a neutral position and 14.4% advocated for an early separation. Such national differences in the perception of the participants could also be found in Boogaard et al. (2010). In this study, Dutch and Norwegian participants were compared. The Norwegian citizens were less concerned about the conflict between naturalness and modern production than the Dutch respondents (Boogaard et al. 2010).

Ventura et al. (2013) shared access to their web-based survey in dairy farming journals. As a result,

69% of the participants were students or teachers (33%), animal advocates (13%), producers (11%), veterinarians (9%), and other dairy industry professionals (3%). Only 31% of the participants had no relationship with the dairy industry. This is a small percentage compared with the share in other studies, e.g., Busch et al. (2017) or Hötzel et al. (2017). As a consequence, Ventura et al. (2013) reported a balanced opinion on cow-calf separation with a tendency to rejection.

Christoph-Schulz et al. (2015) and Christoph-Schulz et al. (2018) conducted moderated, guided focus group discussions with citizens in three German cities. In Christoph-Schulz et al. (2015), calf husbandry became relevant in the discussions. Regarding calf rearing, no unanimous opinion was found. However, some of the participants criticized the separation of calves from their mothers.

In the survey of Boogaard et al. (2011, p. 270), the respondents ($n = 1178$) could indicate their level of support for a statement on a scale from 1 (disagree completely) to 7 (agree completely). The mean for the statement "If it is efficient and practical for a dairy farm, then it is acceptable that a calf grows up without a dam" was 3.04. In earlier studies by Boogaard et al. (2008, 2010), it was reported that many of their Dutch respondents expressed concern about cow-calf separation. In the comparative study by (Boogaard et al. 2010), the rejection rate of the Dutch participants was higher than that of the Norwegian participants. After evaluating 50 questionnaires of participants interested in food before and after a farm visit, researchers reported that many of the participants were surprised by this practice. These citizens rejected the early cow-calf separation (Ventura et al. 2016).

Unnaturalness of the practice is the most common argument of the opponents of early cow-calf separation (Boogaard et al. 2008; Boogaard et al. 2010; Boogaard et al. 2011; Busch et al. 2017; Christoph-Schulz et al. 2015; Hötzel et al. 2017; Ventura et al. 2013; Ventura et al. 2016). Other reasons for a rejection are as follows: ethical concerns, animal feelings or suffering (Hötzel et al. 2017), harming of cow and calf (Christoph-Schulz et al. 2015), emotional stress (Busch et al. 2017; Ventura et al. 2013), and compromises of calf and cow health (Cardoso et al. 2017; Ventura et al. 2013).

The reduction of stress is also an argument of the advocates of early cow-calf separation. Supporters of this practice argue that the stress of animals is minimized when the separation takes place before a bond is established between cow and calf (Busch et al. 2017; Ventura et al. 2013). It was also stated that an early separation promotes calf and cow health and that the dairy industry is limited in its ability to accommodate cow-calf pairs (Ventura et al. 2013). From the farmers' point of view, late separation means a loss of control in breeding, as well as a loss of milk for marketing (Wagenaar and Langhout 2007).

As shown in Table 1, the survey methods used by the researchers differ from each other. The participants of the most of presented studies were citizens with little or no knowledge of the dairy farming or dairy industry. However, Ventura et al. (2013) published an access link to their Internet-based survey in dairy industry journals, which gave them a relatively high proportion of participants with some background knowledge. This was reflected in a balanced opinion towards the practice of cow-calf separation, which was not the case in the other studies. The participants of a later study by Ventura et al. (2016) were citizens with high levels of engagement in food and agriculture issues. The study was conducted with participants of an event organized by a NGO and dedicated to enjoyable, conscious, and regional food. This was reflected in the highest rejection rate towards early cow-calf separation.

Busch et al. (2017) acquired largely students and freelancers through crowdsourcing platforms on the internet. These are people with the motivation to earn money by completing online questionnaires. Therefore, the results of these three studies (Ventura et al. 2013; Ventura et al. 2016; Busch et al. 2017) are limited to the respective focus groups and do not reflect a representative opinion of typical consumers.

On the other hand, Cardoso et al. (2017) ($n = 296$) and Hötzel et al. (2017) ($n = 400$) surveyed randomly selected citizens at an airport, which reduces the likelihood of limiting the opinion due to a particular group. The participants of the three studies by Boogaard et al. (2008, 2010, 2011) were selected from national databases of institutes of public opinion while Rovers et al. (2019) and Olynk Widmar et al. (2017) recruited their participants by an online panel of a market research agency. The methods of Christoph-Schulz et al. (2015, 2018) were focus group discussions with citizens also recruited by an online panel of a market research agency. Compared with surveys, this method allows for a deeper analysis of the topic. For a better comparison with the other studies, the information on how many citizens criticized the cow-calf separation would be

interesting. The same applies to the studies by Boogaard et al. (2010) and Boogaard et al. (2008), which also gave no precise indication of how many participants represented exactly which position. Busch et al. (2017) and Boogaard et al. (2010) each conducted an international comparative study. In both studies, national differences in the opinion on cow calf separation could be determined. While in the study by Busch et al. (2017) the ratio of participants from the compared countries is approximately the same (476 to 491 participants), the ratio reported by Boogaard et al. (2010) of the one country is three times higher than of the comparable country (47 to 16 participants). This must be taken into account when interpreting the results.

As mentioned above, most scientists conclude that many citizens are unaware of cow-calf separation or refuse it regardless of the survey method. They report that the main reason for rejection is the perceived unnaturalness of the method. In addition, the stress of separation is the reason why consumers reject this practice. Some scientists reported that the participants associate the separation of cow and calf with welfare issues (Ventura et al. 2013; Ventura et al. 2016; Busch et al. 2017; Cardoso et al. 2017). However, the question arises whether a life as a domesticated animal in a farm environment can even be called natural or whether a natural life can be equated with well-being for the livestock. For example, farm animals kept in barns are protected against natural predators and unfavorable weather conditions, which is unnatural but benefits the well-being of the animals. Beaver et al. (2019) discussed this topic and showed how by rethinking certain management methods (e.g., restriction of movement, stall design, nutrition management, cow-calf separation, individual housing for calves), a natural behavior instead of natural life can be encouraged on dairy farms.

Meanwhile, some farmers have started the practice of keeping calves with their mothers or foster cows. For example, the Welttierschutzgesellschaft (WTG, in English: World Animal Rights Organization) in Germany regularly publishes an expanding list of farmers who refrain from a strict cow-calf separation (WTG 2019). PROVIEH (in English: Pro Livestock), another German NGO, defined standards and developed a label for cow-calf contact systems (Provieh, 2019). Since 2017, milk-labeled "Elternzeit für unsere Kühe" (in English: maternal leave for our cows) is available in many supermarkets in Northern Germany (De Öko Melkburen 2019), and in the UK, a group of farmers declare their farm as "Cow-Calf Dairy" (2020). Initial scientific research projects on this type of husbandry have already been carried out and have been reviewed by Meagher et al. (2019).

Nevertheless, the economic aspect of this method has to be considered. We did not find any studies on WTP for milk or meat from cow-calf contact systems. It is important to investigate whether rearing calves by suckling is more expensive for the farmer. The profit loss from the less sellable milk must be taken into account as well as the cost for rearing male calves of dairy breeds that realize lower prices due to their lower weights. Nowadays, farmers get a higher price for their milk if they produce it organically (for price differences, see, e.g., Bioland e. V. 2018). Also, there are already extra payments for grazing or hay feeding and costumers are willing to pay higher prices for milk that is produced pasture-based (van den Pol et al. 2002; Hellberg-Bahr et al. 2012). Thus, it might be that surcharges would also be accepted by consumers for milk produced by farms that raise their calves in a system that allows prolonged cow-calf contact. However, the demand for products from such systems is not known, but this information is important for dairies and marketers to estimate whether they will be able to pay extra for products from cow-calf contact systems, such as for pasture and hay milk.

Conclusion

Many husbandry practices in dairy farming are unknown to the public, and the relevant scientific literature shows that many citizens are opposed to these practices when informed about them. There might be an increasing demand of milk and meat produced by farms that avoid the described practices. Future studies should aim to clarify this demand as well as to investigate the awareness of the beef and dairy industry of this topic. If demand and a sufficient WTP can be identified among potential consumers, then farmers, industry, and marketers might be more interested to support husbandry practices that better fulfill consumer expectations and help to maintain the societal acceptance of the sector.

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