3. Extent of food losses and waste

3.1 FOOD VOLUMES PRODUCED

Figure 1 illustrates the 2007 production volumes of all commodity groups in their primary form, including animal feed products (which are then factored out using allocation factors), in the regions of the world studied. The production volumes were compiled from the FAO Statistical Yearbook 2009, except for the production volumes of oil crops and pulses which were collected from FAO's FBS, 2007.

Meat production in Industrialized Asia was dominated by large pig (around 46 million ton) and chicken (around 12 million ton) production. Meat production in Europe was dominated by pig (around 27 million ton) while it was more diversified in North America and Oceania, with chicken (18 million ton), cattle (16 million ton) and pig (12 million ton).

In developing regions, meat in Latin America was dominated by large cattle (around 15 million ton) and chicken (around 17 million ton) production. Meat produced in South and Southeast Asia mainly consisted of pig (7 million ton) and chicken (9 million ton). Animal production in sub-Saharan Africa mostly consisted of cattle (around 4 million ton) and in North Africa, West and Central Asia it was mostly chicken (around 4 million ton) production.

3.2 EXTENT OF FOOD LOSSES AND WASTE

Roughly one-third of the edible parts of food produced for human consumption, gets lost or wasted globally, which is about 1.3 billion ton per year. Food is wasted throughout the FSC, from initial agricultural production down to final household consumption. In medium- and high-income countries food is to a great extent wasted, meaning that it is thrown away even if it is still suitable for human consumption. Significant food loss and waste do, however, also occur early in the food supply chain. In low-income countries food is mainly lost during the early and middle stages of the food supply chain; much less food is wasted at the consumer level.

Figure 1. Production volumes of each commodity group, per region (million tonnes)

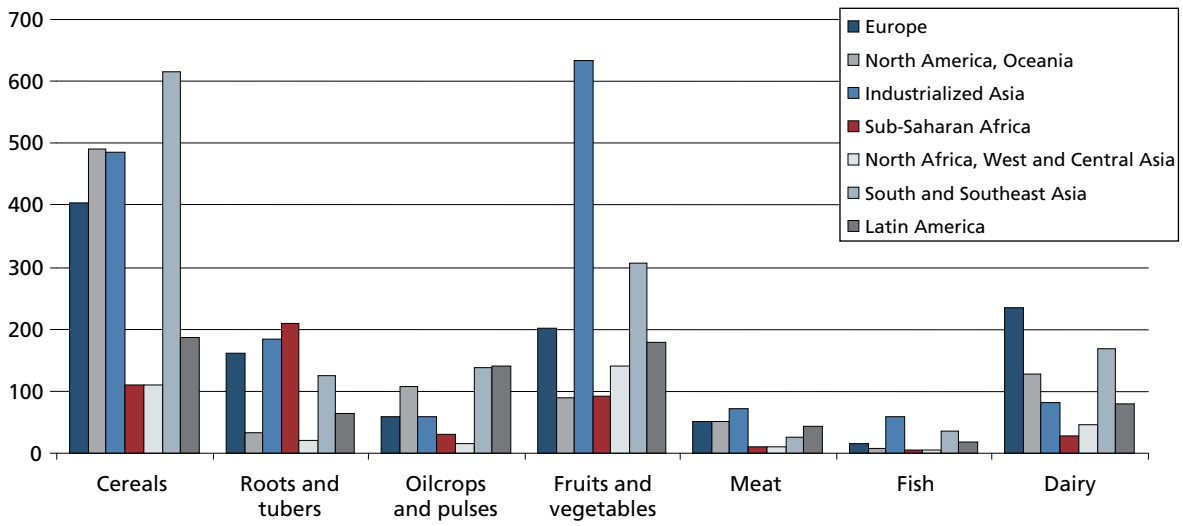


Figure 2. Per capita food losses and waste, at consumption and pre-consumptions stages, in different regions

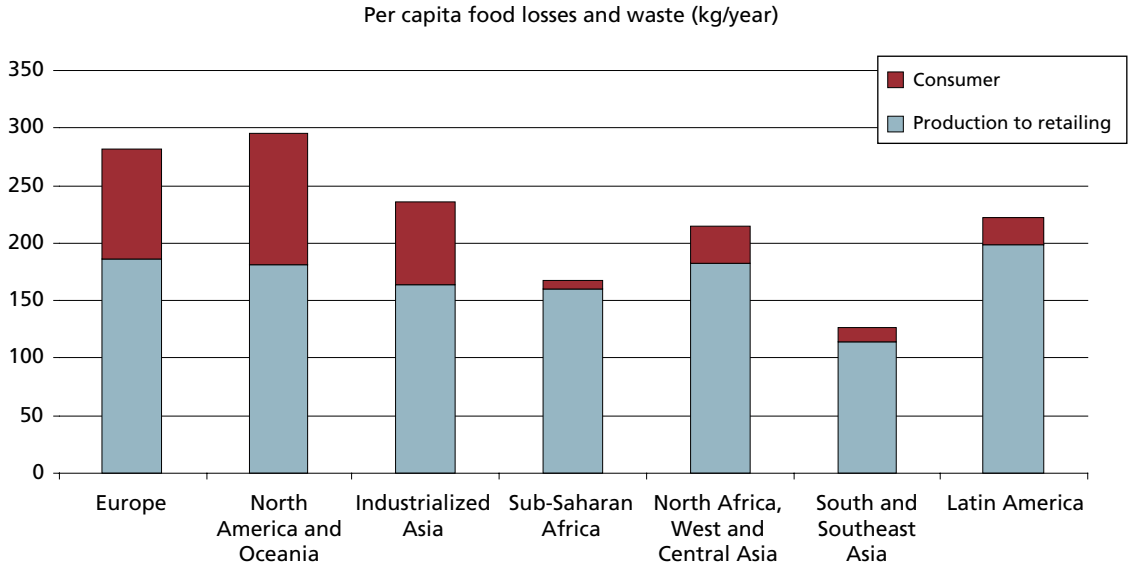


Figure 2 shows that the per capita food loss in Europe and North-America is 280-300 kg/year. In sub-Saharan Africa and South/Southeast Asia it is 120-170 kg/year. The total per capita production of edible parts of food for human consumption is, in Europe and North-America, about 900 kg/year and, in sub-Saharan Africa and South/Southeast Asia, 460 kg/year.

Per capita food wasted by consumers in Europe and North-America is 95-115 kg/year, while this figure in sub-Saharan Africa and South/Southeast Asia is only 6-11 kg/year.

Food losses in industrialized countries are as high as in developing countries, but in developing countries more than 40% of the food losses occur at post-harvest and processing levels, while in industrialized countries, more than 40% of the food losses occur at retail and consumer levels. Food waste at consumer level in industrialized countries (222 million ton) is almost as high as the total net food production in sub-Saharan Africa (230 million ton).

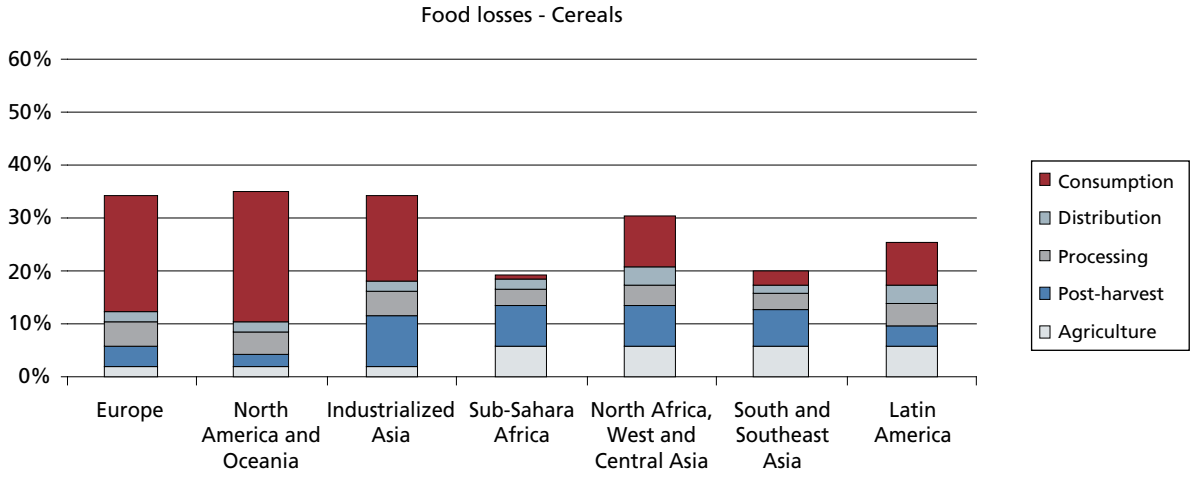
The graphs of the seven commodity groups below show the percentage food losses and waste of the edible parts of food products that were produced for human consumption.

In the case of *cereals* (Figure 3), wheat is the dominant crop supply in medium- and high-income countries, and the consumer phase is the stage with largest losses, between 40-50% of total cereal food waste.

In low-income regions rice is the dominant crop, especially in the highly populated region of South and Southeast Asia. For these regions, agricultural production and post-harvest handling and storage are stages in the FSC with relatively high food losses, as opposed to the distribution and consumption levels.

In the *roots and tubers* group (Figure 4), potato (sweet potato in China) is the dominating crop supply in medium- and high-income countries. Results indicate that all three medium- and high-income regions loose the largest volumes during agricultural production. This mainly depends on post-harvest crop grading, due to quality standards set by retailers. Food waste at the consumer level is, however, also high.

Figure 3. Part of the initial production lost or wasted, at different FSC stages, for cereals in different regions



Cassava is the dominant supply crop in SSA and LA and potato the dominant crop in North America, West Asia and Central Asia, and South and Southeast Asia. For these regions, agricultural production and post-harvest handling and storage are stages in the FSC with relatively high food losses, as opposed to the distribution and consumption levels. One reason for this is that fresh roots and tubers are perishable, which make these products easily damaged during harvest and post-harvest activities, especially in the warm and humid climates of many developing countries.

In the *oil crops and pulses* commodity group (Figure 5), sunflower seed and rape seed are the dominating crop supplies in Europe, while soybeans are the dominating crop supply in North America and Oceania and Industrialized Asia. Losses in all medium- and high-income regions are relatively large during agricultural production, contributing waste percentages between 6 and 12% during harvest.

Figure 4. Part of the initial production lost or wasted at different stages of the FSC for root and tuber crops in different region

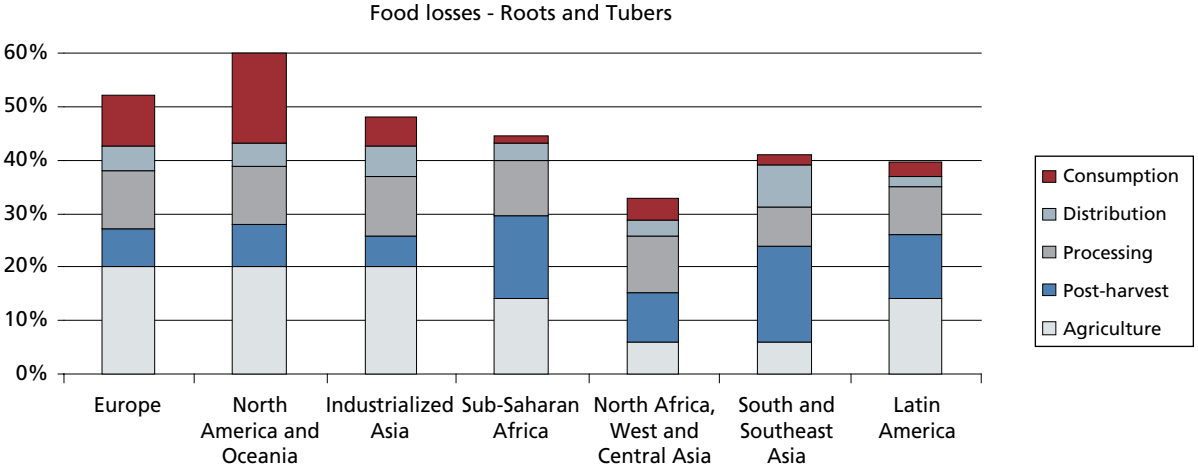
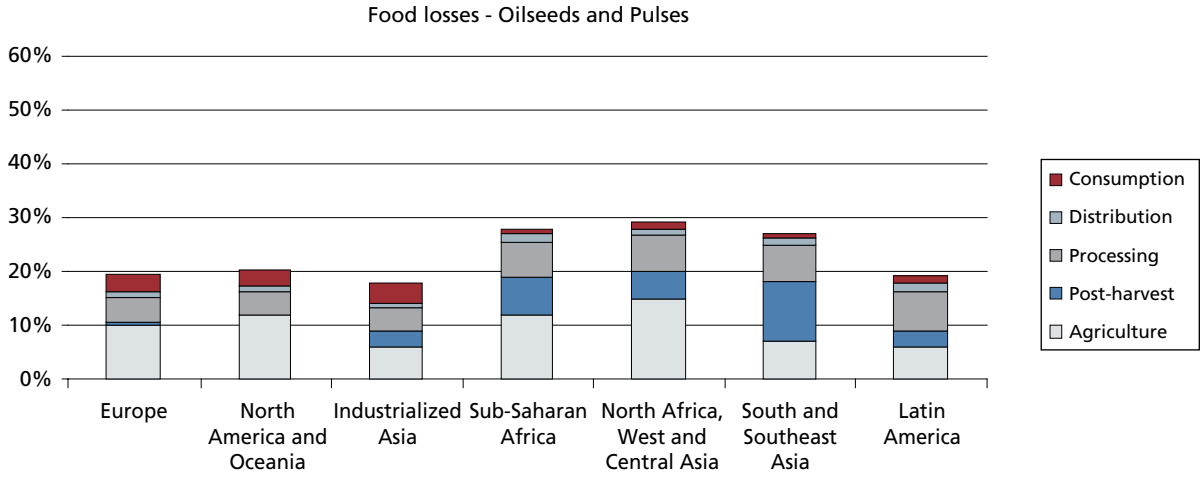


Figure 5. Part of the initial production lost or wasted at different stages in the FSC for oilseeds and pulses in different regions



Groundnut is a dominant oil crop in SSA; soybean and olives in North America, West and Central Asia; soybean and coconut in South and Southeast Asia and soybean in Latin America. Losses in these regions are largest in agricultural production and during post-harvest handling and storage. This is, however, also due to the fact that oil crops in the distribution and consumption stages are mainly consumed as vegetable oils, products which are wasted relatively little compared to fresh products.

In the *fruits and vegetables* commodity group (Figure 6), losses in agricultural production dominate for all three industrialized regions, mostly due to post-harvest fruit and vegetable grading caused by quality standards set by retailers. Waste at the end of the FSC is also substantial in all three regions, with 15-30% of purchases by mass discarded by consumers.

In developing regions losses in agricultural production dominate total losses throughout the FSC. Losses during post-harvest and distribution stages are also severe, which can be explained by deterioration of

Figure 6. Part of the initial production lost or wasted at different stages of the FSC for fruits and vegetables in different regions

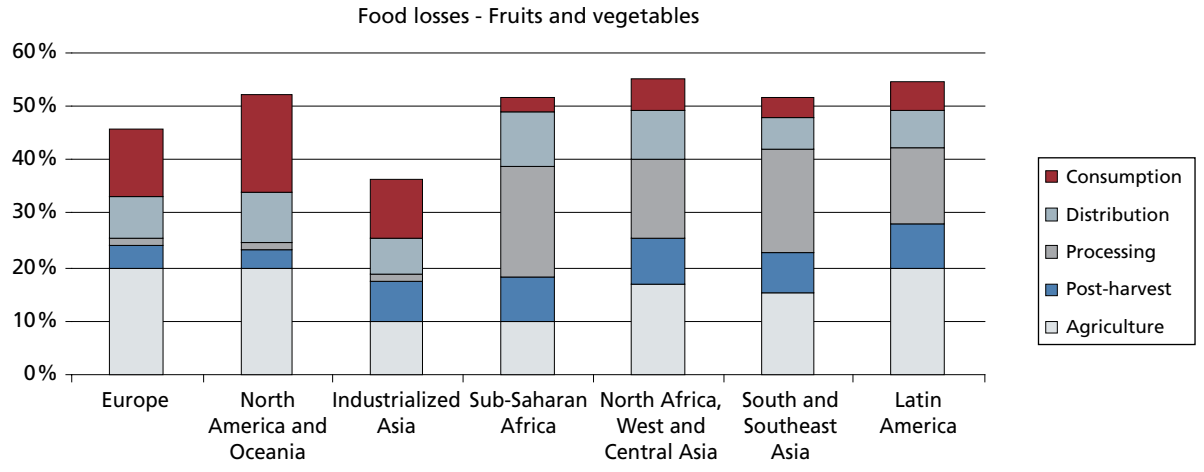
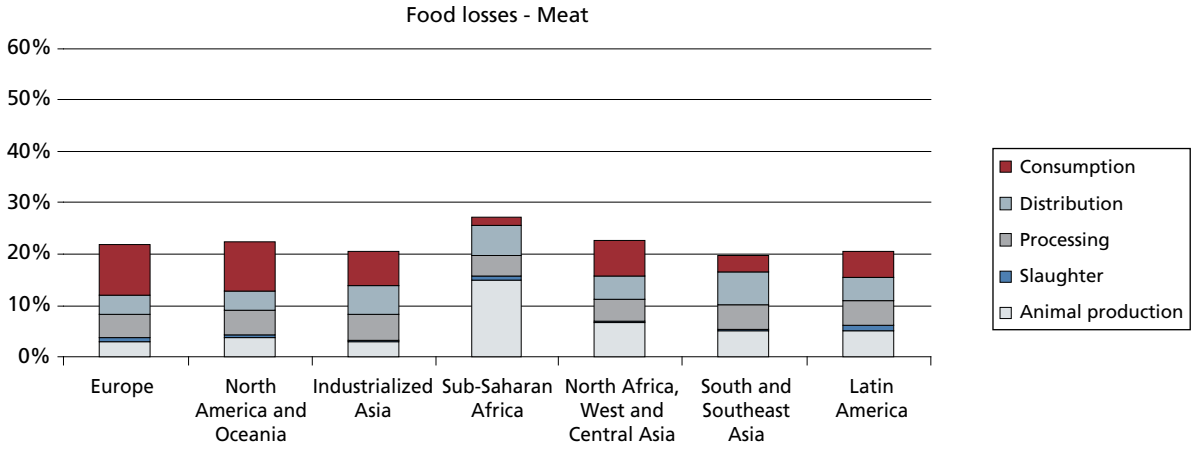


Figure 7. Part of the initial production lost or wasted for meat products at different stages in the FSC in different regions

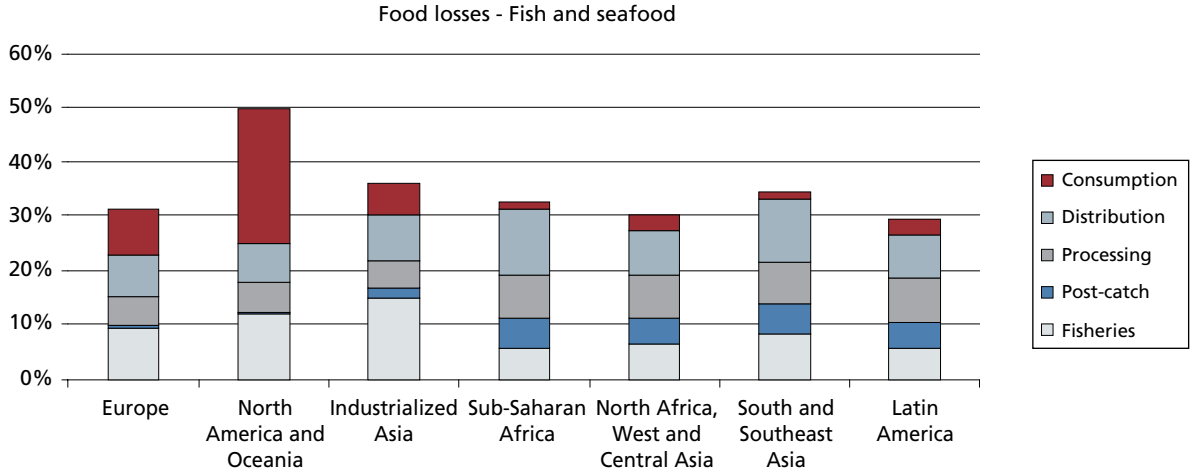


perishable crops in the warm and humid climate of many developing countries as well as by seasonality that leads to unsaleable gluts.

In the case of *meat and meat products* (Figure 7): losses and waste in industrialized regions are most severe at the end of the FSC, explained by a high per capita meat consumption combined with large waste proportions by retailers and consumers, especially in Europe and the U.S. Waste at the consumption level makes up approximately half of total meat losses and waste. The relatively low levels of waste during agricultural production and post-harvest handling and storage can be explained by relatively low losses due to animal mortality during breeding and transportation to slaughter.

Losses in all developing regions are distributed quite equally throughout the FSC, but notable is the relatively high losses in agricultural production in SSA. This is explained by high animal mortality, caused by frequent diseases (e.g. pneumonia, digestive diseases and parasites) in livestock breeding.

Figure 8. Part of the initial catchings (fish and seafood harvested) discarded, lost and wasted in different regions and at different stages in the FSC



Box 1. Snapshot case: fish discards

Fish discards as potential human consumption

Discards, the proportion of total catch that is returned to the sea (in most case dead, dying or badly damaged), represent a significant part of the world's marine catches and is generally considered a wasteful misuse of marine resources. The first global assessment was published in 1994 and it identified a total discard of 27 million ton (Alverson *et al*., 1994). The latest global study conducted by FAO in 2005 suggests that discard have dropped to 7.3 million but the figures are not totally comparable. Even if the first was overestimated and the latter underestimated, reductions seem to have been significant. The latest assessment corresponds to a weighted global discard ratio of 8%. However, large variations among fishing methods and regions exist (Kelleher, 2005).

For all three industrialized regions, losses in primary *fish and seafood* (Figure 8) production are significant due to discard rates of between 9-15% of marine catches. A large proportion of purchased fish and seafood is also wasted by consumer households.

In developing countries, losses in primary production mostly depend on discard rates between 6-8% of marine catches. High losses at the distribution level can be explained by high levels of deterioration occurring during fresh fish and seafood distribution.

For *milk* (Figure 9): waste at the consumption level makes up approximately 40-65% of total food waste in all three industrialized regions. Losses in agricultural production are significant since dairy cow illness (mostly mastitis infections) causes an approximate 3-4% decrease in milk yield.

For all developing regions, waste of milk during post-harvest handling and storage, as well as at the distribution level, is relatively high.

Figure 9. Part of the initial milk and diary production lost or wasted for each region at different stages in the FSC