EXPLAINER

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Methane, ruminant livestock and diet

Methane: quick stats

Methane (CH4) is a short-lived climate pollutant with a Global Warming Potential (GWP_{100}) 28x more potent than CO2 and lasts in the atmosphere about 12 years. Methane makes up about half of agriculture's total UK greenhouse gas (GHG) emissions.

By comparison, Nitrous Oxide (N2O) is 265x more potent than CO2 and lasts in the atmosphere for over 100 years. N20, mostly from nitrogen in the soil, makes up about one third of agricultural total UK GHG emissions.

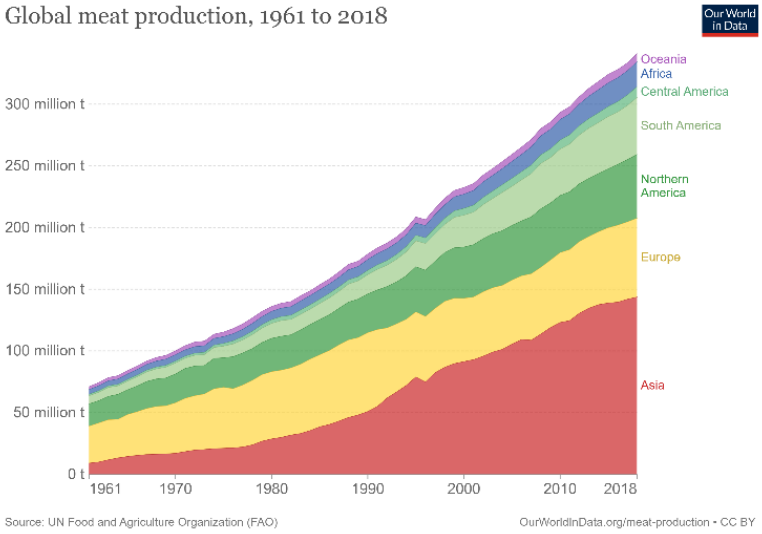
What are the sources of atmospheric methane?

Methane comes from oil and gas flaring and leaks, fracking, landfill, ruminant livestock and rice paddies. 32% of human-caused global methane comes from livestock. Meat and dairy provide nearly 33% of proteins to the human diet and account for 14.5% of global GHG emissions, half of which is ruminant methane (24% N2O and 26% CO2 – GLEAM).

But what about balancing emissions with carbon sinks?

UK farmers are blessed with temperate conditions ideal for grazing livestock with a relatively low GHG footprint. Grazed grassland represents a huge carbon store which farmers actively maintain and protect, making them 'the eco-warriors of the future'. However, opportunities for additional carbon sequestration through grassland management, such as rotational and mob grazing, are limited in the UK and the evidence base is lacking. (Bhogal, ADAS 2021).

Other forms of on-farm carbon storage include enlarged hedges and increased tree cover. In addition, targeted, on-farm AD plants can capture methane from manure and slurry, displace fossil natural gas, and may have a role in storing CO2.



Global meat production, 1961 to 2018 (ourworldindata.org).

Livestock is part of the carbon cycle. What's the problem?

In some countries, deforestation to clear land for livestock results in a very high GHG footprint, while variation in animal lifetimes across different production systems can lead to livestock having significantly higher than global average emissions, especially compared with cereals and vegetables. Methane is a global issue and there is a lot of work going on internationally to improve the situation.

What are the key ways to reduce methane emissions?

There are many things farmers can do to reduce their GHG emissions and which are also good for farm profitability. Our net zero plan encourages improved animal health and welfare, optimal feed management, resource use efficiency, grassland management, feed additives, genetics and breeding techniques, N inhibitors, slurry management and anaerobic digestion.

How will the Global Methane Pledge affect livestock in the UK?

The Global Methane Pledge is for >30% cut in CH4 emissions from 2020 to 2030, improved inventory measurement and a particular focus on high emission sources. USA regulators are targeting "hot spots" or point sources of methane from their domestic oil and gas sector. The EU is helping to set up an International Methane Emissions Observatory for satellite monitoring these point sources worldwide. 108/196 countries have signed up including the EU and the UK. Despite the 30% target not applying directly to agriculture, eNGO's and hence the media continue to emphasise livestock as a key contributor.

Is GWP* a silver bullet?

Methane is short-lived because it breaks down in about 12 years; it may also be described as a 'flow gas' as opposed to a 'stock gas', being destroyed at a similar rate to its emission, and only causing warming for that 12-year period. Methane from livestock is part of a biological process recycling carbon already in the atmosphere. If we gradually reduce methane emissions, climate cooling is actually possible.

GWP* reflects this relationship and is favoured as a useful and more accurate metric for the warming impacts of methane. However, it can also be seen as evidence to support the rapid reduction of livestock numbers to 'buy some time' for the rest of the hard-to-decarbonise industries. While it can be argued that gradually falling livestock numbers and increased productivity are contributing to climate cooling in the UK, this cannot be said globally where livestock numbers continue to rise.

For the UK livestock and dairy sectors, GWP* should not divert attention from the actions that can be taken to reduce emissions – these will contribute to 'climate cooling' in the UK

GHG inventory even as herd size is maintained. GWP* has not yet been formally adopted by international climate scientists, but it was suggested by the Intergovernmental Panel (IPCC) in 2021 that policy makers should use the GHG metric they think is best suited. The NFU supports the use of both accounting metrics.

What is our position on land use over the next 20 years?

Climate Change Committee analysis points to a need for 1.1m ha (7%) more land to maintain current levels of per capita food production and settlement growth in the UK by 2035. They advocate that higher stocking rates per ha, productivity measures and reduction in food waste can achieve this land saving (without reducing head of cattle).

UK production can be some of the most efficient in the world with the GHG footprint of UK livestock about 50% lower than the global average, although international feedlot livestock has a comparable footprint. Resource use efficiency improvements can save money and lead to GHG reduction.

Developing the livestock export market for high quality, lower GHG footprint UK produce would not reduce emissions levels in the UK, but could contribute to a reduction in overall global emissions.

There is evidence that where suitable for the farm system, introducing livestock into arable systems and well managed grazing can support biodiversity and restore degraded soils.

What would be the effect on land use of switching to plant-based diets?

It takes a much larger share of land to produce a kilocalorie of beef or lamb vs plant-based alternatives. But, behind the headline, pasture land is often not suited to growing crops and 86% of livestock feed is not suitable for human consumption.

In the UK;

- 15% of agricultural land is used to grow food crops which provide 68% of calories
- 85% of the farmland that feeds the UK is used to rear animals
- Around 65% is best suited to growing grass rather than other crops
- 22% of agricultural land area is used to grow feed crops
- 85-92% of UK beef and sheep is predominantly forage-based.

The National Food Strategy states that in the UK switching away from livestock would free up one fifth of land for conversion to food crops with some for rewilding or reforestation.

However, there are consequences of land use change from pasture. The Royal Society suggests that cropland expansion would reduce biodiversity and release carbon stored in soils. Food security will be affected as temperatures rise and livestock may be the more suitable food source in some areas.

For each degree rise in temperature a 3.1-7.4% reduction in global yield of major crops is expected.

Switching away from livestock may result in offshoring emissions if we are unable to grow sufficient protein crops in the UK. It is difficult to say with any certainty where would produce the best yields.

How do we see dietary changes affecting livestock numbers?

All farming needs to be sustainable; the future food system is not a simple choice of plant vs meat. The National Food Strategy and CCC call for 30-35% reduction in meat consumption. While meat consumption in the West is set to gradually reduce through diet change, and the message is to reduce overall (all foods) consumption, more protein is required to feed the developing world.

Meat sales in the UK remain strong including beef. Commentators on behaviour change think people would be willing to change diets more quickly with the right policy levers. Any transition as a result of dietary preferences should continue to be gradual and just. To meaningfully reduce emissions, consumers need to reduce consumption across the board; not just meat but all food including reducing wastage; and not just food but all purchases.

What is the effect on nutrition of switching to plant-based diets?

There is strong evidence and research on the high levels of nutrient available vitamin B12 and iron found in red meat, which is not as readily available in plant-based diets. Further research is required to look at the short- and long-term effects on human health of different metabolites found in meat and plant-based alternatives. A full analysis of the effect of all kinds of ultra-processed foods on health would be helpful. Research indicating that meat is harmful to health is in some places being debunked as correlation not causation. The category almost always refers to 'red and processed meat'.

Food labelling should perhaps include the quality of the protein and absorption of essential amino acids, alongside an environmental footprint. We need to value our nutritious food over ultra-processed foods (whether meat or plant-based) which have lower nutritional value.

What about broader issues than net zero?

Net zero and GHG footprint metrics alone are too narrow; water, air quality, biodiversity, nutritional values, welfare standards, the rural economy and a just transition are all vital. In addition a just rural transition is essential and UK farms employ close to half a million people.

For more information, please see Rethinking Ruminants and The Facts about British red meat and milk.