Written evidence from the Agriculture and Horticulture Development Board (AHDB) (MET0008)

The Agriculture and Horticulture Development Board (AHDB) is a statutory levy board funded by farmers and others in the supply chain. Its purpose is to be a critical enabler, to positively influence outcomes, allowing farmers and others in the supply chain to be competitive, successful and share good practice. It equips levy payers with easy-to-use products, tools and services to help them make informed decisions and improve business performance. Established in 2008 and classified as a Non-Departmental Public Body (NDPB), AHDB supports the following industries: meat and livestock (Beef, Lamb and Pork) in England; Dairy in Great Britain; and Cereals and Oilseeds in the UK.

Please note: As an evidence-based non-departmental public body (NDPB) AHDB is not in a position to comment/speculate on all questions relating to this inquiry.

AHDB welcomes the opportunity to provide written evidence to the committee and is happy to provide witnesses to give further information at future oral evidence sessions.

Summary/Key messages

- Farmers are being asked to deliver multiple public goods on behalf of the nation. You can't look at one without simultaneously considering the others. Even when you look at net zero, it's not just about emissions (we need to consider sequestration/removals as well) and in emissions it's not just about methane. Focus should not be solely on methane, but also on CO_2, N_2O and the wider environment.
- There are a wide range of actions that can reduce agricultural methane emissions, but no one silver bullet. We need to provide the evidence of where the industry is now, look at what is possible and then provide farmers with all the tools in the toolbox for them to pick the mitigations that are most relevant to their individual situation.
- Existing support such as slurry infrastructure grants may indirectly reduce methane, but it is not guaranteed.
- Farmers need a measuring, reporting and verification framework by which their good work can be recognised, and then rewarded either through support with costs or a market return in order to be able to implement many of the measures. Some actions, like productivity improvements, can be cost-beneficial, but require time to implement. Emerging technologies and genetics research also need continued research and financial support.
- There are major shortcomings in the current measures of reporting methane emissions. This comes from a reliance on accessing methane's impact on Global Warming through the use of the Global Warming Potential over 100 years (GWP100) methodology; and on emissions factors that give average emissions figures but will not reflect all actions taken to reduce emissions. A comprehensive baseline of UK agriculture's environmental position is needed – you can't measure what you can't manage, particularly at the farm level, where most change needs to take place.
- The science community has not settled on what is the right metric to measure the global warming consequence of methane emissions. GWP100 is just one methodology of measuring methane's warming impact. Other methodologies like GWP* are also articulated by the science community and settling the wider science on methane is very important. Science is settled on long-lived GHG's such as CO_2 and Nitrous Oxide. Therefore, we shouldn't focus all our attention on methane over the other gases and

sequestration. For methane, we should focus on the "no regret" decisions i.e. the win-wins where it is cost effective to reduce methane emissions - not chase the win-loses.

Responses to questions

Overview

What is the impact of methane on climate change and warming, and how does it differ from other greenhouse gases?
What are the main benefits of delivering methane reduction targets?
What trade-offs are there, if any, in tackling methane vs. CO or other greenhouse gases?
Farmers are being asked to deliver multiple public goods on behalf of the nation. You can't look at one without simultaneously considering the others. There is a danger if we simply focus on methane for undesired consequences. For example, methane emissions per unit of output can be improved by more intensive farming methods, however that could have a consequence on biodiversity or animal health.

Methane reduction should be seen as one of the options for our industry to improve its net carbon position. We need to provide the evidence of where the industry is now, look at what is possible and then provide farmers with all the tools in the toolbox for them to pick the mitigations that are most relevant to their individual situation. We also need to be able to recognise and reward the improvements delivered by our industry, which in turn provides the incentives for those improvements.

Methane has a much more potent warming effect than CO_2, but it also has a much shorter lifespan (about 12 years). This means that while other GHGs accumulate in the atmosphere, methane breaks down. If biogenic methane emissions stay at a long-term steady rate, then no additional warming arises – unlike longer-lived gases where the effect is cumulative. This also means that a reduction in methane doesn't just halt warming but can lead to cooling in the following couple of decades. The main benefit of methane reduction targets is that this cooling can buy more time to reduce the emissions of other gases without exceeding 1.5C warming. However, it also means that the benefit is shorter lived, and there is still the longer term, larger issue of increasing CO_2 levels in the atmosphere (and other longer-lived GHGs).

International commitments

1) What role could methane emissions reduction play in meeting the UK's domestic and international climate change targets?
Methane reductions can contribute to these targets, but it should not be treated the same as longer lived GHGs like CO_2. The GWP* metric reflects the warming impact of methane better than the standard GWP100 and should be considered when target setting. Methane reductions may bring short-term cooling impacts but won't fix the long-term accumulation of CO_2 in the atmosphere.

2) What is your assessment of the Global Methane Pledge: is the UK on track to meet it? If not, how could this be accelerated?
It is difficult to say if the UK is 'on track' as it is a commitment to reduce global methane (not UK specifically) by 30%. For agriculture, the emissions data currently used may not reflect the full picture (see q8) and a comprehensive UK baseline is needed to fully understand its emissions. It is also important to note that for agriculture, 2030 is just six harvests, six calvings/lambings away. This limits how much change can be enacted, especially when solutions like genetic improvement take time, and technological solutions like methane inhibitors take time to develop and approve.

3) What are the implications of the separate Global Methane Pledge for overall UK efforts to reduce greenhouse gas emissions?
We need to be careful not to focus solely on methane. As an agricultural industry we need to look at all GHG's and also carbon sequestration, and then allow farmers to pick the options that work for them. The methane pledge risks tunnel vision.

4) Given UK progress in methane reduction in recent years (with notable reductions before 2020) what are the cost/ benefit implications of meeting the pledge?

For agriculture, some methane-reducing actions can be win-wins that also benefit the farm business, such as improving animal health and productivity. However, for Agriculture to make substantial methane reductions, more costly measures like feed additives would likely have to be used as well. Currently there is no UK wide, fair market incentive to do this, just a cost to farmers if they were to use them.

5) How significant are UK methane emissions when compared to global emissions? What impact could UK efforts on reducing methane emissions have on total emissions?

When considering agricultural methane emissions, we need to view this in a global context, aligned to global nutritional needs, and determine what role the UK has in helping to deliver the UN's 2050 vision of zero hunger (see q20). The UK accounted for 0.4% of global methane emissions in 2021. UK per capita methane emissions were 0.25 t CO_2e in 2021, vs a world average of 1.33t CO_2e. This puts the UK 162nd for per capita methane emissions[1]. However, it is the emissions per unit of production that is important and whether the UK should drive for an increase in production to meet the increase in global demand in an environmentally efficient way.

It should be noted that the above CO_2e conversions use GWP100, when GWP* would be better suited. Because UK methane emissions have been steady or declining long-term, no additional warming has arisen from UK methane emissions for at least 20 years under GWP*[2].

6) What is the UK doing to lead and facilitate international action on methane reduction? Could this be enhanced?

For years the UK agriculture industry has been committed to maximising resource efficiency within current systems, which has delivered a reduction in methane emissions per unit of output. Genetic improvements, productivity gains and better animal health all deliver methane reduction per unit of output. AHDB launched its dairy Envirocow index in 2021; the first independent genetic index in the world to focus solely on breeding cows for their environmental credentials. AHDB are now looking to develop a similar index in sheep genetics.

7) What lessons could the UK learn from abroad?

New Zealand's Climate Change Response (Zero Carbon) Amendment Act requires that, by 2050, all long-lived greenhouse gases reach net zero, and biogenic methane reduces by 24-47% relative to 2017 levels, with a 10% reduction by 2030[3]. The targets have been disputed as still being too harsh compared to New Zealand biogenic methane's warming under GWP*[4], but nevertheless this kind of specialised target is a big step in the right direction.

The Republic of Ireland last year refreshed and updated their Marginal Abatement Cost Curve (MACC)[5], i.e. the cost of GHG mitigation, not just methane, but also nitrous oxide. AHDB welcomes the current work to update the Defra MACC. The Irish work should be looked to as an example around the cost of methane mitigation and how methane mitigation should be economically prioritised against N_2O and CO_2 mitigation. It's wider scope in terms of exploring different scenarios should also be considered. Additionally, MACC work that covers all the devolved nations is needed.

Data, measurement and monitoring

8) What is the status of methane accounting, monitoring and reporting in the UK at present and how does it compare internationally? Is UK accounting and reporting considered to be

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[1] Jones et al (2023) via Our World in Data
[2] Applying GWP* to UK national GHG emissions | AHDB
[3] Climate Change Response (Zero Carbon) Amendment Act 2019 | Ministry for the Environment
[4] Kiwi farmers need science-led methane review | Beef + Lamb New Zealand (beeflambnz.com)
[5] Marginal Abatement Cost Curve 2023 - Teagasc | Agriculture and Food Development Authority

accurate and robust? What improvements, if any, are possible and what benefits would these deliver?

One issue with current agricultural methane emissions accounting is the accuracy of the emissions factors used in the national inventory. These factors assume that all ruminants of the same species and broad age will emit the same amount of methane. This means that even if widespread methane-reducing practices or methane-inhibiting feed additives were adopted, the reduction would not show up at the national inventory level under the current methodology. This can also give the false impression that only destocking will reduce livestock emissions, as that would show up in the inventory.

We welcome the UK Government's commitment to move towards using the highest tier (most accurate) methodologies. An updating of the emissions factors, an upgrade to tier III factors, and a comprehensive baseline of UK farm emissions and carbon stocks are all critical to evidence where we are now, to demonstrating future progress and allowing recognition and reward for those delivering improvements.

9) What progress is being made on methane monitoring and data collection in the UK using technologies such as satellite data and drones?

AHDB believes if you can't measure it then you can't manage it. That is why we are putting money to help fund a baselining pilot on 170 farms across GB. As well as helping us show where we are now and evidencing what individual farmers are already able to achieve, we will also test some of the new satellite technologies to understand their benefits and limitations.

11) What are the advantages and disadvantages of available metrics used to report and compare methane emissions including GWP100 and GWP?*

GWP100 does not do a good job at reflecting the impact of short-lived methane, understating its short-term impact while overstating the long-term impact. This was recognised by the IPCC in their 6th Assessment Report[6]. GWP* has been designed to better show these effects[7]. This is particularly important as UK methane emissions have been steady or declining long-term, and under GWP*, it can be seen that no additional warming has arisen from UK methane emissions for at least 20 years[8]. However, GWP* does rely on comparing current emissions to those 20 years ago, meaning both a longer dataset is required and also the impact can be affected by fluctuations at both ends of the timespan. While a useful took at the global or national level, GWP* is not currently suitable for farm level assessment.

Until the International science community have agreed on the right methodology to use to measure methane's actual impact on global warming, AHDB would like to see a unified approach to dual reporting using both GWP100 and GWP*. We would also like to see more money invested in understanding the breakdown of methane in the atmosphere, because it is the total amount of GHG's in the atmosphere that is the critical measure, not necessarily just the emissions.

UK Methane emissions and sectors

12) What progress has the UK made on reducing methane emissions and where is there room for improvement?

UK methane emissions in 2022 were 62% lower than in 1990 and 2% lower than in 2020. UK Agriculture methane emissions in 2022 were 15% lower than in 1990 and level with 2020[9]. This decline primarily occurred between 2000-2010 as a result of destocking of ruminants. This was driven first by foot and mouth disease and then by CAP moving away from headage payments. Destocking to reduce emissions is not advised as the UK has relatively low-emission ruminant production and replacing our production with imports could lead to higher

[6] IPCC Sixth Assessment Report; Climate Change 2021: The Physical Science Basis, Chapter 7
[7] Lynch et al 2020
[8] Applying GWP* to UK national GHG emissions | AHDB
[9] Final UK greenhouse gas emissions national statistics: 1990 to 2022 - GOV.UK (www.gov.uk)

global emissions. Instead focus should be on efficiency, genetics and best practice. The FAO has produced several reports on methane mitigation measures for livestock[10].

Within agriculture, some sectors have set out roadmaps for environmental sustainability, including emissions. The UK Dairy Roadmap[11] initiative has been ongoing for 15 years and includes the target of "sustained reduction in methane and nitrous oxide emissions from 2025 to 2050", among others. Other livestock sectors have had roadmaps in the past but not continuous initiatives. AHDB is currently facilitating a new beef and lamb roadmap initiative and aims to start one for pork in the near future.

13) Which sectors are most promising for achieving further methane emissions reductions? And which are likely to be at least relative cost?

For the agriculture sector, reductions from efficiency gains will be at the least relative cost. In theory these improve both emissions per unit output (though not necessarily total emissions) and cost of production. However, efficiency gains are only part of the solution; advancement in technology and investment in the sector will need to be highly adopted to achieve reduction targets.

14) Are there sources that could be mitigated quickly and easily in the short term, and which would take longer or be more complex?

There are a number of actions that could reduce methane emissions from livestock quickly. In reality the speed of reduction would be limited by rate of uptake, itself limited by cost barriers and farmer behaviour. Simple actions for manure management include slurry acidification and covering slurry tanks (both with notable limitations – see q16-17), but infrastructure costs can be prohibitive. Simple actions for enteric methane can include improving animal health, simple diet adjustments like increasing digestibility, and general best practice. More complex actions include setting up anaerobic digestion for manure, long-term animal health and welfare improvements, and genetic change.

Agriculture

16) Are there emerging technologies, such as methane suppressant feed products or approaches to slurry management, that could aid with methane emissions reduction in agriculture? What impact could they deliver?

The FAO has provided several comprehensive reports on methane mitigation opportunities for livestock[12]. Methane suppressant feed products are largely still in development/approval and the few that have been approved still have a cost barrier to implementation. The FAO's review of these products found the expected decrease in CH_4 to be low (≤15%) or unknown for most products. Only one, 3NOP, had a 'high' (≥25%) expected methane decrease[13]. Additionally, feed additives are best suited to housed cattle fed a mixed ration, while the majority of UK livestock are grazed for at least part of the year. It is also important that those using such additives can be recognised for doing so; the use of tier 2 averages in reporting (scope 3 or National inventory) means currently any benefits are averaged away.

In Defra's MACC analysis[14], the abatement cost of using feed additives (3NOP) for England (2050) was estimated to be £1074.01 kt CO2e/yr and the cost effectiveness was estimated to be £111t/ CO2e. In CIEL's modelling work, total uptake of methane inhibitors with a 30% effectiveness could lead to 20.3% reduction in total dairy herd GHG emissions, 22% in the beef herd and 22% in sheep[15]. However, the current situation does not allow for this level of uptake or inhibitor effectiveness.

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[10] Pathways towards lower emissions (fao.org); Methane emissions in livestock and rice systems (fao.org); Achieving SDG 2 without breaching the 1.5 °C threshold: FAO's global roadmap

[11] The Dairy Roadmap | Dairy UK

[12] See above (10)

[13] Methane emissions in livestock and rice systems (fao.org)

[14] Delivering Clean Growth Through Sustainable Intensification - SCF0120 (defra.gov.uk)

Various studies have examined how a range of amendments can affect methane emissions from stored slurry[16]:

- Acidification to pH 5.5 by adding H_2SO_4 appears to be most effective with emission reductions of up to 90%. Other chemical additives have shown significant reduction in CH_4 emission at lab-scale. However, acidified slurry may negatively impact soil pH, health and biodiversity when applied. Care and further research are needed e.g. on long-term impacts. Basalt could potentially balance soil pH while also sequestering carbon, but trials in this area are limited.
- Bio-acidification can be achieved by the inclusion of easily digestible carbohydrates or other precursors of biological acid formation within the slurry. Emission reductions of around 80% have been observed in lab tests. The addition of liquid biowastes such as citric and orange juices has resulted in a 77–78% reduction in CH_4 emission in a long-term incubation study. The addition of wastes or chemical additives to slurry may result in environmental permitting when spreading to land.
- As methane is produced in anaerobic conditions, aeration can be effective in reducing methane emissions although increased ammonia emissions will result.
- Slurry separation equipment which has been shown to reduce methane emissions by up to 30% using screw press separation. This technique sees significant increases in CO_2 and NO_2 emissions, but as CH_4 is the dominant gas, GHG emissions can be reduced overall. Slurry separation was also found to increase NH_3 emissions by around 35%[17].
- The addition of Calcium cyanamide ($CaCN_2$) can effectively eliminate CH_4 emissions from stored slurry.
- Both physical and biological methods have been less effective in reducing CH_4 emission when compared to chemical acidification.
- Many commercial products that are blends of bacteria, enzymes and partially degraded organic substances are available to treat slurry and trials have seen a 46% reduction in CH_4 emissions.

Anaerobic digestion could offer great benefit in avoiding methane emissions, while also providing green energy, and a way to provide a digestate that is more easily transportable for benefiting soil health. However, a solution needs to be found to make it cost-effective at small scale for on-farm use, and/or incentives to drive the uptake.

Other emerging technologies include:

- Vaccines to reduce CH_4 emissions are under development but remain several years away from commercial release, at earliest. Research in New Zealand has an aspirational goal of 30% reduction in enteric methane[18].
- Genetics – a focus on breeding traits that reduce emissions intensity. For example, AHDB's Envirocow index launched in 2021 (see q6). AHDB are also part of an industry project called "Breed for CH4nge" that will help the industry to breed sheep with a naturally low carbon footprint.

17) How effective are existing policies and incentives, such as Slurry Infrastructure Grants, in driving methane reduction?

The Slurry Infrastructure Grants (SIG) do not inherently reduce methane, as whether emissions reduce or increase depends on the slurry type and storage type. Although results are variable, some studies have shown that covering slurry stores can result in increased methane emissions, especially when using impermeable plastic-based covers as required by the Slurry Infrastructure Grant[19]. Covering slurry stores with an impermeable cover can provide the opportunity to capture the methane, fugitive or heat generated, and reduce emissions to atmosphere, although the Slurry Infrastructure Grant does not accommodate

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[15] Net Zero & Livestock: Bridging the Gap Report July 2023 | CIEL (cielivestock.co.uk)
[16] Ambrose et al 2023; also Delivering Clean Growth Through Sustainable Intensification - SCF0120 (defra.gov.uk)
[17] Fangueiro et al 2008
[18] Net Zero & Livestock: Bridging the Gap Report July 2023 | CIEL (cielivestock.co.uk)
[19] Kupper et al 2020

methane capture. Grant aid is also available for slurry separation equipment which has been shown to reduce methane emissions (see q16).

18) What other policy tools, frameworks or incentives could be employed in agriculture to drive methane reduction?

The creation of a single framework for measuring reporting and verifying emission reduction and carbon stock improvement. Currently without this, no one knows how they will be measured, how their change will be recognised in scope 3 declarations, or how it will be reported and acknowledged within the GHG National Inventory, let alone how their change will be financially valued and paid for.

Grants could target methane emission reduction. Anaerobic Digestion results in methane capture, reducing emissions to atmosphere, but requires subsidies or incentives as there is a high capital cost associated. Feed additives have been shown to reduce enteric methane emissions from housed cattle, but are cost preventative and not suitable currently for animals grazing outside.

Mechanisms to improve forage and ration management, such as education, knowledge exchange and subsidised nutritional advice, could have a beneficial effect on reducing enteric methane emissions. Similarly, improved understanding of manure management best practice could result in reduced methane emissions although NH_3 and NO_2 emissions would be more significant beneficiaries of these best practice techniques.

The uptake of using better genetic material is only around 20-25% in the dairy herd, and still lower in the beef herd (Defra 2018). An increased uptake will lead to further improvements in efficiency. Changing behaviour needs a joined thinking approach with frameworks developed to address each aspect of a change model such as the RESET model (R-rule and regulations, E-education, S-social pressure, E-economics, T-tools).

19) How can efforts to mitigate methane emissions in agriculture be integrated into broader approaches to facilitate and incentivise climate and nature-friendly farming practices?

The best starting point is to highlight the win-wins to incentivise farmer action. Improving efficiency, animal health and welfare, and productivity all help the farm's bottom line, but also reduce emissions and environmental impacts per unit product produced.

Public funding has a role to play in researching and incentivising more nature-based solutions which can deliver on multiple public wins, simultaneously, and that commercial research has less interest in (compared to technological solutions such as feed additives). For example, diverse swards could include plants that can reduce enteric methane, or plants that fixate nitrogen and reduce nitrous oxide, as well as bringing better biodiversity, better water infiltration and drought tolerance and potentially better and deeper carbon sequestration. However, it takes time for research to prove these, and it needs to be better funded. Initiatives like Defra's new "The Evaluation of Market Ready agricultural Technology Options (TEMaRTO)" project will also help support farmers.

20) How can efforts to reduce methane reduction be balanced against other important considerations in the agricultural sector, including food security?

It is difficult to ascertain how important methane is vs other considerations while there is still debate over how best to measure its impact. Regardless, the bigger picture must be kept in mind. Farmers are being asked to provide a range of public goods, including providing food, running a profitable business, improving soils, improving biodiversity, and protecting the environment.

The FAO report "Achieving SDG2 [zero hunger] without breaching the 1.5C threshold: A Global Roadmap" stresses that livestock products are vital for human development and good health[20]. The FAO has also predicted an increase in global demand for livestock products[21].

When considering methane emissions we need to view this in a global context, aligned to global nutritional needs, and determine what role the UK has in helping to deliver this 2050 vision.

One approach is to focus on win-win actions. For example, improving efficiency, animal health and productivity also support farm businesses and food security as well as reducing emissions per unit product. Improving soil health could improve numerous environmental factors including carbon sequestration and carbon removals, as well as improving crop productivity and resilience to our changing climate.

However, there will also be conflicts – practices that may improve environmental outcomes but cost the business, choices to use land for food or habitat. Farmers need support and knowledge to enable environmental actions while staying profitable. Additionally, the global picture should be considered – will a loss of food production for the sake of environmental practices lead to increased environmental impacts in another country that we then import from?

Fossil fuels

25) Are there further methane reductions that could be made in the UK fossil fuels sector (e.g., oil, gas or other fossil fuels), or at a faster pace?

Support for methane capture from slurry stores and anaerobic digestion of manure/slurry could help displace fossil fuels.

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[20] Achieving SDG 2 without breaching the 1.5 °C threshold: FAO's global roadmap

[21] Pathways towards lower emissions (fao.org)