



The impact of animal farming on people and planet

In this Paper:

- 1.0 Climate Change
 - 1.1 Hidden Emissions
 - 1.2 18% of global GHG emissions
 - 1.3 Is meat all bad?
- 2.0 Resource Depletion
 - 2.1 Oil
 - 2.2 Water
 - 2.3 Energy
 - 2.4 Deforestation
- 3.0 Policy Recommendations

The issues

The World Bank estimates demand for meat and dairy products will grow by 85 per cent by 2030¹. This demand comes predominantly from the industrialised, developed world. Meat and dairy production can have severe consequences for climate change and resource depletion. The United Nations Food and Agriculture Organisation (UNFAO) in their report *Livestock's Long Shadow* have estimated that animal farming is responsible for 18 per cent² of all greenhouse gases (GHG). Animal farming is also responsible for resource depletion including oil, water, energy and for significant amounts of deforestation. This paper will look at what consequences such findings may have at a policy and individual level.

¹ Evans, A., *The feeding of the nine billion, Global food security for the 21st century*, The Royal Institute of International Affairs, Chatham House, London, 2009

² According to the Vegan Society, the UNFAO figures are based on a standard 100 year timescale. If we use a 20 year timescale, and leave the rest of the calculations unchanged, then the percentage contribution to human greenhouse gas emissions from the animal farming industry rises to 22.7 per cent.

1.0 Climate Change

*'1kg of beef is responsible for the equivalent of the amount of CO₂ emitted by the average European car every 250km'*³

Dr R.K. Pachauri

The European Commission recognises that '*Climate change is already happening and represents one of the greatest environmental, social and economic threats facing the planet*'⁴. Dr Pachauri, the chair of the Intergovernmental Panel on Climate Change (IPCC), states '*a reduction in meat consumption can have substantial benefits in reducing greenhouse gases*'. The exact impact of animal farming on climate change is widely disputed. For example the UNFAO report *Livestock's Long Shadow* considers livestock production to be responsible for 18 per cent of all greenhouse gas emissions, famously stating that it is a bigger contributor than transport (Steinfeld *et al* 2006). This is compared to the EU estimate of 13 per cent, while the UK places it closer to 8 per cent (Garnett 2008:54). Regardless of these varying estimates we can see that it has a significant impact.

1.1 Hidden emissions

Livestock production generates emissions in ways which are not immediately apparent to the consumer.

- Production and application of synthetic fertilizers for feed crops
- Emissions from manure
- Deforestation either for cattle ranching or feed crop production
- Extensive use of machinery, for ploughing, harrowing, drilling, harvesting etc.
- Transport from farm to slaughter, from slaughter to processing, processing to distribution, and distribution to retail and retail to consumption.

If one accounts for the livestock's entire life cycle, the emissions are considerably higher than those from the simple rearing, slaughtering and selling of meat and dairy.

³ Pachauri, P.K., *Global Warming, The impact of meat production and consumption on climate change*, Presentation on 8/09/2008, accessed 13 March 2009, available at <http://www.scribd.com/doc/13095652/Dr-Pachauri-Meat-Production-and-Climate-Change>

⁴ European Commission (2009) *Climate Change*, accessed on 11 March 2009, available at http://ec.europa.eu/environment/climat/home_en.htm

Non CO₂ GHG emissions

Animal farming produces significant amounts of methane which is approximately twenty times more damaging for global warming than carbon dioxide. The UNFAO estimates that animal farming is responsible for 37 per cent of all methane emissions. It also generates significant amounts of nitrous oxide. The UNFAO estimates that livestock is responsible for 64 per cent of all nitrous oxide emissions. Nitrous oxide is approximately two hundred times more damaging for global warming than carbon dioxide. In total they calculated that animal farming is responsible for 18 per cent of global GHG emissions.⁵

1.2 How reliable is the 18 per cent?

These emissions are very difficult to count, and the FAO report has been heavily criticised by some⁶.

There are two broad questions. **Firstly**, how is this figure calculated and why is it considerably higher than any other report? **Secondly**, how has this figure been used by different organisations to suggest very different policy recommendations?

The 18 per cent figure is based upon previous growth rates in meat consumption, and the deforestation that goes along with it. If meat consumption is curbed, or even frozen at current levels, we would also freeze or curb the amount of forest that would need to be cleared for cattle ranching or feed crop production. In other words, the FAO report is based on the assumption that we either do not accept that livestock production is fuelling climate change or that we do not do anything about it, thus ensuring that the meat industry continues to grow. The figures can only be held to be true if no action comes from its basic point that meat consumption is fuelling climate change. This over-estimate however has been widely quoted by many environmentalists.

Livestock's Long Shadow has been quoted by a variety of sources including NGOs such as Compassion in World Farming and Animal Aid and academics such as Koneswaran and Nierenberg (2008) and Garnett (2008)⁷. It is apparent that the FAO report has been used to justify the agendas of a number of

⁵ See footnote 2

⁶ The Ecologist, October 2008. *Getting to the meat of the matter*

⁷ Compassion in World Farming, *The Global benefits of eating less meat*, 2007

Compassion in World Farming, *Global Warming: Climate change and animal welfare*, 2008

Animal Aid *Meat Free, feed four for under a fiver*, London, Animal Aid, 2009

Koneswaran, G. and Nierenberg, D., *Global Farm Animal Production and Global Warming: Impacting and mitigating climate change*, Environmental Health Perspectives, vol 116 (5) May 2008 pp. 578-582

organisations. For example, if it can be shown that meat-eating contributes to climate change, Animal Aid (an animal welfare charity) can call on all those concerned about climate change to stop eating meat. But there is a contradiction between this and other parts of the FAO report. The FAO strongly advocates an intensification of farming methods to maximise production. This is in opposition to the majority of green pressure groups, animal welfare groups and environmentalists who normally call for a reduction in the intensification of farming methods⁸. The Vegan Society claims that growing plant crops to eat 'first hand' makes much better use of resources than animal farming does. One billion people around the Earth are under-nourished, mostly in the developing world. Meanwhile, the United Nations says that over three billion people could live on the grain fed to farmed animals.

The disagreement is, however, not about whether or not livestock production contributes to global warming but about the extent of this contribution and how best to tackle this challenge. There are some environmental advantages to intensive livestock production, these include:

- Breeding animals for greater productivity requires less energy input for the same quantity of output
- Feeding more concentrated cereals and less grass to cattle reduces methane emissions
- The possibility of chemical additions to regulate and reduce methane emissions.

Intensive farming and the environmental advantages mentioned above are however, based on a system that is reliant upon fossil fuels to maintain a high output. Taking the scenario of limited oil resources and climate change into account, intensive farming methods cannot be viewed as sustainable. They can only be viewed as a stop gap to meet the demand of an over-consuming population.

There are also other immediate disadvantages of intensive farming methods that need to be considered, including:

- A potential shortened life-span of animals as a result of physiological stress
- Potential damage to soil and rivers as a result of using synthetic fertilizers

⁸ Compassion in World Farming, *The Global benefits of eating less meat*, 2007
Compassion in World Farming, *Global Warming: Climate change and animal welfare*, 2008
Lucas, C. and Woodin, M. ,*Green alternatives to globalization: A manifesto*, Pluto Press, London, 2004
The ecologist magazine, *Getting to the meat of the matter*, October 2008

- The need for more nitrogen fertilizers some farmers may not be able to afford and which may push small and medium-sized farmers out of business.

In order to reduce GHG emissions, there have to be significant reductions in meat and dairy consumption across the developed world to go hand-in-hand with a significant shift in production methods. Currently we consume 2816 oz of meat each per year, which is the equivalent of 281 10oz steaks⁹. It would seem possible to reduce that level of consumption without significant hardship.

1.3 Is meat all bad?

There is no reason to believe that small-scale meat and dairy consumption cannot be part of a sustainable future although the arguments have to be approached with care. Two examples might illustrate this:

Cattle can consume a variety of agricultural by-products such as molasses cake, spent hops, brewer's grain, citrus pulp, straw and such forth. Through meat and dairy consumption we can incorporate waste which humans cannot eat, into the food chain. Currently, only a small quantity of such waste products are used for cattle feed. The amount of by-products we currently produce however could only go towards feeding a fraction of the cattle we currently farm. Therefore this theory would only hold any weight if our consumption rates were significantly reduced¹⁰.

Some people agree that in terms of land-use, there is a significant proportion of land that is not suitable for crop production which can be used for livestock. Overgrazing however can have a significant impact on climate change through carbon loss from trampled soil. There is no reason to believe that small scale meat and dairy consumption cannot be part of a sustainable future. The Vegan Society has a counter argument in which it states that land less suited to growing arable crops can be used to grow annual, shrub and tree crops for food, fuel, fibre, construction materials and other uses with stock-free farming methods.

2.0 Resource Depletion

Meat production using current production techniques consumes a large amount of resources to produce relatively small amounts of meat and dairy. Current production is based on consuming oil, water, energy and land at an unsustainable level. The impact of animal farming on these different resources will be explored in the following sections.

⁹ Walsh, B., *Meat: Making Global Warming worse*, Time (CNN) 10 September 2008

¹⁰ Garnett, T., *Cooking up a storm*, Food Climate Research Network, Centre for Environment Strategy, University of Surrey, Surrey, 2008

2.1 Oil

Industrial meat production is fundamentally reliant on derivatives of crude oil.

- There has been a shift toward a mechanical form of agriculture
- There has been a shift towards more synthetic packaging
- It is estimated that 40 per cent of the world's food protein relies upon synthetic fertilizers¹¹. In turn, the fertilizer industry is dependent upon industrial meat production. The fertilizer industry is thus, unsurprisingly, one industry which argues that current levels of meat consumption are sustainable and tries to band-aid the issue by advocating less GHG intensive fertilizers.
- Our produce is travelling longer distances to get to our plates. Food miles are an issue in terms of both the mode of travel and the distance travelled. A DEFRA report as quoted by Lucas *et al* states, '[air freighting] produces 11 per cent of the food transport CO₂ equivalent emissions...and is the fastest growing mode'¹². As current modes of transport are reliant upon oil, we can see that the quantity of our meat that we are flying around the world is unsustainable.

It could be argued, as Garnett has, that it is more important to look at the type of food we consume rather than how far it has come. In other words it may be better to consume root vegetables from the other side of the world than beef from within the EU. It is apparent however, that eating habits as they stand, act as an environmental double whammy, consuming meat from the other side of the world that has been fed large quantities of cereals from another part of the world. Put simply, we not only eat meat, but we eat meat that has travelled considerable distances to our plate.

2.2 Water

'If ready supplies of water were taken out of the equation, then the whole business model that lies behind today's intensive meat production systems would collapse'

Jonathon Porritt (2007)

Animal farming accounts for about 8 per cent of the world's water use¹³, of which 88 per cent is used on feed crops¹⁴. In a world where two thirds of the

¹¹ Lucas, C., Jones, A., and Hines, C., *Fuelling the food crisis, the impact of peak oil on food security*, The Greens/European Free Alliance in the European Parliament, 2007

¹² DEFRA as quoted by Lucas, C., Jones, A., and Hines, C. in *Fuelling the food crisis, the impact of peak oil on food security*, p. 11, The Greens/European Free Alliance in the European Parliament, 2007

¹³ World Society for the Protection of Animals, *Eating our future, the environmental impact of industrial animal agriculture*, WSPA, London, 2008

population live in water-stressed environments¹⁵ we can see that both our direct and indirect water consumption has to be considered.

Looper *et al* estimated that ‘a 1,500 pound lactating cow, producing 40-100 pounds of milk daily, consumes around 18.4 - 35.6 gallons of water’¹⁶. This is at a minimum 83.65 litres a day per cow! This only represents a minority of the water that is used in the whole cycle of production of milk and meat. It is apparent that livestock is currently consuming, directly and indirectly, an increasingly scarce resource at an unsustainable rate.

It is worth noting the varying water inputs that are needed for different foods. Dr Pachauri, chair of the IPCC has produced this table to illustrate how much water is needed to produce one kilogram of these different foods:

Maize	900 litres
Rice	3,000 litres
Chicken	3,900 litres
Pork	4,900 litres
Beef	15,000 litres

This however, does not take into consideration other outputs of animal farming such as wool and leather. Following this logic one could split these figures between the number and quantity of useful items an animal produces. This however, does not apply for milk, as the cow is there purely to produce milk. It is estimated that to produce a litre of milk it takes 990 litres of water¹⁷.

Livestock has another impact on water. It is responsible for large amounts of pollution. There are a number of sources of pollution from livestock including animal waste, antibiotics and hormones, chemicals from tanneries, fertilizers and pesticide use and sediment from eroded pastures¹⁸. Both nitrogen and phosphorus excreted by animals increases the chance of eutrophication¹⁹ which can lead to algal blooms. This in turn can lead to damage to fish stocks and can produce toxins. This problem can be exacerbated by the use of nitrogen

¹⁴ Steinfeld *et al*, *Livestock's long shadow*, 2006 as quoted by World Society for the Protection of Animals, *Eating our future, the environmental impact of industrial animal agriculture*, WSPA, London, 2008

¹⁵ Steinfeld *et al*, *Livestock's long Shadow*, UNFAO, Rome , 2006

¹⁶ Looper, M.L. and Waldner, D.N., *Water for dairy cattle*, Oklahoma Cooperative Extension Fact Sheets, 2007

¹⁷ World Society for the Protection of Animals, *Eating our future, the environmental impact of industrial animal agriculture*, WSPA, London, 2008

¹⁸ Steinfeld *et al*, *Livestock's Long Shadow*, United Nations Food and Agriculture Organisation, Rome, 2006

¹⁹ Surplus nutrients in the water

fertilizers. This is a particular problem for closed water systems like the Baltic Sea²⁰.

2.3 Energy

Energy consumption and energy security are increasingly being referred to at a Member State and EU level. It is apparent however, that these issues are being tackled predominantly through the supply end whilst essentially ignoring the demand side of the problem. One of the biggest and often ignored pressures on energy demand and consumption is agriculture and especially livestock production. It takes ten times the amount of energy to produce meat protein than it does to produce the equivalent plant-based protein²¹.

There is the potential to make small savings on direct energy consumption on farms by implementing existing technologies and good practice. DEFRA estimates a saving of 15 per cent of direct energy costs by 2015 is feasible by simply implementing current technologies and good practices²². Although direct energy inputs represent a small proportion of total energy inputs, it is something that could be changed relatively easily. To really understand and reduce the impact livestock has on energy consumption we have to look at a life-cycle assessment of food products.

Essentially, meat production consumes energy in a number of different ways, including:

- Energy used in producing fertilizers used for growing feed crops
- Energy used in transporting fertilizers to feed crop farms
- Energy used in transporting feed crops to the herds being bred for meat production
- Energy used on the farms
- Energy used in slaughter
- Energy used in processing (this depends on the type of product of course - the less processing, the less energy input)
- Energy used in transporting products to the point of sale (this can have several intermediary stages)
- Energy used in preparing the meat/meat product for consumption
- Energy used in disposing of by-products and waste at all stages of production.

Clearly, some of these also apply to the production of other foodstuffs but not all of them do.

²⁰ World Society for the Protection of Animals, *Eating our future, the environmental impact of industrial animal agriculture*, WSPA, London, 2008

²¹ Singer, as Quoted by The Ecologist (2008) *Getting to the meat of the matter*, October 2008

²² Garnett, T., *Cooking up a storm*, Food Climate Research Network, Centre for Environmental strategy, University of Surrey, Surrey, 2008, p. 89

Of course, meat and dairy foods are not the only foods that consume energy in their production cycle. Kanyama *et al* produced a life-cycle energy assessment of different food products. It is clear from their results that meat and dairy consistently represented some of the most energy-intensive foods. Although this study upholds the claim that meat and dairy consumption has a negative environmental impact, it breaks down the myth that to be vegetarian (or vegan) is good *per se*, and that meat consumption is bad *per se*. They argue for a significant reduction in the consumption of meat products and heavily processed foods. Heavily processed foods can include fresh fruit if, for example, it has been chilled for 10 months before consumption, or if it has been heavily reliant upon synthetic fertilizers. Equally, food miles and distribution all contribute to the *processing* of the food we consume.

The Vegan Society claims that the average vegan diet requires much less water, land and crops than the average meat-based diet. The basis for their argument is that the area currently being used for crops in the UK is 4.7 million hectares, whereas they estimate that only 3 million hectares would be required to feed the UK population on a vegan diet.

2.4 Deforestation

Between 2000 and 2007 the Amazon was pushed back by an average of 19,368 km² per year²³. Over this time period, an area the size of Greece was destroyed. National Geographic estimates that 60 per cent of deforestation is due to cattle ranching. This evidence is emerging at a time when the Brazilian government are planning to double the size of the cattle industry²⁴. Deforestation on this scale destroys crucial carbon sinks and eco-systems and pushes species towards extinction. Equally it destroys the homelands that support indigenous peoples.

There is a direct correlation between meat consumption in the developed world and cattle ranching in the Amazon. This includes the forest clearing for the growing of feed crops. There are moves to tackle these issues both within Brazil and internationally, but Brazil is moving towards greater intensification of their production systems. The Brazilian government does not view their planned expansion of the cattle industry and their commitment to tackle climate change to be contradictory.

One of the potential solutions has been to combine the industries of livestock production and bio-fuels. At the moment both bio-fuels and feed crops are competing for the same land. If we continue to demand meat protein and bio-fuels²⁵ we can see one of three things happening:

²³ Gross, M., *Amazon Cattle footprint, state destruction*, Greenpeace, 2009

²⁴ McCarthy, M., *Rainforests razed so cattle can graze*, The Independent, 31 January 2009

²⁵ Bear in mind the EU's commitment to bio-fuels

- 1) More land would be cleared to accommodate the growing demand. This would make tackling climate change almost impossible as a significant carbon sink disappears
- 2) A concerted increase into fertilizer and pesticide inputs to increase productivity; this too will lead to more emissions through increased fertilizer use and to other environmental problems
- 3) The land that is currently used for 'less profitable' crops will be taken over. These crops will be forced to use more marginal land or production will cease. This will affect the predominantly poorer individuals who currently farm such products²⁶.

The argument for growing these bio-fuels and feed crops together, put forward by both industries, is that a by-product of bio-ethanol production is a residual product (distiller's grain) rich in protein and fibre which could be fed to animals bred for meat and thus reduce demand for traditional feed crops, effectively freeing up land space. While this might seem like an ideal solution, a scenario in which the two crops complement each other might give further impetus to a demand for both to be grown. Their GHG emissions would then also grow/increase. The potential for further deforestation, on an unprecedented scale could well result from this.

3.0 Policy recommendations:

There are a series of important policy changes that need to happen if we are to face up to and tackle the growing environmental threat that our consumption and production of meat is currently contributing to. The following principles should be adopted:

- 1) Comparable reduction targets in meat consumption in developed countries need to be set in line with GHG emission reduction targets. This could be done through an equivalent contraction and convergence scheme.
- 2) Brazil should receive EU funding to help it achieve zero deforestation by 2015.
- 3) Mechanisms need to be put into place to ensure that the price of meat and dairy products reflect their true environmental costs including all externalities. This would enable farmers to reduce stock intensity, without losing out economically. It would also allow a move to better animal welfare and environmental practices
- 4) Imported products should be required to meet the same standard and as such receive an equivalent price, protecting farmers in the developing world. This would free up considerable proportions of land currently

²⁶ Garnett, T., *Cooking up a storm*, Food Climate Research Network, Centre for Environment Strategy, University of Surrey, 2008

- used for feed crops and financial assistance should be provided to farmers to help them adapt to a more varied mixed system of farming.
- 5) The role of livestock farming needs to be considered as part of a wider approach to tackling climate change. Livestock can consume waste, make use of unproductive land and contribute to soil sequestration. This has to be done through small-scale production and not the currently favoured intensive methods.
 - 6) There needs to be clearer, concise and impartial scientifically based information highlighting the complete environmental impact of livestock production. The European Commission is well placed to support the research needed. This would enable consumers to make educated decisions.
 - 7) Retail industries and large supermarkets must provide reliable information on the origin of animal products such as meat and leather.