Why we need to reduce consumption of livestock products by 50% by 2050

Executive summary
A 50% reduction in the consumption of livestock products by 2050 would:

- avert a wide range of damaging environmental impacts and reduce the incidence of certain non-communicable diseases
- result in reduced demand for cereals and soy as animal feed. This would lead to lower use of arable land, water, energy; reduced greenhouse gas emissions and deforestation; and decreases in the use of pesticides and nitrogen and phosphorus in fertilisers. The reduced demand for feed crops would allow cropland to be farmed less intensively so enabling biodiversity, soils and water quality to be restored
- help feed the growing world population as a much greater proportion of crops would be used for direct human consumption
- enable animals to be reared extensively to high welfare standards and with reduced use of antimicrobials
- make it possible to meet the Paris climate targets
- reduce pressures on wildlife as habitat destruction could be reversed.

Detailed briefing

Averting the detrimental impacts on the environment of business-as-usual consumption of livestock products in 2050

If the consumption of livestock products were to continue on a business-as-usual (BAU) basis (and allowing for growing world population and the shift to increased consumption of livestock products as people become wealthier), there would by 2050 be devastating environmental consequences.

Equally, as detailed below, a 50% reduction in the consumption of livestock products would produce very substantial benefits including reduced deforestation; reduced use of arable land, chemical fertilisers, pesticides and energy; and a marked decrease in the pollution of water, soils and air that arise from excessive use of nitrogen and phosphorus in chemical fertilisers.

It is often argued that on a BAU basis food production will need to increase by 60% by 2050. Such an increase in livestock production would require a similar increase in the production of cereals and soy for animal feed. These additional crops would be produced intensively using monocultures and agro-chemicals; this would lead to further soil degradation, biodiversity loss and overuse and pollution of ground- and surface-water i.e. to further degradation of the resources on which the future health of agriculture depends.

Research funded by the FAO shows the great benefits of avoiding a BAU increase in food production and the substantial dangers of failing to do so. It compares:

1. a base year comprising mean values for the years 2005-2009
2. a reference scenario based on FAO projections for food production and demand in 2050

3. a scenario in which in 2050 no 'food-competing feedstuffs' (i.e. human-edible crops) are used as animal feed (the 'food not feed' scenario). In this scenario animals are fed only from grassland and by-products from food production. Crucially there is no expansion of grassland.

Food availability for people does not suffer in the 'food not feed' scenario; energy supply per capita increases and protein supply per capita increases very slightly compared with the base period. However, the consumption of meat, milk, fish and eggs is reduced by 53% compared with the 2005-2009 base year.

The substantial environmental benefits that arise from adopting the 'food not feed' strategy are set out in Table 1. The 'reference scenario' column (BAU in 2050) shows there would be substantial increases in all production inputs and detrimental environmental impacts (except deforestation) compared with the 2005-2009 base period. However, the last column shows that a 53% reduction in the consumption of livestock products would lead to major reductions in in production inputs and environmental impacts compared with both BAU in 2050 and (except in freshwater use for irrigation) the base year of 2005-2009.

Table 1: Comparison of inputs and environmental outcomes between base year, 2050 reference year and 'food not feed' strategy (the latter leading to a 53% reduction in consumption of livestock products and fish)

Production inputs and environmental outcomes	Base year (mean values 2005-2009)	Reference scenario: FAO projections for 2050 i.e. Business-as-usual	Food not feed strategy in 2050 i.e. 53% reduction in consumption of livestock products	% reduction achieved by 53% reduction in consumption of livestock products & fish in 2050 compared with reference scenario	% reduction achieved by 53% reduction in consumption of livestock products & fish in 2050 compared with base year 2005-09
Arable land use: billion hectares	1.54	1.63	1.20	26%	22.1%
GHG emissions: Gt CO2-eq	11.0	12.8	10.4	18%	5.5%
Freshwater use (for irrigation): km^3	1371	2178	1718	21%	+ 25.3% (i.e. there is an increase)
N-surplus: million tonnes N	87.9	121.8	65.2	46%	25.8%
P-surplus: million tonnes P	47.2	64.0	38.4	40%	18.6%
Non-renewable energy use: exajoules	22.6	26.7	17.2	35%	23.9%
Pesticide use:*	14.1	15.4	12.0	22%	14.9%
Deforestation: million ha	8.2	7.2	6.5	9%	20.7%

Table 2 is a simplified version of Table 1. It sets out the positive environmental impacts of a 53% reduction in global consumption of livestock products in 2050.

Table 2: Positive environmental impacts of a 53% reduction in global consumption of livestock products in 2050 [1]

Factor affected by 53% reduction in consumption of livestock products	% reduction in 2050 from levels in 2005-2009
Arable land use	22.1%
GHG emissions	5.5%
Freshwater use (for irrigation	+ 25.3% (NB: this is an increase)
Nitrogen emissions	25.8%
Phosphorus emissions	18.6%
Non-renewable energy use	23.9%
Pesticide use	14.9%
Deforestation	20.7%

Source: Schader *et al*, 2015

A range of studies shows a similar picture in the EU i.e. that a 50% reduction in consumption of meat, dairy and eggs would lead to a major decrease in both production inputs and detrimental environmental impacts. Table 3 sets out the details.

Table 3: Positive environmental impacts of a 50% reduction in EU consumption of meat, dairy and eggs [2, 3, 4]

Factor affected by reduction in meat consumption	% reduction from current levels
Soybean use as animal feed	75%
Use and pollution of surface- and ground-water *	20%
Cropland use	23%
Nitrogen emissions	37-42%
Greenhouse gas emissions	19–42%

* In this case the figure in column 2 refers to a 45% reduction in meat consumption

Climate change

The FAO estimates that the livestock sector is responsible for 14.5% of greenhouse gas (GHG) emissions.[5] To meet the Paris Agreement's targets, all sectors need to reduce their emissions. However, on a BAU basis emissions from food and agriculture will increase substantially and could make it very difficult to reach the Paris targets.[6]

As indicated in Table 3, research shows that a 50% reduction in EU consumption of livestock products would lead to a reduction in GHG emissions of 19-42%. Other studies indicate that large falls in global GHG emissions would also be achieved by dietary shifts away from livestock products.

Bajželj *et al* (2013) conclude that a 50% decrease in food waste and a move to healthy diets (which in many, but not all, parts of the world involves substantial reductions in meat and dairy consumption) would lead to a decrease in GHG emissions of 19% or, with crop yield gaps closures, of 48%.[7] The proposed healthy diets in this study vary between regions. They involve a 60% and 23% decrease in meat and milk consumption respectively in West Europe. The decrease in East Europe would be lower: a 45% and 4% reduction in meat and milk consumption respectively.

Springmann *et al* (2016) conclude that transitioning toward more plant-based diets that are in line with healthy dietary guidelines could reduce global food-related GHG emissions by 29–70%.[8]

To conclude, a substantial reduction in the consumption of livestock products is needed if the food and farming sectors are to play their part in helping us to meet the Paris targets.

Threatening the survival of wildlife

Studies show that population and species extinctions are proceeding rapidly and a sixth mass extinction may already be underway.[9] Human pressures including agriculture are an important factor in this. Ever more forests and savannahs are being destroyed to grow soy and cereals for industrially farmed animals and to provide pasture for cattle. This is eating into wildlife habitats driving many species – including elephants and jaguars – towards extinction.[10] Moreover, the chemical soaked monocultures that have arisen in part to satisfy the industrial sector's growing demand for feed crops have devastated birds, butterflies and pollinators.[11] A reduction in the consumption of livestock products would ease the pressure on wildlife enabling their habitats to expand and improve in quality.

Health benefits of reducing meat consumption

Many studies show that reducing meat consumption would be beneficial for public health. High levels of consumption of red and processed meat contribute to heart disease, obesity, diabetes and certain cancers.[12, 13, 14]

A study published in *The Lancet* concluded that a 30% decrease in intake of saturated fats from animal sources in the UK and São Paulo city could reduce the total burden from ischaemic heart disease by 16% and 17% respectively.[15] It may well that the UK figure would be similar for the EU as a whole.

Research published by the University of Cambridge in 2012 concludes that reduced consumption of red and processed meat would lead to reduced risks of heart disease, diabetes mellitus and colorectal cancer and also to reduced GHG emissions.[16]

A major EU study *Nitrogen on the Table* (2015) concluded: "The current average per capita protein intake in the EU is about 70% higher than would be required according to the World Health Organization (WHO) recommendations … The current intake of saturated fats is 42% higher than the recommended maximum dietary intake, leading to increased risk of cardiovascular diseases. As 80% of saturated fats originate from animal products, a reduction in animal products would in general be favourable to human health".[17]

The study stresses that a 50% reduction in EU consumption of livestock products would:

- lead to food consumption patterns that are better aligned with international dietary recommendations
- bring the average intake of saturated fats within a range recommended by the WHO

- reduce the average intake of red meat to being only slightly above the maximum recommended by World Cancer Research Fund.

The study concludes that reduced intake of red meat and saturated fats in the EU "means that public health risks would be reduced".

Infectious diseases

Further increases in livestock production will inevitably take place in the industrial sector. The European Medicines Agency has said that in animal production systems with a high density of animals, the development and spread of infectious diseases is favoured. Indeed, disease is inevitable when a large number of animals are housed together in close confinement. A report by the FAO, *Industrial Livestock Production and Global Health Risks*, points out that industrial livestock production plays an important part in the emergence of highly pathogenic avian influenza and other diseases.[18] The US Council for Agriculture, Science and Technology has warned that a major consequence of modern industrial livestock production systems is that they potentially allow the rapid selection and amplification of pathogens.[19]

Antibiotics use

In 2013 the global consumption of all antimicrobials in food animals was estimated at 131,109 tons and is projected to reach 200,235 tons by 2030 i.e. to increase by 53%.[20] Research shows that limiting meat intake worldwide to 40 g/day/capita could reduce global consumption of antimicrobials in food animals by 66%. Whilst this is an ambitious target substantial reductions in meat consumption could result in a significant decrease in antimicrobial use.

A wide range of studies show that antimicrobial use is much greater in industrial livestock systems than in extensive production.[21] [22] [23] [24] [25] Accordingly, it would be particularly beneficial in terms of lowering the use of antimicrobials if reduced meat consumption led to a move away from industrial to extensive livestock production.

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