Written evidence from Professor Neil Ward (MET0016)

Introduction

1 Your inquiry into the UK's progress in achieving the targets set out by the Global Methane Pledge is to be warmly welcomed. Methane is the second most significant greenhouse gas after carbon dioxide. Addressing methane emissions is increasingly recognised as crucial to global efforts to reduce emissions of greenhouse gases and so avoid the risk of climate change reaching catastrophic levels. The Global Methane Pledge is a welcome development, and it is encouraging to see a growing list of countries signing up to the pledge. The UK can point to a strong track record in reducing methane emissions over the past three decades. This is particularly because of successes in reducing methane emissions from the oil and gas sector and from landfill. In contrast, progress in reducing emissions from agriculture has been much less marked. In the years ahead, it will become increasingly difficult to avoid tackling methane emissions from the UK agriculture sector. Scientific knowledge is advancing at pace, although there is still more to learn, but policy change and political will has lagged over the past decade.

2 In the UK, methane emissions from agriculture are dominated by ruminant farm livestock. For the purposes of official reporting through the National Inventory, these emissions are split between enteric fermentation (*i.e.* emissions directly from the animals themselves) and emissions from manure management (*i.e.* from the storage and handling of slurry and manure). Both internationally and in the UK, most attention has been paid to enteric emissions, with emissions from manure management seen as a lesser issue. However, there is increasing evidence in the international scientific literature that methane emissions from manure management may be being underestimated through standard international approaches to calculation. It is quite possible that methene emissions from manure management may be considerably higher than currently officially estimated. Fortunately, there are a range of practical measures that can be put in place to capture and reduce emissions, some of which may bring financial benefits to livestock farmers.

3 I help lead UK Research and Innovation (UKRI)'s Network+ on supporting the development of a sustainable agri-food system for the net zero transition.[1] I am based at the Tyndall Centre for Climate Change Research at the School of Environmental Sciences, University of East Anglia. I have been involved in research into agriculture and environmental issues since the late 1980s. This

[1] https://www.ukri.org/news/research-network-to-help-uk-agri-food-industry-reach-net-zero/

submission is in my personal capacity as an independent academic and should not be taken as an official statement of UKRI.

UK Methane Emissions and Sectors

4. *What progress has the UK made in reducing methane emissions and where is there room for improvement?* The UK has a good track record in reducing methane emissions which have fallen by over 60 per cent since 1990. This is principally through measures taken in the oil and gas sectors and in landfill. Agriculture now represents the largest source of methane emissions in the UK and is calculated as accounting for around a half of all emissions. Methane emissions from agriculture did decline after 1990, associated with a fall in total numbers of cattle and sheep. However, since 2010, there has been no discernible downward trend in methane emissions from UK agriculture. This leaves agriculture as a prominent methane source with significant room for improvement in emissions reduction.

5. *Which sectors are most promising for achieving further methane emissions reductions? And which are likely to be at least relative cost?* There is considerable potential for methane emissions to be more actively managed and reduced from the agriculture sector. There are four broad strategies. First is the question of the number of farm animals. This has been in long term decline since 1990, but the rate of decline has slowed somewhat. Changing patterns of demand for meat and dairy products will have some influence on numbers, as will changing approaches to agricultural subsidies. Second is the potential of animal breeding. Harnessing the power of data can help animal breeding for both quality and productivity traits but also to address methane emissions. Third is the technologies around animal feeds, which may help mitigate levels of enteric methane emission. Finally, there are measures around slurry and manure management that can capture methane and utilise the gas, thus providing environmental benefits but also a utilisable resource with realisable value.

6. *Are there sources that could be mitigated relatively quickly and easily in the short term, and which would take longer or be more complex?* More scientific effort has been directed to animal breeding and feeding – the second and third of the strategies outlined above. Actively reducing livestock numbers is deemed to be politically sensitive and becomes associated with debates about dietary change and land use pressures. Realising the benefits from animal breeding can take some time, but the information sets exist, if only breeders could be more strongly incentivised to focus on methane emissions over other animal traits. There is considerable potential to improve manure management and bring relatively speedy benefits to farmers. The constraints here are in the capital outlays required to cover slurry pits and capture and process emissions, and the rate at which the biogas industry might be able to scale up

to support an ambitious technological transformation in slurry storage and management.

7. *To what extent is there existing regulation in each emitting sector to mitigate methane emissions, and how well is this working?* Policies and regulations to address methane emissions from farm livestock are not yet in place in the UK. We do see evidence of other countries beginning to explore measures to address these emissions, including New Zealand and Ireland. Measures to reduce methane emissions could be better aligned with measures to address local air pollution from ammonia and to tackle widespread water pollution risks from agricultural manures.

Methane Emissions from UK Agriculture

8. *Are there emerging technologies, such as methane suppressant feed products or approaches to slurry management, that could aid methane emissions reduction in agriculture? What impact could they deliver?* Science and innovation efforts have tended to focus more heavily on addressing emissions from enteric fermentation. For example, a recent Food and Agriculture Organisation report into methane emissions from agriculture contained discussion of 31 alternative strategies for reducing enteric emissions, over almost five times as many pages as the thirteen strategies for reducing emissions from manure management.[2] A prominent strategy for addressing emissions from manure management is anaerobic digestion, but facilities can be prohibitively expensive for individual farms.

9. *How effective are existing policies and incentives, such as Slurry Infrastructure Grants, in driving methane reduction?* The Government's independent statutory advisor on climate change, the Climate Change Committee, has suggested that significant reductions in methane emissions from UK agriculture are required to meet the Sixth Carbon Budget — equating to around 30 - 35 per cent reductions in livestock numbers. These calculations are based on estimates of emissions published in the UK National Inventory updated and submitted annually to the UN Framework Convention on Climate Change. There is increasing evidence in the international scientific literature calling into question the international system, developed by the IPCC, to estimate emissions from manure management from different farm livestock types. For example, recent direct measurement of methane emissions from slurry pits on dairy farms in Cornwall suggests that emissions levels were four to five times greater than the calculations in the UK's National Inventory assume.[3] While at the very least, this should

[2] Food and Agriculture Organisation (2023) *Methane Emissions from Livestock and Rice Systems – Sources, Quantification, Mitigation and Metrics*. Rome: FAO, pp.49-139.

[3] Atkins, A. and Ward, N. (2024) *Methane, Muck and Money: Are We Missing a Trick With Manure?*, UKRI AFN Network+ Webinar, 12th April, https://www.youtube.com/channel/UCKZOdp5f0F4XFv0GjGVY53g

support the case for more research into methane emissions from manure management on UK livestock farms, it also suggests there is greater urgency, and potential benefit, from addressing manure management than had previously been thought. For UK dairy farms, instead of the ratio of methane emissions from enteric fermentation to manure management being 75:25, it could be closer to 50:50. The level of resource targeted through Slurry Infrastructure Grants is unlikely to meet the scale of the challenge of supporting agriculture's contribution to the UK's net zero transition. Reducing methane emissions from manure management should be a higher priority than it currently is.

10. *What other policy tools, frameworks or incentives could be employed in agriculture to drive methane reduction?* We can learn from past experience of stimulating system-wide improvements in slurry management, including the schemes and initiatives put in place in the late 1980s and early 1990s to address water pollution. Measures included a 'carrots' and 'sticks'. A new Code of Good Agricultural Practice was introduced with a stronger emphasis on addressing water pollution risks from slurry handling. There was increased funding for research and development, and farmers were provided with free advice on pollution control from ADAS. In addition, generous 50 per cent grant funding was available for capital equipment to improve slurry storage and dirty water management. Alongside these benefits, statutory technical standards were set for storage facilities and maximum fines for causing pollution were raised from £2,000 to £20,000. Together, these measures helped significantly raise understanding and awareness of the importance of responsible slurry management. Currently, managers of landfill sites are required by regulation to monitor and control methane emissions from these sites. There is a place for regulation to address methane emissions from agriculture, especially where slurry is stored from large numbers of animals, but it would require sufficient resources for enforcement. Capital grants could help stimulate the adoption of airtight covers for slurry stores and the development of local networks of methane capture and utilisation, as are currently being developed in Cornwall.

11. *How can efforts to mitigate methane emissions in agriculture be integrated into broader approaches to facilitate and incentivise climate and nature-friendly farming practices?* Methane emissions from cattle on UK farms are being increasingly geographically concentrated as the livestock industry goes through a continuous process of structural consolidation. For example, dairy cow numbers are being concentrated on smaller numbers of farms. (The average dairy herd was 21 cows in 1960, 60 cows in 1990 and is now around 150 cows). This geographical concentration of production means there are advantages to integrating measures to address methane emissions, local air pollution problems (such as from ammonia) and water pollution risks. These issues have tended to be dealt with separately, but responsible slurry management, including the capital expenditure involved, requires

that they be looked at in the round. However, even if technical approaches to lower-emission slurry management were to be extensively adopted, this may not be sufficient to address the wider sustainability challenges of there simply being too many animals concentrated in some sensitive areas or catchments (as recently illustrated by the 20 million or so poultry birds producing manure in the Wye catchment, for example).

12. *How can efforts to reduce methane emissions be balanced against other important considerations in the agricultural sector, including food security?* Reducing methane emissions from UK agriculture need not compromise food security at all. Food security is a function of markets and supply chains, but also what foods are demanded. We are seeing some change in dietary preferences, although the pace of change is not yet sufficient for the Climate Change Committee's targets for emissions reductions to be met by 2050. The interest in dietary change and replacing ruminant meat and dairy products with plant-based alternatives is driven principally by the need to meet challenging objectives around land use, especially establishing forests and woodland, but also growing energy crops. If the current processes of change in diets were accelerated, this could help reduce incentives to stock so many animals and so reduce methane emissions. Measures to reduce emissions per animal (through breeding, feeding and manure management measures), would bring additional emission-reduction benefits. In the case of manure management, methane reduction measures could be developed in tandem with measures to address air and water pollution and so bring multiple wider public benefits, including tackling agriculture's extensive diffuse water pollution problems.

Recommendations

13. The UK currently lacks a comprehensive methane emissions reduction plan to support its stated objective of reducing methane emissions in line with the Global Methane Pledge by 2030. A plan with measurable targets is urgently required and would help support the UK's international reputation in addressing methane emissions and its role in influencing other countries' work in this area.

14. More research is required into the patterns of methane emissions, both across agricultural sectors and also across the UK's geography. In particular, there is a need to increase confidence in the calculations around methane emissions from manure management. A programme of systematic field measurements ought to produce a robust evidence base to support the National Inventory calculations.

15. There needs to be a stronger emphasis on addressing methane emissions from manure management, which as been the 'poor relation' to enteric emissions in methane science. Technologies

exits to capture methane from slurry pits with opportunities for it to be utilised as a source of bioenergy. Research is required to support the technical scaling up of capture and processing technologies, but also to better understand the factors influencing adoption by farmers individually and in groups.