

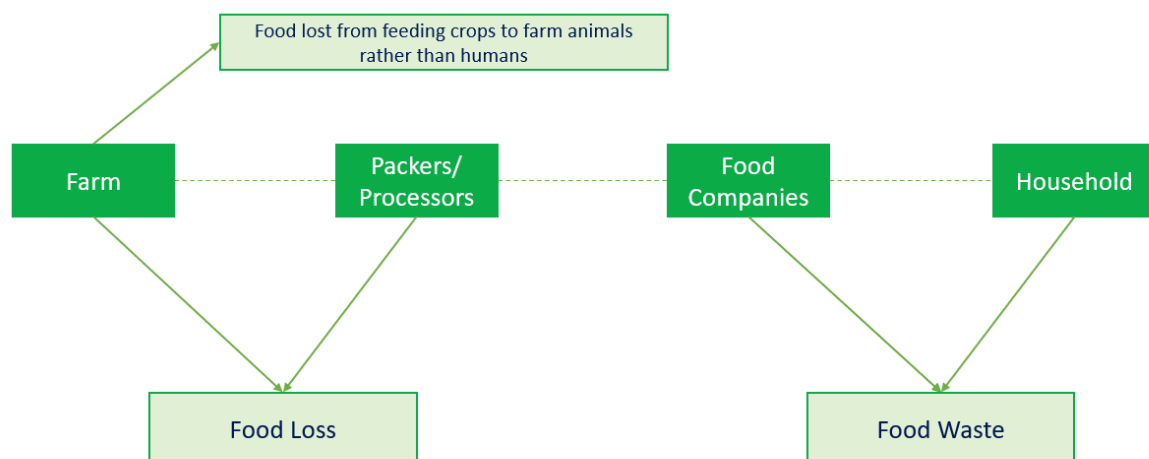
"In a world of seven billion people, set to grow to nine billion by 2050, wasting food makes no sense – economically, environmentally and ethically, aside from the cost implications, all the land, water, fertilisers and labour needed to grow that food is wasted – not to mention the generation of greenhouse gas emissions produced by food decomposing on landfill and the transport of food that is ultimately thrown away." – Achim Steiner, UN Under-Secretary-General and UNEP Executive Director (1)

Introduction to the problem and scale

"Food loss" refers to any food that is discarded, incinerated, or otherwise disposed of along the food supply chain from harvest/slaughter/catch up to, but excluding, the retail level, and is not used for any other productive use, such as animal feed or seed.

"Food waste" refers to food that is discarded at the level of retailers, food service providers and consumers. Food is wasted in many ways, for example:

- Fresh produce that deviates from what is considered optimal (e.g., size, shape or colour) and is removed during sorting actions.
- Foods that are discarded by retailers or consumers when it's close to or beyond the best before date.
- Unused or leftover food that is thrown out from households or restaurants" (2).



In addition, Compassion includes two further sources of food loss and waste that further contributes to the above:

- Food loss occurring in terms of *misdirected calories* due to crops being grown to feed farm animals rather than for humans.
- Food waste occurring due to the *overconsumption of animal protein*.
- A recent study looking at farm-stage food loss has increased the previously quoted global statistic from 1/3rd of all food produced being wasted to approximately 40% of all food produced being wasted along the supply chain

(3). This is equivalent to 2.5 billion tonnes of food, or over 5.8 trillion meals, which could feed over 5 billion people, or over 66% of the global population, three meals per day each year (4).

- Globally, 12% of meat and animal products are wasted on farms each year, roughly equivalent to 153 million tonnes worth around \$100 billion (3).
- Quantifying farm-stage farm animal food waste is complicated and ambiguous, as the point at which the animal becomes 'food' is not clearly defined, and what constitutes 'food' changes in different social and geographical contexts e.g., veal, offal, etc.
- A recent study found that each year, since COVID-19, 18 billion animals a year die, but never end up being eaten (5)
- Food waste causes the release of methane when it breaks down, a greenhouse gas that has a global warming potential 28 to 36 times greater than carbon dioxide over a century (6). Whilst this methane has the potential to be used as an energy source through the proper disposal and processing of food waste via anaerobic digestion, the energy inputs that go into growing the food are greater than the outputs generated from anaerobic digestion, and so food waste must still be minimised.

Link to intensive animal farming

Welfare links:

- 5.3% of broiler chickens (7), or around 1.4 million tonnes, never make it to slaughter in the United States due to mortality on farm. This is estimated to be equivalent to over 480 million chickens*.
- It can be argued that the relationship between improved welfare and reduced waste is a two-way relationship as reducing waste means that a farmer needs fewer animals on a farm to meet buyer needs, allowing for the remaining animals to have more space, thereby reducing welfare-related mortality.
- Waste levels of farm animals are strongly linked to animal welfare and handling, demonstrating the importance of improving welfare in farm animal systems (3). This is due to both mortality and morbidity associated with intensive production systems and practices, the health and welfare issues associated with high performance breeds, leading to further downgrading/wastage of carcasses and animal products, as well as the culling of animals with low productivity, and the killing of animals seen as by-products, e.g., day-old male chicks in the egg production industry.
- Pre-slaughter stress impacts meat quality, leading to a reduced shelf-life and increased waste upstream, again causing a greater number of animals to be farmed to meet customer demand. Severe short term (or pre-slaughter) stress results in a Pale, Soft and Exudative (PSE) meat, which has a lower-than-normal ultimate pH of 6.2, due to a rapid rate of glycogen breakdown in muscle, leading to the production of lactic acid. PSE meat is unattractive and tough when cooked. Long term stress causes higher levels of pH (6.4-6.8) in meat due to glycogen depletion and results in Dark, Firm and Dry (DFD) meat which has a shorter shelf life, due to favourable conditions for the growth of bacteria (8) (9) (10).

*9,200,000,000 total US chickens produced. Average weight is 2.97kg. Average mortality rate is 5.3%: $9,200,000,000 \times 5.3\% = 487,600,000$ chickens, or 1,448,172 tonnes.

Environmental links:

- Half of Earth's habitable land is now used for agriculture, and globally 40% of crop calories are used as animal feed, with 97% of the world's soy destined for farmed animals. If cereals were used for direct human consumption instead of animal feed, an extra 3.5 billion people could be fed. Therefore, global farm animal consumption can be seen to waste enough food to feed 3.5 billion people per year (11).
- Global farm animal farm-stage food loss is associated with 856Mt of CO₂ eq. emissions each year and is shown to have the highest proportion of emissions out of all the food categories (40% of total agricultural emissions derived from only 13% of global food loss tonnage) (12).
- The land area associated with annual losses of meat and animal products is equivalent to half the land area of India (12).

Consumption links:

- As meat is one of the more expensive commodities, it tends to have lower wastage levels than other commodities, however large amounts of meat and animal products are still wasted.
- An average of 11.5% of meat and animal products are wasted on farm globally each year, with Europe and South & Southeast Asia generating the highest levels of this waste (12).

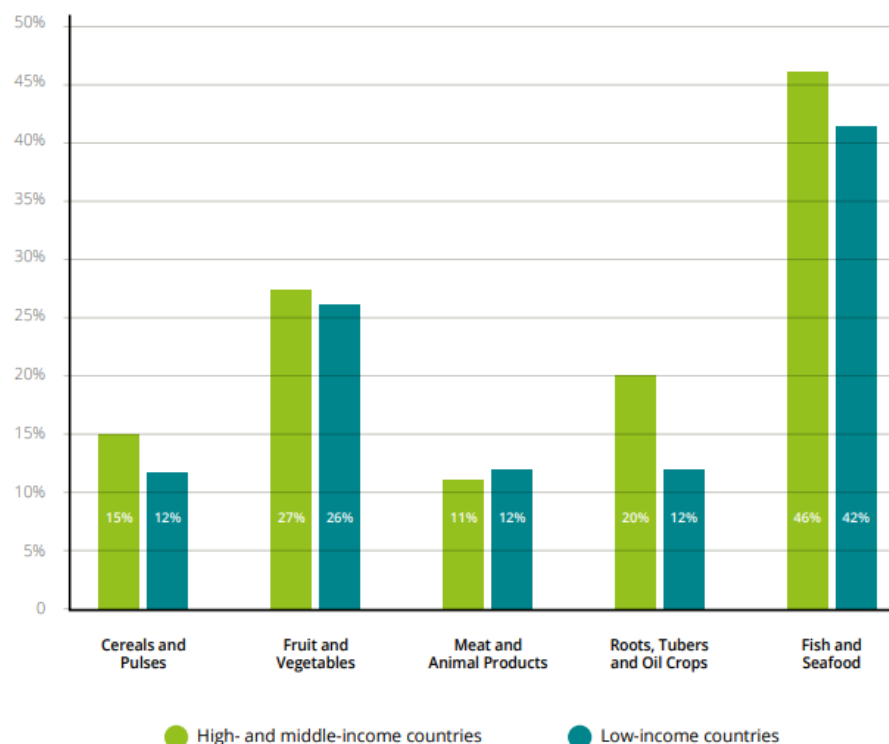
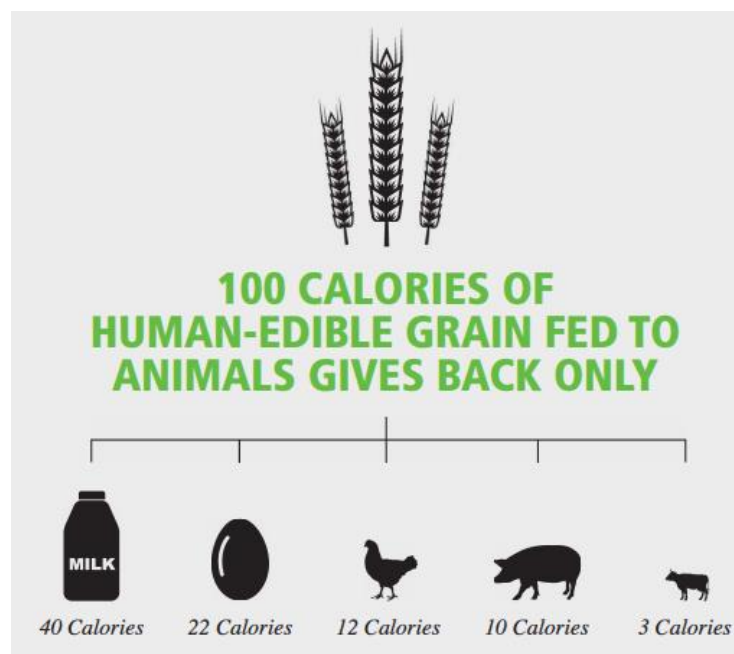
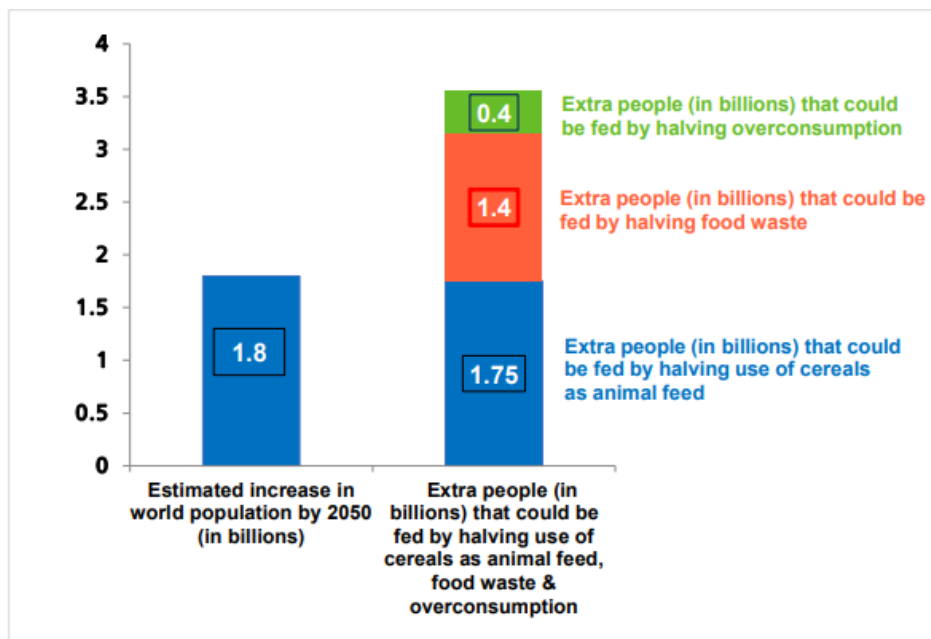


Figure 2
Farm stage food waste by commodity group as % total food production.

- Research by the European Commission (2018) estimates that up to 10% of food waste generated annually in the EU is linked to date marking, i.e., “use by” and “best before” date labels (13). Some retailers are now removing the ‘best before’ label on their dairy products, aiming to tackle the 85 million pints of milk wasted in the UK due to date labels (14), and the associated 31,532 tons of CO2e emissions that arise from their production (15).
- Food waste is also linked to intensive agriculture due to the wastage associated with growing feed for farm animals. Whilst crops grown for feed have less stringent specification standards than crops grown for food, there is still wastage that occurs on farms.
- Moreover, if viewed as a waste due to the inefficient conversion of calories, the numbers become more staggering. Roughly half the calories farmers grow are used for raising farm animals globally, and about 4 kcal of crop products are used to generate 1 kcal of animal products (16) (17).

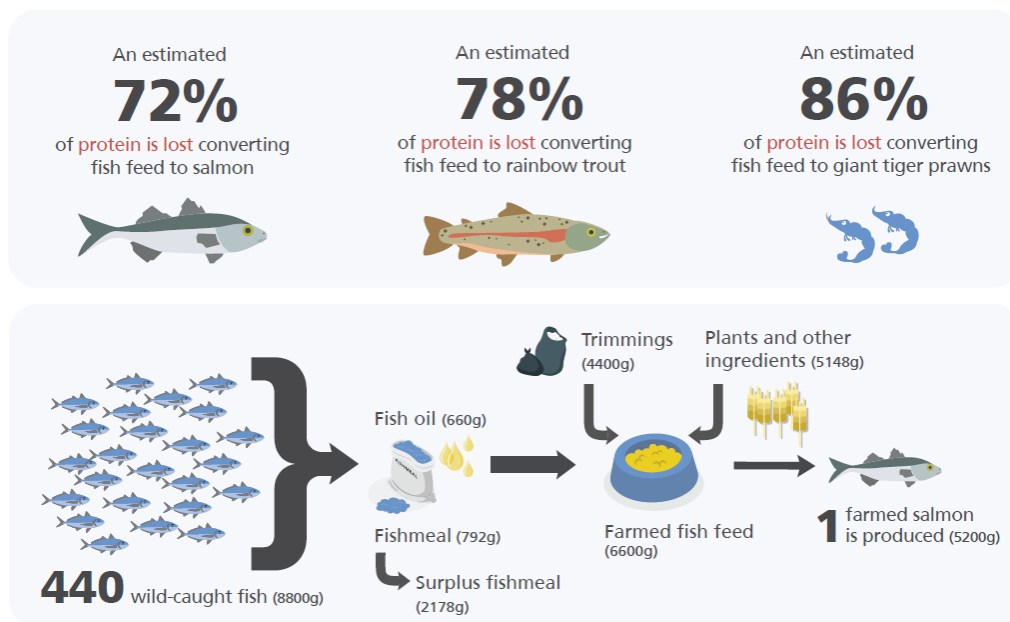


(18)



(19)

- Almost a fifth of the world's total catch of wild fish is processed into fishmeal and fish oil, the majority of which are used to feed farmed fish (20). Through this process, enough food to feed 4 billion people is wasted. Enough to sustain more than half of humanity today (21).

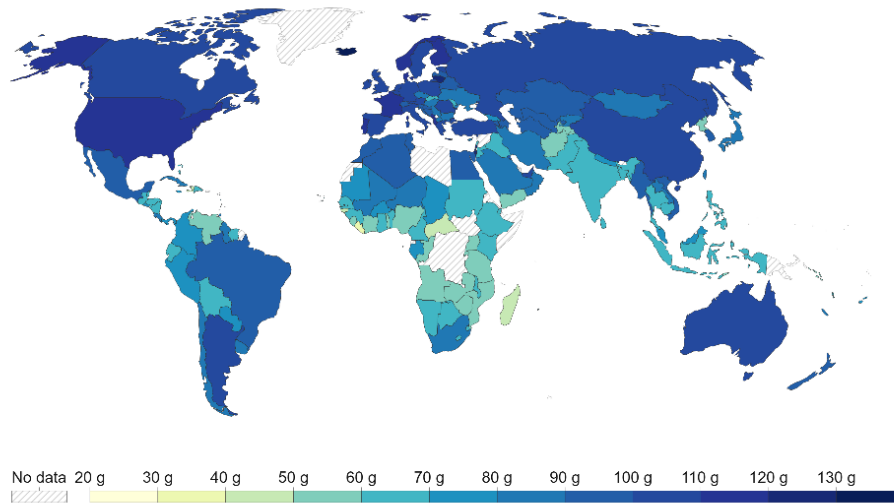


11 (22)

- Food waste can also be viewed under the lens of the overconsumption of protein. The global average protein consumption in 2017 was 81g per person per day, far above the recommended 46-56g of protein per day (23) (24). However, the distribution of this protein intake is not equitable, as seen in the map below (23), and so certain regions need to reduce their protein consumption whereas others need to increase theirs.

Daily per capita protein supply, 2017

Average daily per capita protein supply, measured in grams of total protein per day.

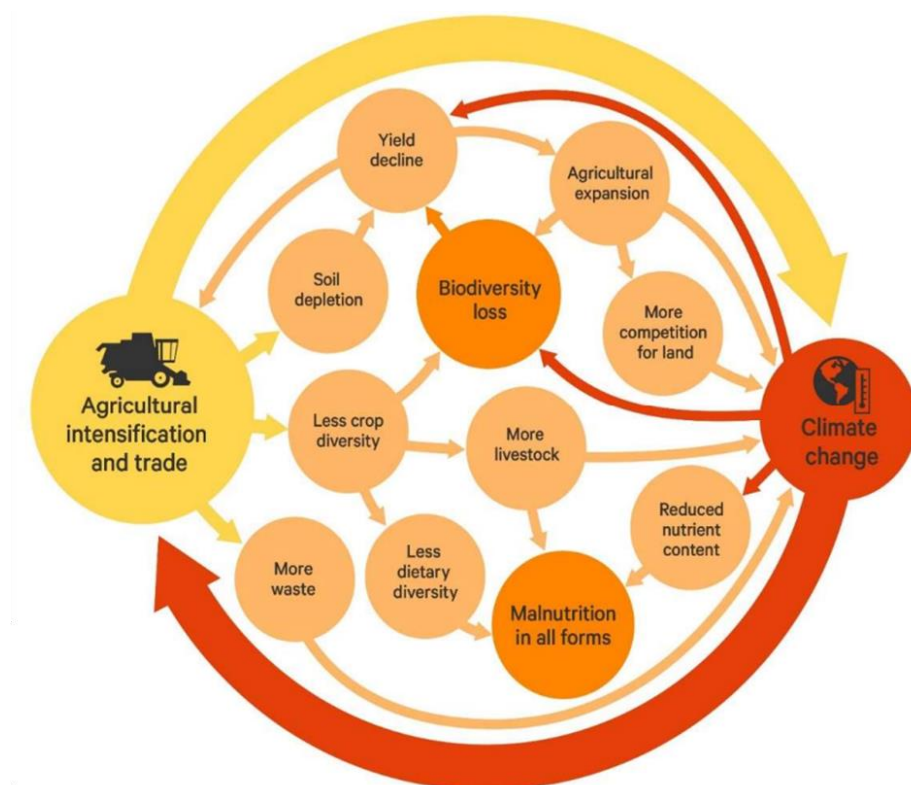


Source: UN Food and Agriculture Organization (FAO)

OurWorldInData.org/food-supply • CC BY

Note: Data measures the availability delivered to households but does not necessarily indicate the quantity of protein actually consumed (food may be wasted at the consumer level).

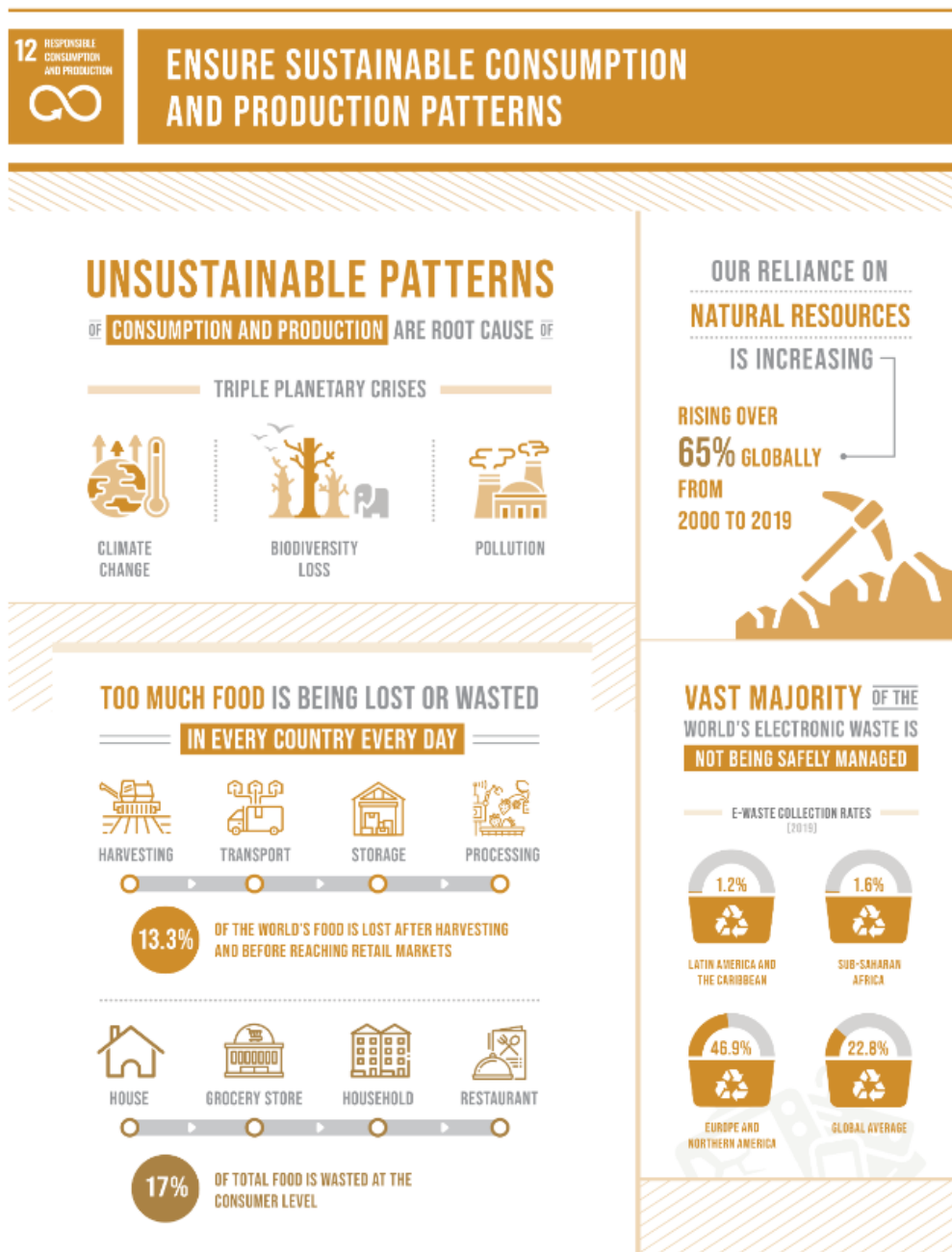
- Intensive animal farming produces cheap animal sourced products that do not reflect the 'true cost' of producing them. This 'cheap food paradigm' drives interlocking vicious circles, as seen in the graphic below (25):



(22)

LINK TO THE RELEVANT SDG (S)

SDG 12: Responsible consumption and production: Ensure sustainable consumption and production patterns – Target 12.3 - By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses (26).



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