

FCRN foodsource

A free and evolving resource to empower informed discussion on sustainable food systems



Chapter 8.

Focus: the difficult livestock issue

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Why should you read this chapter?

A central topic of most debates on sustainable food systems is the complex role of livestock, meat and dairy. This is due to their connection to many issues of moral and practical concern related to food systems; affecting both humans and the environment, and animal's own interests.

The picture is complex. And because different stakeholders bring different worldviews and perspectives, people often disagree about the appropriate role of livestock, meat, and dairy, in sustainable food systems.

Yet demand for meat and dairy consumption is expected to grow considerably, and as a result, debates around livestock-related issues are becoming increasingly prominent. Understanding these helps to provide a broader understanding of food systems more generally.

This chapter addresses the following questions:

- How does livestock product production and consumption relate to issues around nutrition, the environment and animal welfare?
- Who are the major stakeholders in these debates and what arguments do they make in relation to the above? What is the evidence to support these arguments?
- Why do people who agree on the nature of a problem disagree about the way(s) to solve it?
- What are the perspectives that shape how a person approaches a problem?

Key points

- Livestock represent a convergence point of concerns within food systems; encapsulating issues and outcomes of greenhouse gas emissions, nutrition, animal welfare, livelihoods and many others.
- The debate around meat and dairy has many stakeholders holding many different priorities, interests and values: the livestock and food industry, civil society, consumers, vets, ethicists, public health bodies, academics and policy makers.
- Many countries have official food-based dietary guidelines. Meat and dairy features in all of them, with around a quarter recommending reducing or limiting meat intake, and some distinguishing between forms of meat and dairy on the basis of health impact. Very few take into account the sustainability of diets.
- In high income countries, the evidence on the association between meat consumption and poor health outcomes often falls short of proving beyond doubt, a causal link. Different 'pathways' for impact have been proposed, but different stakeholders interpret the meaning of the evidence differently.
- In low income countries, livestock rearing and meat consumption are usually associated with positive health outcomes, both via the benefits of keeping livestock on access to animal-sourced foods, and income to spend on health; and by the nutritional contribution that meat and dairy make to people's diets.
- Livestock contribute 14.5% of human-made GHG emissions. Carbon sequestration has been posited by pro-livestock stakeholders to offset these emissions, but the evidence is that this potential is limited, and very dependent on circumstance.
- Under business-as-usual scenarios, total meat consumption is projected to nearly double by 2050, and per capita meat and dairy consumption is also due to rise, but with most of this rise taking place in low- and middle-income countries.
- Animal welfare can be defined as five freedoms. Freedom from: hunger and thirst; discomfort; pain, injury and disease; fear and distress; and to express normal behaviour. These can be affected by many different factors in farming systems.
- The effect of intensifying livestock production on animal welfare is complex and debated. Impacts will depend on how intensification occurs, and will differ, according to the baseline type of farming system considered: i.e. subsistence versus more industrial farming models.
- Better animal welfare and lower environmental impacts per unit of food, don't always co-occur. The most intensive livestock production systems are more GHG and land-use efficient. However, increased total consumption due to lower food prices, may offset any reduction in impacts.
- Differences in perspectives on what the problems of livestock production are and how to solve them, stem from three main worldviews: the efficiency perspective; the demand-restraint perspective; and the systems transformation perspective.

8.1 Introduction: what are the concerns with meat and dairy, and who are the major stakeholders in the debate?

8.1.1 Livestock: a convergence of concerns

Rearing livestock and consumption of animal products raises multiple social, environmental and ethical concerns

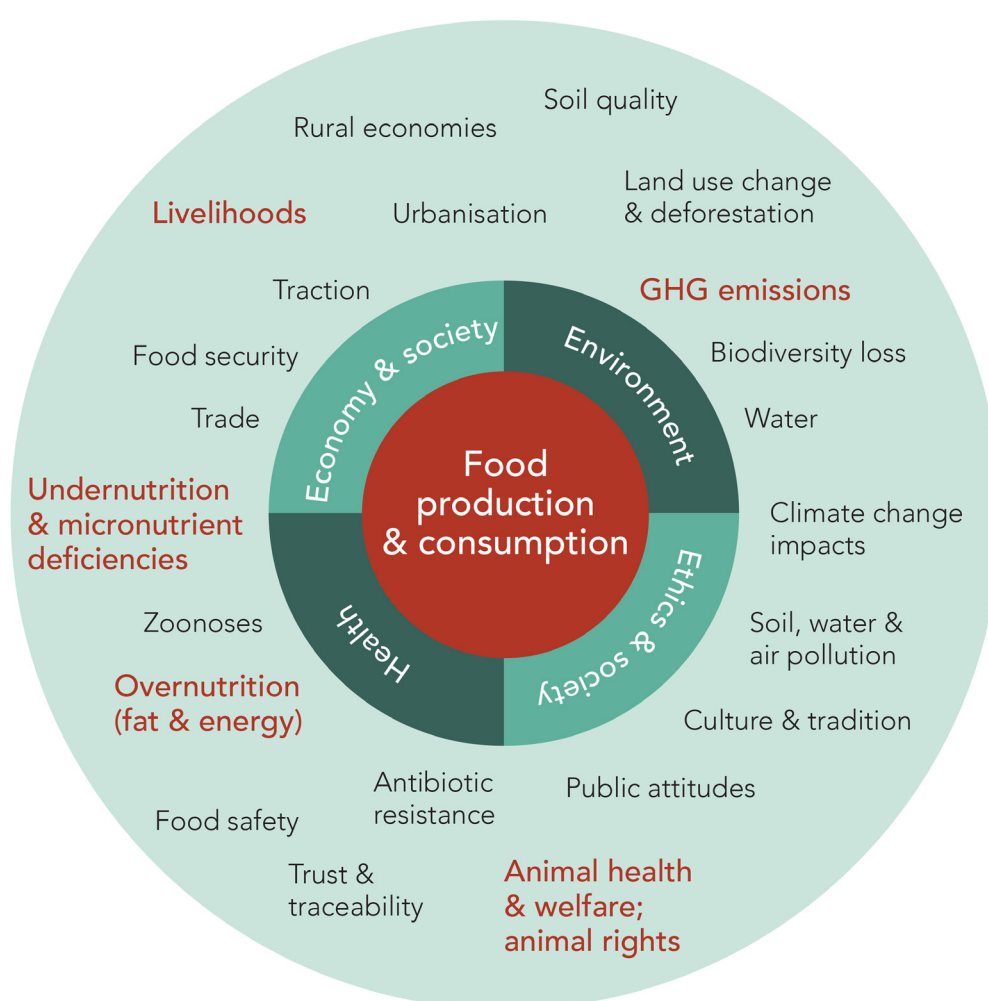


Figure 1: Issues related to the production and consumption of animal products.

Source: FCRN (2016, unpublished).

8.1.2 The stakeholders in the debate

Stakeholders in the meat and dairy debate

Stakeholders include:

- Livestock & food industry.
- Civil society organisations (including environmental, animal rights/welfare groups, public health campaigners etc.).
- People with specific dietary interests (e.g. religious, ethical, health-conscious, etc.).
- Vets.
- Ethicists.
- Public health bodies.
- Academics and policy makers (all influenced by the above).

All have different priorities, interests and values relating to livestock's impact on health, the environment and society.

This chapter looks at the different views these stakeholders hold on meat and livestock in relation to: health, the environment and animal welfare.

8.2 What are the nutritional issues around meat and dairy?

8.2.1 What does mainstream nutritional advice have to say about meat and dairy in the context of a healthy diet?

Where do meat and dairy products sit in the context of national food based dietary guidelines?

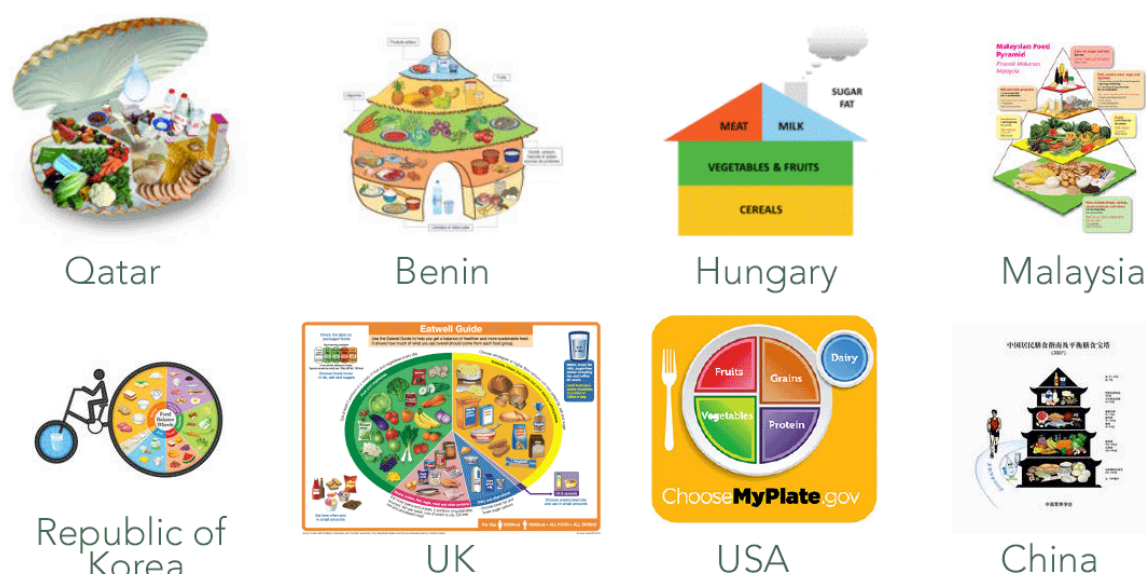


Figure 2: Illustrations of national food based dietary guidelines from different countries.

Food-based dietary guidelines (FBDG) are short, science-based, practical and accessible messages produced by national governments with the goal of guiding people on healthy eating and associated healthy lifestyles. Unlike recommended nutrient intakes – which are standards that apply worldwide – FBDG are tailored to the specific nutritional, geographical, economic and cultural conditions within which they operate. In many cases, the messages provided in dietary guidelines are illustrated with the aid of visual representations such as pyramids, plates or other diagrams – also known as Food Guides. These show the recommended relative contributions of different food groups to the diet.

About 85 countries (of 215 countries in total) have official food-based dietary guidelines, although the numbers are gradually rising. Most of them are developed or more affluent countries.

These guidelines provide broadly similar messages: that diets should be diverse, in energy balance, low in sugary and high fat foods, rich in whole grains, fruits and vegetables and that they should contain some meat and dairy products. However, there are differences in the level of detail and emphasis, and the format in which advice is presented.

What do food based dietary guidelines advise on meat and dairy products?

- All include advice to consume animal products, often recommending 'moderate' quantities.
- Often no specific quantities are recommended but general advice is given, e.g. to eat meat in moderation or that white meat is healthier than red, or to choose low fat versions.
- Where specific advice on quantities is given it can vary by country (e.g. US and Sweden have different advice on how much dairy to consume).
- Only ~25% recommend reducing or limiting meat intakes, with some guidance distinguishing between red and processed meat.
- Sometimes average daily quantities are recommended.
 - E.g. Chinese guidelines on animal products (meat & poultry 50-100 g, fish & shrimp 50 g, eggs 25-50 g, milk & milk products 100 g).
- Sometimes there is guidance on a recommended maximum (e.g. Sweden and the UK recommend a maximum of 500 g red/processed meat a week).
- Dietary advice for vegetarians and vegans may or may not be available.
- Currently only four formal government-approved national guidelines explicitly include sustainability within their guidelines (Sweden, Germany, Qatar and Brazil) – see [here](#) for dietary guidelines by country and as part of this advice recommend moderating meat intakes. Advice on dairy products in relation to sustainability is less in evidence.
- The UK's new dietary guidelines do not explicitly mention sustainability (except in the context of meat). However they place emphasis on pulses and beans as good sources of protein and recommend less dairy consumption than the previous guidelines, suggesting that sustainability as well as health concerns have been taken on board.

Why is it difficult to be very specific about how much meat and dairy is needed in the diet?

- The nutritional importance of any particular food in the diet will depend upon what else is or is not eaten – i.e. the overall quality and diversity of the diet.
- The context of consumption is critical too (i.e. factors such as sanitation, pre existing health status, an individual's particular nutritional needs etc. – see [Chapter 7](#)).
- An individual's lifestyle also affects nutritional requirements (e.g. how physically active they are, and other lifestyle impacts upon health (smoking, alcohol consumption etc.)).
- There is variability between societies and between individuals as regards the acceptability and importance of and need for particular foods based on culture, genetics and geography.
- Humans are adaptable – the biological response to scarcity is to utilise nutrients (including those found in animal products) more efficiently. We are successful as a species because we are adaptable.
- Sometimes recommendations focus on specific nutrients (calcium, iron) rather than the foods containing these nutrients – meat and dairy products may be rich sources of these nutrients but not the only sources.
- Variations in recommended intake between countries may be based on different population needs or judgements about what is optimal or realistic, by perceptions of risk, and may also be shaped by industry influence.

8.2.2 How do different stakeholders use the evidence available to argue for/against meat and dairy consumption in high income/consuming countries?

How are the nutritional arguments for and against meat and dairy in high income/consuming countries played out?

Since the livestock issue is so contested, stakeholders may use evidence from particular studies selectively to support their positions.

Stakeholders form different conclusions on whether the link between animal product consumption and a given health outcome is causative or associative (i.e. with confounding factors) based on their ideological positions and beliefs.

Meat: some argued pathways

Many studies show an association between high processed and sometimes high red meat intakes, and various negative health outcomes including heart disease, strokes, diabetes and all cause mortality. But establishing a causal link is difficult: it is hard to randomise people to consume low meat diets over a long enough period to measure health outcomes. For example, vegetarians and vegans are often 'different' in so many ways that there are many confounding factors to consider when isolating the specific effect of low meat consumption. All evidence presented below is based on observational studies, so it is all associational. But when it is supported by other evidence (e.g. plausible biological pathways) and when experimental data is unlikely to emerge, then sometimes experts take a leap and call it causal.

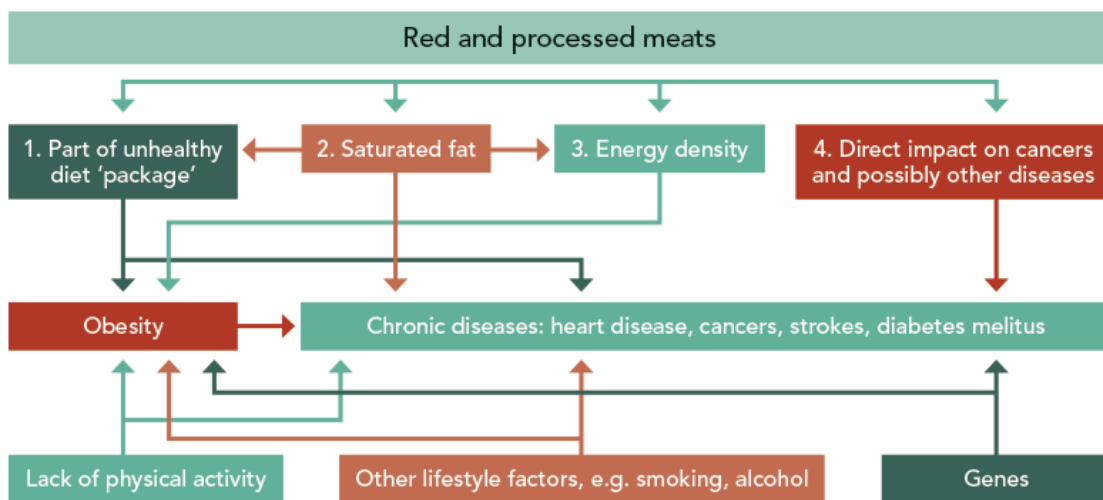


Figure 3: Biological pathways linking the consumption of red and processed meats to health impacts.

Source: FCRN. (2016).

Four main 'pathways' linking red and processed meat consumption to particular health outcomes have been proposed, at least three of which are contested:

- Meat and the unhealthy diet package.
- Meat and saturated fat.
- Meat and excess energy intakes.
- (Red and) processed meat and particular health problems (colorectal cancer, diabetes, ischaemic heart disease).

Each of the pathways has its arguments, and counter-arguments, and this are discussed in greater detail below.

Pathway 1: 'Unhealthy package' pathway

Neutral fact: People who eat a lot of meat often eat a lot of unhealthy foods. Unhealthy diets are risk factor for many non communicable diseases and obesity.

The 'anti-meat' argument: "People who eat meat have higher rates of heart disease, diabetes and so forth"

The counter-argument:

- This is because their diets overall are unhealthy, and not because of the meat in the diet.
- 'Traditional' diets containing meat offer the opportunity to eat a range of healthy foods (e.g. the Sunday roast with potatoes and two veg) e.g. www.beefnutrition.org.

Question: Are high meat intakes a 'marker' of unhealthy diets and lifestyles or do they actually make a causal contribution?

- The answer is hard to discern because:
 - Vegetarians more health conscious anyway, making comparisons hard.
 - One major UK study (the EPIC-Oxford study) compared vegetarians with health conscious meat eaters and found the incidence of ill health similar in both groups. But intakes of meat were lower than the UK average among the meat eaters.
- Two conclusions are possible:
 - Anti-meat conclusion: meat is part of unhealthy lifestyles, eaten at expense of healthy food.
 - Pro-meat conclusion: meat per se should be disassociated from unhealthy lifestyles and as such can be part of a healthy diet.

Pathway 2: Saturated fat pathway

Neutral fact: Animal products are the main source of saturated fat in the Western diet. Saturated fat has been linked to heart disease and strokes.

The 'anti-meat' argument:

- Meat is high in saturated fat and consumption therefore increases the risk of heart disease and strokes.

The counter-arguments:

- Some studies challenge the association between saturated fat and ill health.
- It is pointed out that substituting saturated fat with refined carbohydrate could be worse.
- It is possible to choose low fat meat and dairy options: dietary guidelines often advise people to choose leaner cuts and lower fat products.
- There are differences between production systems: some environmental groups emphasise the benefits of grass-fed meat in terms of 'good fats', meaning a higher ratio of omega 3 compared to omega 6 fatty acids (e.g. Soil Association).
- There is evidence to suggest that not all saturated fats are equal – dairy fat is associated with lower risks of heart disease, strokes and some cancers (more on dairy later).

Pathway 3: Energy density pathway

Neutral fact: Meat eaters on average consume more energy than vegetarians and vegans, and meat eaters on average have a higher body mass index than vegetarians or vegans.

The 'anti-meat' argument:

- Meat is energy dense because it can be high in energy dense fat and so 'contributes to' obesity.
- Meat is often eaten 'instead of' healthy and lower energy density veg etc.

The counter-argument:

- Meat is not a particularly energy dense food.
- It is necessary to distinguish between meat per se and the overall dietary patterns that may accompany meat eating.
- Meat's high protein content means it offers satiety: meat can therefore form part of a weight loss approach (NB: The counter counter-argument: plant based high protein foods have also been found to offer similar satiety).

Pathway 4: Specific links pathway to cancer and other diseases

Neutral fact: a growing body of evidence links:

- Red meat to colorectal cancer & diabetes.
- Processed meat to colorectal cancer, ischaemic heart disease and diabetes.

The WHO concludes that there is a:

- Causal link between processed meat and colorectal cancer. An association with stomach cancer also seen.
- Probable causal link between red meat and colorectal cancer and evidence of links with pancreatic cancer and prostate cancer.

Advocates of meat consumption argue:

- That the red meat argument is purely associational and red meat has many essential beneficial nutrients (e.g. protein, iron).
- As to processed meat: is this a problem with the meat per se? Or with the additives used to process it? E.g. Salt? N-nitroso compounds? – and if alternatives were developed, would the risk go away?

Other diseases: Evidence here is currently associational (see 'Unhealthy package pathway' above).

What about white meat, especially chicken?

- Poultry production is a focal point for much criticism by animal welfare and environmental groups.
- But poultry consumption is positively associated with healthy outcomes (although as with all associations, the problems of confounding factors also apply).
- Critics of chicken consumption sometimes adopt a different approach, emphasising health concerns of intensive poultry production (E. coli, zoonotic diseases, broiler meat being more 'fatty' than free-range etc.).

Can any conclusions be drawn?

- As with all dietary factors, establishing a causal link between meat and dairy and health outcomes is difficult.
- All the data that links meat and dairy with disease incidence or mortality is collected from observational studies, where it is not possible to rule out the chance of confounding.
- Since the livestock issue is so contested, stakeholders may use evidence from individually selected studies to support their positions.
- Meta-analyses of observational studies have shown associations between red meat and processed meat consumption and coronary heart disease, type 2 diabetes and colorectal cancer.
- Most recently, after reviewing all of the epidemiological evidence, experts at the International Agency for Research on Cancer (IARC) of the World Health Organisation classified processed meat as a group 1 carcinogen ('carcinogenic to humans') and red meat as a group 2A carcinogen ('probably carcinogenic to humans').

Dairy and bone health

Neutral fact: Dairy products are rich in calcium and other nutrients. Calcium is essential to maintain bone strength and for other functions.

- Vegan groups highlight the alleged 'calcium paradox' – prevalence of osteoporosis is highest in high milk consuming countries. In fact:
 - Some evidence that milk has positive impacts on bone health in children, but inconclusive evidence for adults.
 - Bone fracture rates 30% higher among vegans but not among vegans who consume sufficient calcium.

- No evidence to support acid load theory sometimes promoted by vegans.
- Dairy positively associated with reduced risk of colorectal cancer and increased risk of prostate cancer.
- So the question arises: is dairy 'essential' or is it just that calcium and other contributors to bone health (e.g. phosphorus, magnesium and Vit D) are 'essential'?

8.2.3 What about consumption in low income/ consuming countries?

Meat and dairy in the context of developing countries

In developing countries, arguments relate to the need for nutritional improvement in diets via both **production** and **consumption** pathways.

- Argued **production** pathways:
 - a. More livestock production leads to more animal source food consumption.
 - b. Livestock production is a marker of higher socio-economic status (and higher SES people have better health).
 - c. Livestock production leads to income generation which can be good for health.
- Argued **consumption** pathways:
 - a. Animal products (consumption) = energy dense.
 - b. Animal products (consumption) = nutrient dense.
 - c. Animal products (consumption) = marker of dietary diversity.

Arguments for meat and dairy consumption in developing countries focus on both production and consumption pathway

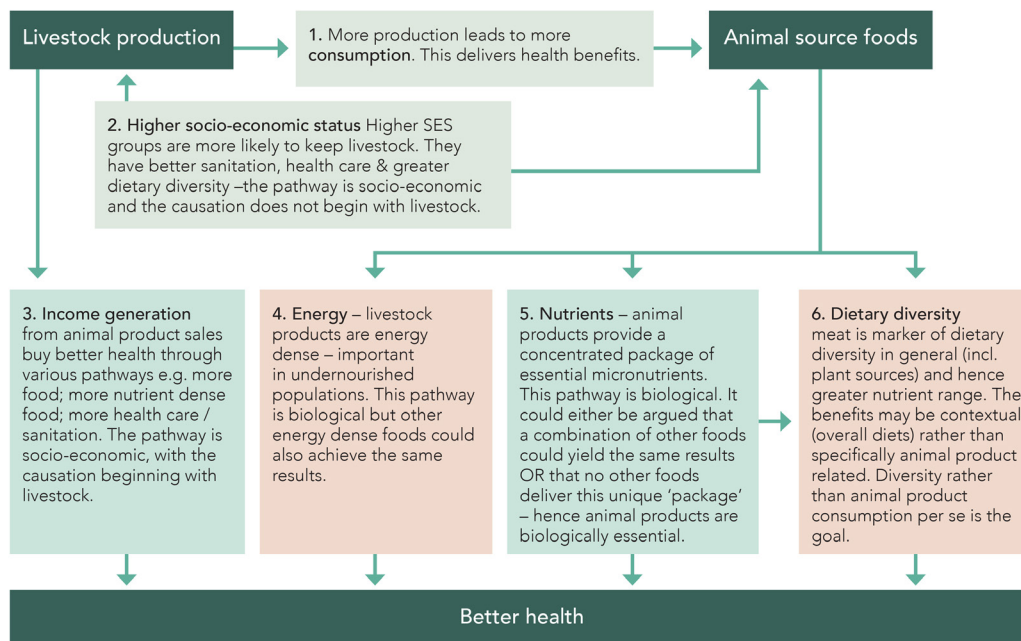


Figure 4: Arguments for the benefits resulting from meat and dairy consumption in developing countries.

Source: Garnett, T. (2015) unpublished.

These pathways are explained in more detail below.

Pathway 1: More production leads to more consumption

There are not many studies and not much hard evidence but such as there is probably suggests that livestock production leads to increased consumption of animal products and positive impacts on health.

BUT is this intrinsic to animal products or to greater / more diverse agricultural production per se?

- e.g. India's Operation Flood: milk production heavily supported by government led to increased milk production and health benefits. But would similar health benefits have been achieved by government intervention focused on vegetables? In other words, would government interventions to promote dietary diversity in general be just as effective as focusing on dairy in particular?

Pathway 2: Meat production and consumption is marker for higher socio-economic status (SES)

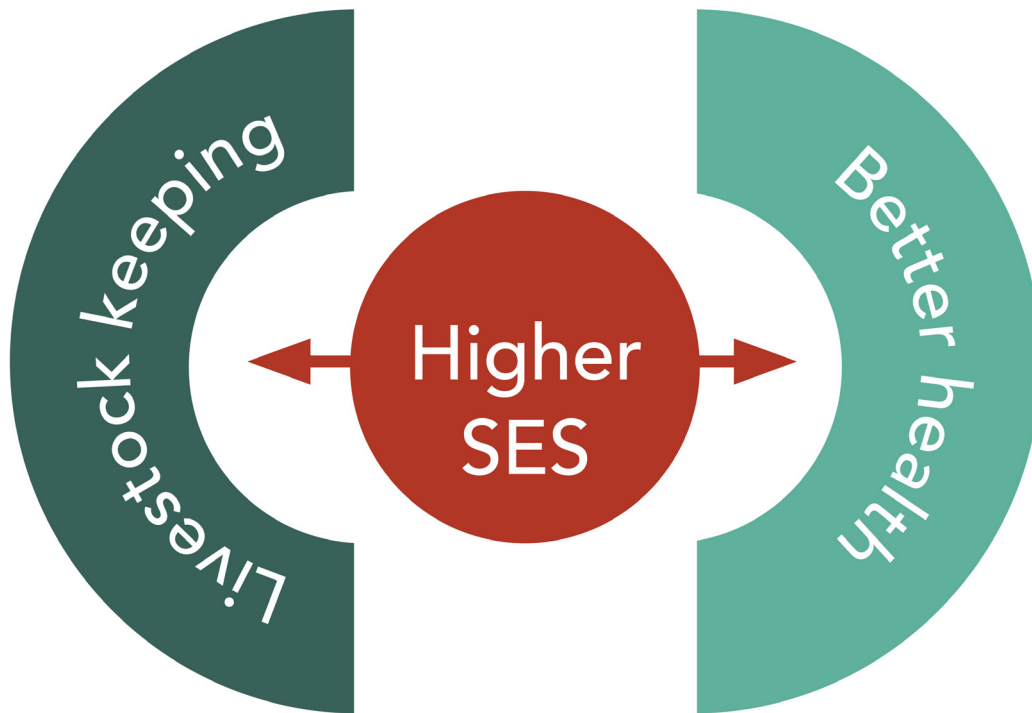


Figure 5: Higher socio-economic status is linked to both livestock keeping and better health.

Source: FCRN. (2016).

- People who keep livestock/buy animal production are generally healthier.
- But they may keep livestock / buy animal products because they are richer and they may be healthier because they are richer.
- In other words it could be argued that causation runs from socio economic status (SES) to livestock and from SES to health – in other words, that livestock keeping is not causally linked to better health.

Pathway 3: Livestock production as income generation

- Livestock production generates income.
- Earnings can be spent on medicines, better sanitation, better food etc. ... but also on sweets, alcohol, cigarettes.
- Causation runs from livestock to higher SES to better health.
- **Pro-animal product conclusion:** livestock is an important part of sustainable livelihoods.
- **Anti-animal product conclusion:** rural development and income generation per se is important– other rural development approaches could achieve same outcomes without necessarily a need to boost livestock production.

Pathways 4 and 5: Animal products are energy and nutrient dense

- This route is consumption/nutrition rather than production/livelihood focused.
- There have been studied interventions where children are given one of the following: meals containing meat; meals containing milk; or meals with added vegetable oil, all designed to be iso-caloric.
- In all cases there were difficulties with the study design and practical implementation (interventions were in some of the world's poorest villages).
- Impacts were inconclusive but some positive findings.
- **Pro-animal product conclusion:** Animal products provide a unique package of essential nutrients and energy.
- **Anti-animal product conclusion:** the additional energy provided by the animal products is a significant part of the story (and other products could substitute); the nutritional role of animal products is only significant in contrast with the lack of overall diversity of the diet.

Pathway 6: Animal products as a marker for dietary diversity

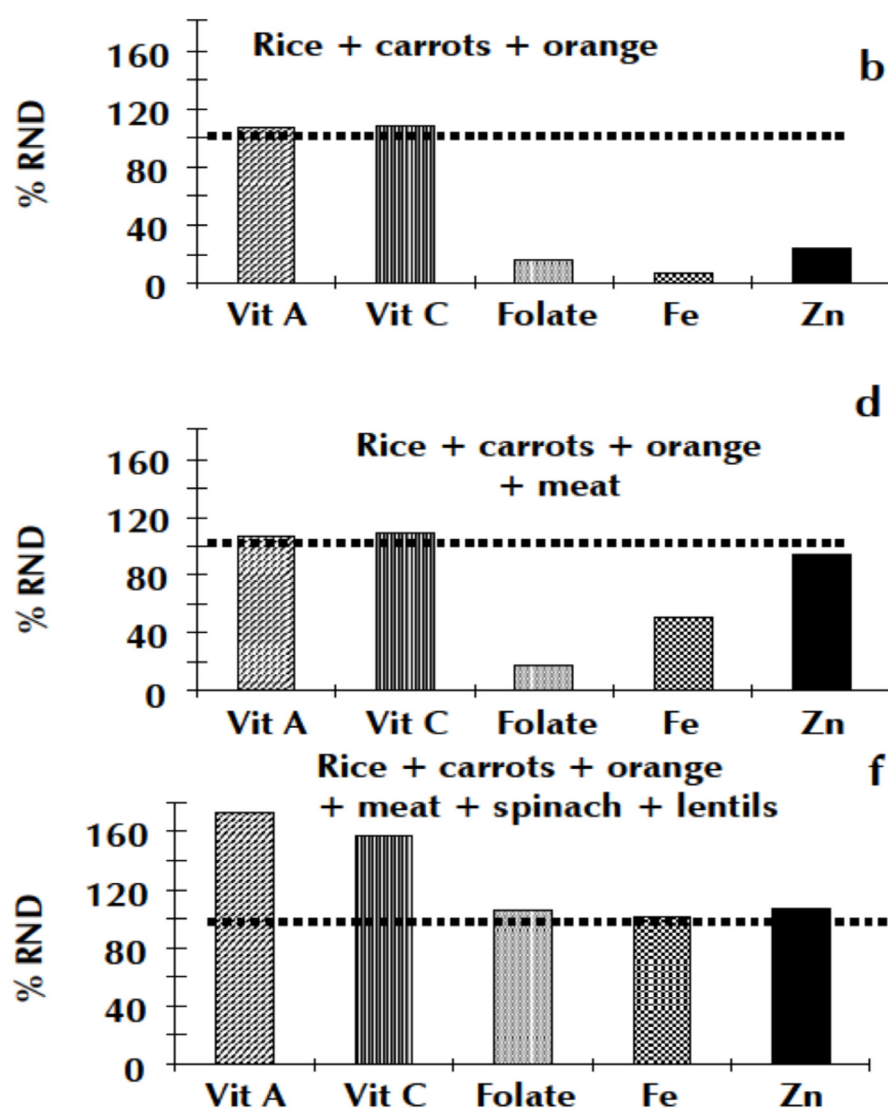


Figure 6: Animal products provide a marker for overall dietary diversity and nutrient consumption.

Source: Adapted from FAO/WHO (2016)

Greater food diversity = Greater nutritional quality
Animal products can have an important role in this diversity.
**Greater dietary diversity leads to increased chance of
meeting nutritional needs.**

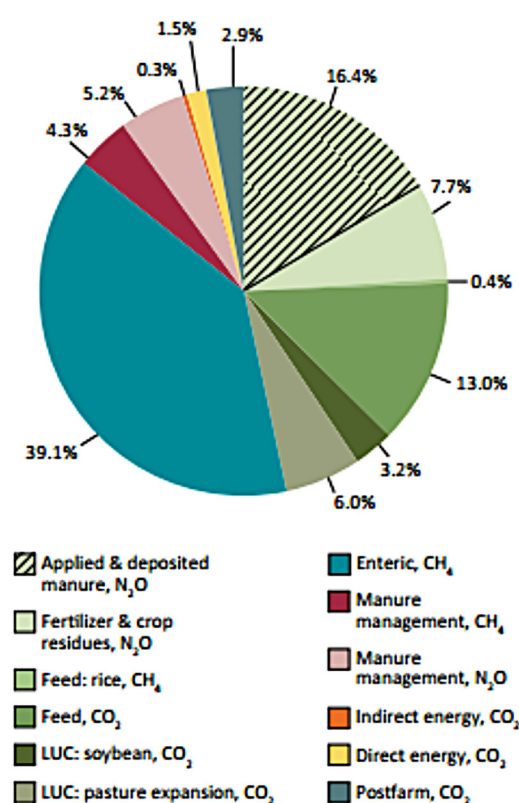
- **Pro-animal product conclusion:** Animal products add to dietary diversity which leads to good health.
- **Anti-animal product conclusion:** People who eat animal products tend to have more diverse diets and it isn't 'meat' per se we should be encouraging but dietary diversity – and predominantly a greater range of plant foods.

8.3 What are the environmental issues associated with milk and dairy?

8.3.1 Livestock production contributes significantly to GHG emissions

GHG contributions from livestock systems

FIGURE 4. Global emissions from livestock supply chains by category of emissions



Livestock contribute 14.5% of human-made GHG emissions. Of this 14.5%:

- Enteric fermentation from ruminant animals contributes nearly 40% of livestock GHGs.
- Emissions related to manure contribute around 25%.
- Production of animal feed contributes around 13%.
- Land-use change for livestock contributes nearly 10%.
- Post-farm emissions (processing and transport from farm to retail) contributes only 2.9%.

Figure 7: Global emissions from livestock supply chains by category of emissions.

Source: Gerber, *et al.* (2013).

Within the livestock sector, almost all GHG emission contributions come from enteric fermentation (methane emissions), manure (both methane and nitrous oxides), animal feed production (carbon dioxide and some methane), and from land-use change (carbon dioxide emissions from land clearing).

The percentage contribution from post-production emissions is very small for livestock – in this case they are CO₂ emissions related to the processing and transportation of livestock product between the production and retail point.

For more on the contribution of food systems to GHG emissions, see [Chapter 3](#).

Focus on livestock – aggregate global emissions by species

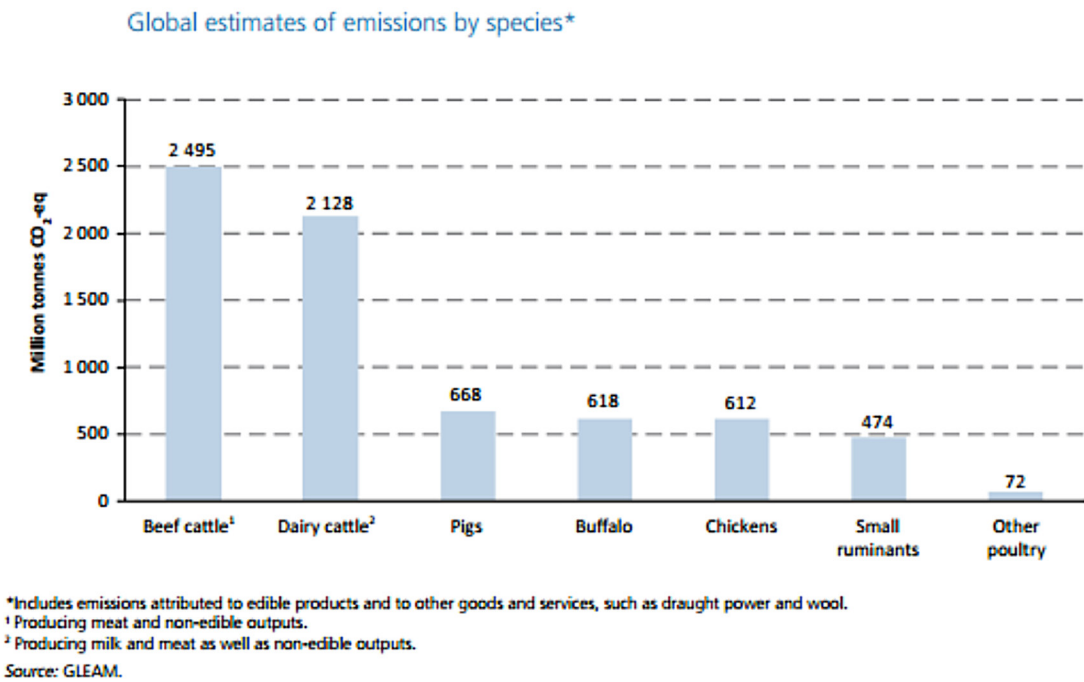


Figure 8: Global emissions from livestock by species of animal.

Source: Gerber, et al. (2013).

Globally, beef and dairy cattle contribute the highest GHG emissions, being ruminants and farmed in high numbers. Other ruminants (for example buffalo, sheep and goats) contribute less overall due to lower production numbers.

Non-ruminants such as pigs and chickens contribute less than cattle mainly because they do not emit as much methane from enteric fermentation, and convert feed into meat more efficiently, so the GHG emissions from pork and poultry production are lower, despite their being farmed in large numbers.

8.3.2 Carbon sequestration has been proposed to counter this

Ruminant emissions are high but it has been argued that these are countered by their role in sequestering soil carbon

Advocates of grass-fed beef systems argue that well managed grazing livestock can help sequester carbon in soils.

It is claimed that this sequestration can partly or entirely outweigh the methane and nitrous oxide the animals emit; potentially grazing livestock systems can even be 'emission negative'.

If sequestration is assumed the carbon footprint of beef can shift from very high to very low

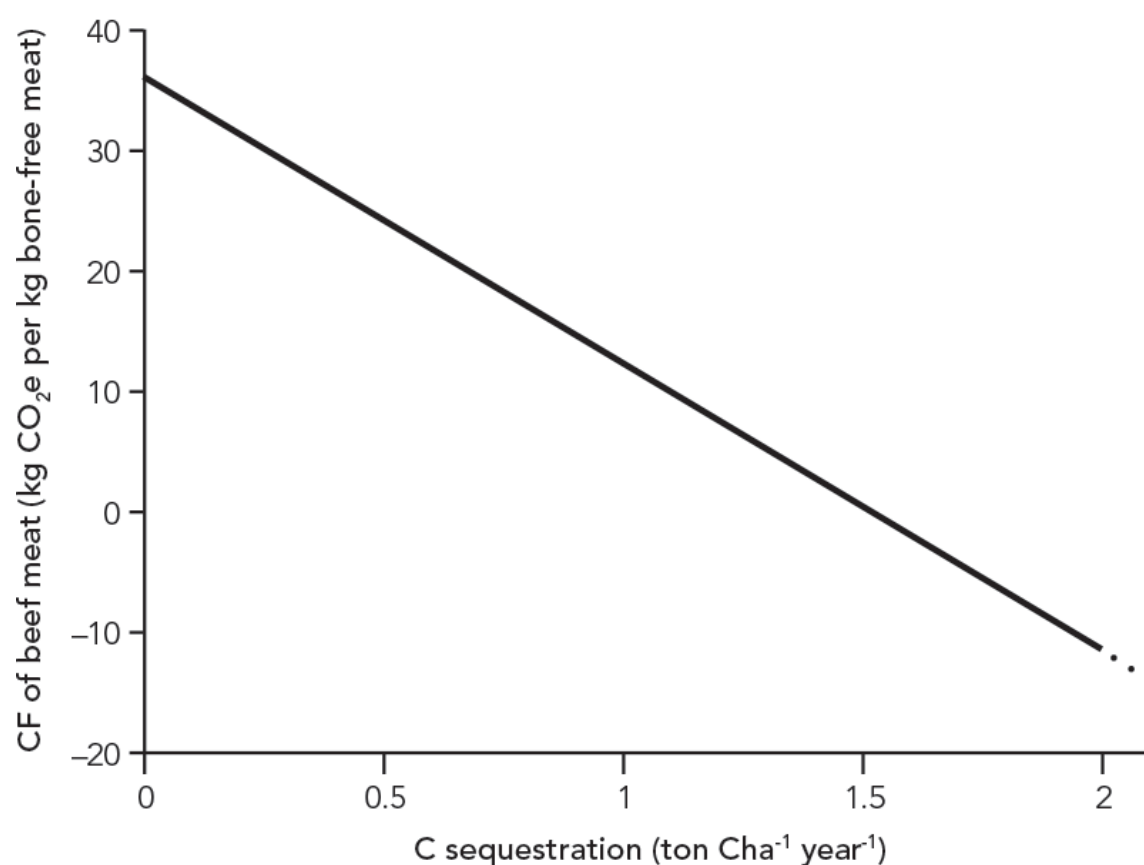


Figure 9: Theoretical relationship between carbon footprint of meat and level of carbon sequestration.

Source: Rööß and Nylinder (2013).

But caution is needed when it comes to livestock and sequestration

- This is still an under researched area and the evidence base is still uncertain.
- Carbon sinks are temporary, while ongoing livestock production will continue to produce methane and nitrous oxide.
- The extent to which sequestration occurs depends on: the status of the soil carbon levels before any management change, the baseline soil type and conditions, specific management techniques, climate, rainfall etc. – and many of these factors can change.
- Also need to consider: reversibility (grassland can be ploughed up) and saturation (after some decades soils approach carbon equilibrium; methane and nitrous oxide emissions will then always outweigh the sequestration); impacts on biodiversity can be mixed and may be negative.
- What is clear is that grasslands are major carbon stores – so it is important not to plough them up.
- Some grasslands are home to unique flora and fauna and grazing livestock may have historically contributed to this. But other grazing lands contain very little biodiversity.
- Poor grazing management can contribute to soil carbon losses while grazing livestock have historically (although less so now) been an important driver of deforestation.

8.3.3 Consumption and associated production of animal products is projected to increase globally

Overall consumption and production of meat is projected to nearly double by 2050 under a business as usual scenario.

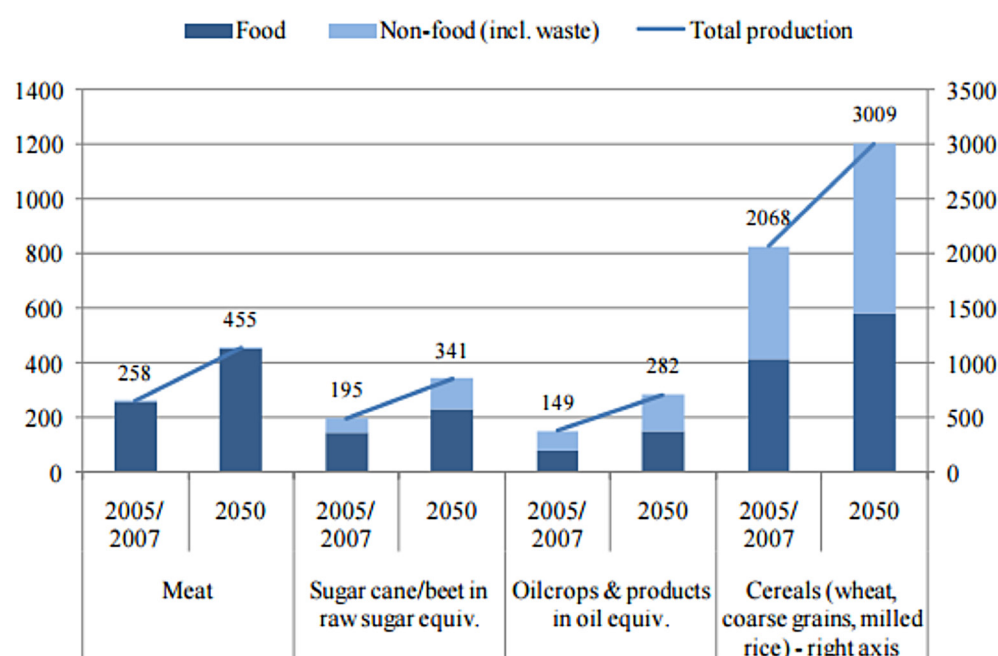


Figure 10: Projections of levels of agricultural commodity production in 2050 compared to 2005/2007 levels.

Source: Alexandratos and Bruinsma (2012).

Projected growth in production up to 2050. An additional 200 million tonnes of meat would need to be produced annually by 2050, compared with production in 2005/07.

Based on current trajectories, with rising incomes in developing countries and food consumption per capita and absolute population growth, total food consumption is projected to rise significantly. Meat consumption is expected to nearly double by 2050.

In developed countries, meat consumption is not expected to rise much further, if at all. The majority of the increase would be in developing countries, where significant income rises and population growth are expected. Population growth in Sub-Saharan Africa is projected to nearly double, from 730 million in 2006 to 1.68 billion in 2050.

The importance for food-related GHG emissions comes from the high GHG-intensity of meat production (see [Chapter 3](#) for a review of this topic).

Consumption of meat and dairy products per capita is expected to rise

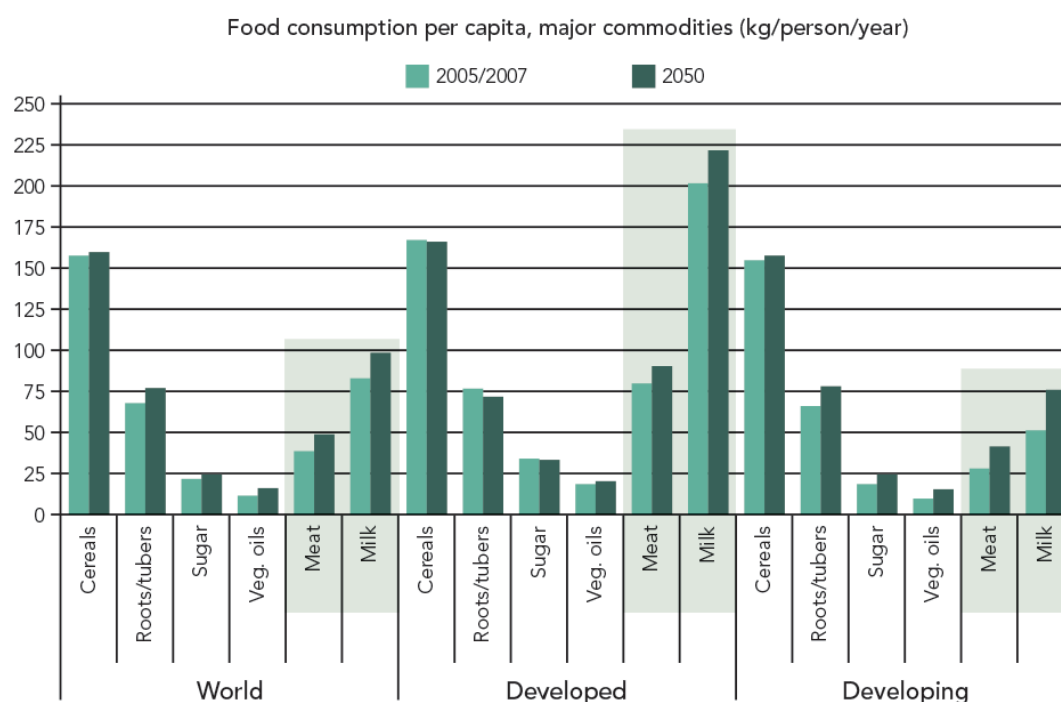


Figure 11: Projected increase in per capita consumption of major commodities between 2005/2007 and 2050, in developed and developing countries.

Source: Alexandratos and Bruinsma (2012).

Per capita consumption of animal products (meat and dairy) is projected to rise mainly because of increased demand in developing countries, made possible by increases in average incomes.

But there is significant variation between and within regions

- Meat consumption has grown at 2.6% per year since 1981.
- But the aggregate picture masks strong regional variations.
- Consumption of meat has been growing at 4.9% annually in developing countries since 1981, with the per capita average increasing between 14 to 28 kg per year.
- But annual growth rate is only 3.3% if China and Brazil are excluded from the developing country totals.
- Currently Brazil and China account for 56% of developing country meat consumption but constitute only 28% of the developing country population.
- Consumption of animal products in Sub-saharan Africa has stagnated and in some countries has actually fallen.
- Consumption in developed countries has risen very little, since per capita intakes are already high.

8.4 What are the animal welfare issues associated with livestock production?

8.4.1 How can we define animal welfare?

Animal welfare and the 'Five Freedoms'

A useful way of defining animal welfare is given by the UK Farm Animal Welfare Council. It focuses on the need for animals to enjoy the following Five Freedoms:

- Freedom from hunger and thirst, by ready access to water and a diet to maintain health and vigour.
- Freedom from discomfort, by providing an appropriate environment.
- Freedom from pain, injury and disease, by prevention or rapid diagnosis and treatment.
- Freedom to express normal behaviour, by providing sufficient space, proper facilities and appropriate company of the animal's own kind.
- Freedom from fear and distress, by ensuring conditions and treatment, which avoid mental suffering.

8.4.2 What are the main issues that influence animal welfare?

What are the main issues affecting animal welfare in practice?

Within the framework of the Five Freedoms, animal welfare can be affected by the following issues:

- Feed quality (nutrition, availability etc.).
- Housing quality (warmth, security, space etc.).
- Stockmanship and veterinary care (good, bad, or lack of).
- Transport & slaughter conditions.
- Access to natural behaviours (open space, mobility, foraging).
- Breeds used for appropriate conditions.

And it is important to understand which aspects of welfare people emphasise and value. Some stakeholders place more value on physical health (sometimes at the expense of natural living/behaviours), and others on natural living/behaviours, even where physical health may be compromised.

- Is it possible to have them both, always, everywhere?
- Are confined systems always bad for welfare? – the “do cows like fields?” question? (i.e. does it matter to a cow that it is ‘living naturally’ by being outside in a field if it is cold and wet?).

8.4.3 How can the context affect understandings of how to improve animal welfare?

How can the context affect understandings of how to improve animal welfare?

- Intensification is sometimes thought to be synonymous with poor animal welfare. But the context is very important when comparing intensive and extensive systems.
- What is the baseline? Which livestock contexts are we talking about?
 - Intensification has a different meaning in production systems where a dairy cow is already producing 10,000 litres of milk per year as compared with systems in low income countries where healthcare and diets may be very poor.
- In other words when people talk about 'intensification/productivity increases' do they mean:
 - Better diets, better vet care for a cow living in poor conditions, or
 - Increased industrialisation to push the high producing cows beyond their metabolic limits?
- Can we define 'good welfare' in different cultural contexts?
- Can we establish animal welfare as a boundary condition?

8.4.4 Is there a relationship between environmental impact and animal welfare?

Is there a relationship between environmental impact and animal welfare?

Various metrics can be used to define environmental impact (for example GHG, land-use and water-use). Intensive and extensive livestock systems relate to these metrics in different ways.

With regard to GHG emissions:

- Intensive systems are often more GHG 'efficient' per unit output/unit GHGs (e.g. broiler vs free range chickens).
- Intensive systems also lend themselves to carbon-offsetting approaches such as anaerobic digestion.
- The 'efficiency' of intensive systems may mean that the cost of meat is lower as compared with extensive systems; this can lead to increased demand, thereby outweighing the carbon savings achieved through greater efficiency (**Jevons Paradox**).

With regard to land-use:

- Intensive systems' land take is smaller, although reliance on prime arable land (to grow livestock feed) is greater.
- Some extensive systems (e.g. cattle and sheep) can use pasture that is unsuitable for crop production, and if well managed may even have a role in sequestering carbon (GHG mitigation) although, more research is needed on this potential.
- That said the land-use impacts of meeting current trajectories in meat demand would likely be worse if all that extra demand was met from extensive systems.

With regard to water-use

- Intensive systems generally have higher irrigation water requirements.

8.5 Motivations for disagreements: three perspectives on the food, nutrition and sustainability issue

There is general agreement that livestock are central to many problems about food, nutrition and sustainability. But different opinions exist as to how best to solve these problems.

This section considers why people have different opinions and the three main perspectives that may underpin these opinions.

8.5.1 Why do we have different opinions?

Why do we have different opinions?

We all want a sustainable health-enhancing food system, and there is a general agreement that livestock has a central role.

BUT:

- We have different views on:
 - How the world works.
 - What is 'inevitable' and what is 'possible' – i.e. how far the status quo can be challenged.
- There are different visions of what a sustainable healthy food system looks like.
- We differ in the extent to which diverse issues are viewed holistically and seen as requiring integrated solutions, or as separate concerns requiring targeted issue-specific interventions.
- There are three broad perspectives on the food-nutrition-sustainability problem, which are outlined in this sections (see Chapter 4 for more on these approaches in the context of GHG mitigation).

8.5.2 Efficiency perspective

Perspective 1: The Efficiency Perspective

- **Overall goal according to this perspective:** “More food for less negative impact”.
- **Focus:** Production – producers.
- **Geographical perspective:** Macro – global markets.
- **Key stakeholders:** Policy makers, agricultural producers and farming unions, food industry.
- **How dominant is this view?** This perspective dominates food security & mitigation discourse.
- **Underlying moral values of this perspective:**
 - Decoupling (of consumption from impact) is possible – thanks to human ingenuity: ‘green growth’.
 - Better material quality of life for all.
 - Freedom = freedom to consume.
 - Innovation with informed choice.

How does the efficiency perspective approach food security and nutrition challenges?

- **Food security goal:** “More food to meet demand”:
 - More grains, more livestock.
 - Hunger is viewed as a supply-side problem to be addressed by increased output.
 - Demand trajectories are viewed as unchangeable.
- **Nutrition goal:** make ‘inevitable’ consumption trends more healthy:
 - Breed leaner animals.
 - Reformulate products: less fat, fewer calories, enhanced nutrients (probiotics, added vitamins etc.).
 - Better labelling and information (informed consumer choice).
 - Biofortification and fortification.

Environmental goals, food security and nutrition are often addressed as separate issues within this efficiency perspective.

8.5.3 Demand restraint perspective

Perspective 2: Demand restraint perspective

- **Overall goal according to this perspective:** Combat excessive consumption of high impact foods
- **Focus:** Consumption – consumers.
- **Geographical perspective:** Developed / rich world origins and focus.
- **How dominant is this view?** Widespread among environmental and animal welfare organisations, vegetarian and vegan groups, animal rights activists.
- **Underlying moral values:**
 - Livestock farming is the ‘source of all evil’ (lumps issues, i.e. livestock is a nexus of health, ethical (e.g. animal welfare) and environmental concerns).
 - “Limits to growth”.
 - ‘Greed’ narrative: overtly moralistic – excessive consumption is cause of our crisis.
 - Freedom = freedom from consumption – ‘live better by consuming less’.
 - Production-side measures are an (immoral?) ‘techno-fix’.
 - Regulation needed to change context of consumption.

How does the demand restraint perspective approach food security and nutrition challenges?

- **Food security:**
 - Contraction and convergence is the way forward: “there is enough food to feed everyone” (highlights problems of obesity – “more fat people than thin people”).
 - Emphasises ‘wastefulness’ of meat consumption as regards feed conversion and land use.
- **Nutrition:**
 - Emphasises negative qualities of animal products (e.g. saturated fat, calories) (fat rich focus).
 - Underplays positives: iron, calcium, B vitamins, zinc, protein.

8.5.4 System transformation perspective

Perspective 3: Food system transformation perspective

- **Overall goal according to this perspective:** need to tackle not production, not consumption but inequitable power structures.
- **Focus:** Interaction among food system actors.
- **Geographical perspective:** developing countries plus ‘alternative food movements’ in developed country – generally rural.
- **Stakeholders:** wide spectrum (alternative food movement through to elements of FAO). Strong representation from international development organisations and civil society.
- **How dominant is this perspective?** Vocal, but not yet changing practice.
- **Underlying moral values:**
 - Equity & justice.
 - “Small is beautiful” (Agrarian? Romantic?).
 - Not “green growth” or “limits to growth” but “capacity building”.
 - Not freedom to consume or freedom from consumption but freedom to self determine.

How does the system transformation perspective approach food security and nutrition challenges?

- **Food security** = livelihoods, institutions, markets, empowerment.
 - Emphasises the importance of thinking about not just supply but access (including access to means of production), utilisation and stability (see [Chapter 7](#)).
 - Can you afford it? What kind of food is it? What are the conditions within which you are consuming? Do you have reliable access?
- **Nutrition:** Not ‘more’ food plus post-harvest nutritional enhancement; not ‘less meat’ either – but dietary diversity for micronutrient adequacy (meat, veg, legumes, local foods...) and the transformative role of empowered production.

8.6 Conclusions

- Livestock is a contested issue linking multiple health, socio-economic, environmental and ethical concerns.
- These issues are contextual and differ between developed and developing countries.
- Trends indicate increased demand for animal products, although this growth is uneven between regions and across socio-economic groups.
- Advocacy of different solutions depends on differing perspectives that variously emphasise production efficiency, demand restraint and food system rebalance.
- Sustainable healthy diets ([Chapter 9](#)) need to take into account the positive and negative health factors, and environmental and ethical issues associated with meat and dairy production and consumption.

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Credits

Suggested citation

Garnett, T., Scarborough, P., & Finch, J. (2016). Focus: the difficult livestock issue (Foodsource: chapters). Food Climate Research Network, University of Oxford.

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Funded by

The production of this chapter was enabled by funding from the following sources:

The Daniel and Nina Carasso Foundation;
The Oxford Martin Programme on the Future of Food;
The Wellcome Trust;
The Esmée Fairbairn Foundation;
Jam Today;
Waste Resources Action Programme (WRAP);
The Sustainable Consumption Institute at Manchester University.