Written evidence from Plantlife (MET0029)

Plantlife is the global charity working to enhance, protect, restore and celebrate the wild plants and fungi that are essential to all life on earth. Plantlife owns 24 nature reserves covering nearly 4,500 acres across England, Scotland, Wales and the Isle of Man. It carries out conservation and outreach work on its own land and in partnership with many others, advises landowners and publishes best practice guidance, and undertakes research to inform government policy.

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?

In summary:

- **There is the potential to support farmers to reduce their methane emissions through adopting low-input farming approaches to manage more species-rich pasture and meadows**. Management techniques, such as rotational grazing and no/reduced fertiliser usage, can boost biodiversity, build soil health, reduce air and water pollution – which are associated with decreased methane emissions.

- **There is the opportunity for species-rich grassland management to synergistically deliver methane emissions, nitrous oxide, ammonia and carbon dioxide emission reductions.** Species-rich grasslands are productive land, that can provide healthy and nutritious food, fibre, and other products, as well as providing habitat for wildlife and delivering a range of public goods, such as mitigating and adapting to climate change, reducing air and water pollution, and contributing to health and wellbeing.

1. Agriculture accounted for nearly half of the UK's methane (CH_4) emissions in 2021[1]. Whilst there is a clear need to implement a range of strategies to rapidly cut methane emissions from the agriculture sector, the focus should not be solely on 'technological' solutions for feed and slurry management. There are **opportunities to reduce methane emissions within an agro-ecological farming system**, whilst also delivering multiple co-benefits for climate, nature and sustainable food production.

2. In particular, we would like to highlight opportunities for methane emission reductions within a **low-input farming system that grazes livestock on grassland that has a greater diversity of plant species**. Tackling methane emissions as part of the whole farm system is vital to

[1] GOV.UK. (n.d.). *Agri-climate report 2023*. [online] Available at: https://www.gov.uk/government/statistics/agri-climate-report-2023/agri-climate-report-2023.

identify and address co-benefits and trade-offs with other policy objectives, including air and water pollution and nature restoration.

3. Methane emissions from livestock come from manure and gastroenteric releases, as a result of livestock's digestion process. The quantity, type and quality of animal feed consumed by a ruminant influence how much methane is emitted, as well as the species of livestock, and the microbes within them[2].

4. In an agro-ecological farming system, semi-natural and species-rich grazing pasture and hay meadows are the main sources of feed for livestock.

5. The management of more species-rich grassland requires **appropriate management of the livestock**, which could mean more **extensive management** with fewer livestock per hectarage. Species-rich grassland is still productive land that supports livestock (producing food, fibre, and other materials) and can produce hay for livestock feed, as well as provide a wealth of other ecosystem services, such as pollination services, flooding mitigation, climate mitigation and adaptation, and health and wellbeing value.

    - Support for farmers to implement more extensive management systems, producing 'less but better meat', is in line with recommendations that organisations, such as the think tank Green Alliance[3], have made to bring UK diets more in line with sustainable and healthy eating recommendations, for example made by the National Food Strategy.

        - According to Green Alliance 'associated benefits [of dietary shift] include better health, better air quality and the reduced use of synthetic fertiliser through improved slurry management.'[4]

    - Research suggests that livestock feeding on more species-rich pasture have health benefits for both livestock and people[5].

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[2] Smith, P., Reay, D. and Smith, J. (2021). Agricultural methane emissions and the potential formitigation. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 379(2210), p.20200451. doi:https://doi.org/10.1098/rsta.2020.0451.

[3] The Global Methane Pledge. (n.d.). Available at: https://green-alliance.org.uk/wp-content/uploads/2022/10/Global-methane-pledge.pdf.

[4] Ibid.

[5] Anon, (n.d.). *Research demonstrates the human health benefits of Pasture for Life Meat – Pasture for Life – Certified 100% grass-fed meat, milk and dairy*. [online] Available at: https://www.pastureforlife.org/research/research-demonstrates-the-human-health-benefits-of-pasture-for-life-meat/.

6. Alternatively, farmers could implement **rotational grazing approaches,** such as mob-grazing, which does not necessarily mean reducing livestock numbers; it relies on regular movement of the livestock over different areas of grassland, which therefore allows the grass time to recover from grazing. Studies[6], suggest that rotational grazing can help reduce on-farm methane emissions by:

    - providing higher forage quality, which is easier for livestock to digest, resulting in fewer emissions;

    - allowing livestock to optimise their forage intake, which enhances their live weight gain (i.e. increase the live weight of an animal over time – a measure of growth) and so reduces their methane emissions[7];

    - More evenly distributing manure across the land, rather than concentrating it in one area as is typical in concentrated feeding or continuous grazing systems;

    - Manure that is deposited on pasturelands produces carbon dioxide with little or no methane and has the added benefit of returning nutrients directly to the soil.

7. The **addition of a greater diversity of plant species into grassland have been shown in studies to reduce methane emissions**.

    - Some forage legume species, such as Birds-foot Trefoil *(Lotus corniculatus)* contain Condensed Tannins (a chemical compound) which have been shown to reduce methane emissions from livestock dung or urine[8],[9]

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[6] Thompson, L.R. and Rowntree, J.E. (2020). Invited Review: Methane sources, quantification, and mitigation in grazing beef systems. *Applied Animal Science*, 36(4), pp.556–573. doi:https://doi.org/10.15232/aas.2019-01951.

[7] Zubieta, Á.S., Savian, J.V., de Souza Filho, W., Wallau, M.O., Gómez, A.M., Bindelle, J., Bonnet, O.J.F. and de Faccio Carvalho, P.C. (2021). Does grazing management provide opportunities to mitigate methane emissions by ruminants in pastoral ecosystems? *Science of The Total Environment*, 754, p.142029. doi:https://doi.org/10.1016/j.scitotenv.2020.142029.

[8] Jordon, M.W., Willis, K.J., Bürkner, P.-C. and Petrokofsky, G. (2022). Rotational grazing and multispecies herbal leys increase productivity in temperate pastoral systems – A meta-analysis. *Agriculture, Ecosystems & Environment*, 337, p.108075. doi:https://doi.org/10.1016/j.agee.2022.108075.

[9] Mueller-Harvey, I., Bee, G., Dohme-Meier, F., Hoste, H., Karonen, M., Kölliker, R., Lüscher, A., Niderkorn, V., Pellikaan, W.F., Salminen, J.-P., Skøt, L., Smith, L.M.J., Thamsborg, S.M., Totterdell, P., Wilkinson, I., Williams, A.R., Azuhnwi, B.N., Baert, N., Brinkhaus, A.G. and Copani, G. (2019). Benefits of Condensed Tannins in Forage Legumes Fed to Ruminants: Importance of Structure, Concentration, and Diet Composition. *Crop Science*, 59(3), pp.861–885. doi:https://doi.org/10.2135/cropsci2017.06.0369.

- A greater plant community and fungal diversity in grasslands has been shown to facilitate greater carbon storage in the soil, with species-rich grasslands storing more soil organic per hectare than improved (i.e. high-input) grassland, and arable crops[10] .

8. Species-rich grasslands require low soil fertility in order to thrive, and therefore **require no or little synthetic or organic fertiliser. This also reduces the need for slurry**, which is spread on fields as a fertiliser, and is a methane source.
    - The manufacturing process of synthetic, nitrogen-based fertiliser produces both methane and carbon dioxide emissions, and the transportation of the fertiliser can produce them as well.
        - The application of organic and inorganic fertilisers to land results in nitrous oxide and carbon dioxide emissions – these are powerful greenhouse gases and contribute to climate change (nitrous oxide has a global warming potential nearly 300 times that of carbon dioxide[11]).
        - Synthetic and organic fertilisers and other livestock wastes are also one of the main sources of ammonia (NH_3) emissions, with widespread and damaging impacts on public health, biodiversity and ecosystems. Ammonia is a precursor to the formation of fine particulate matter ($PM_{2.5}$), one of the main air pollutants of concern for public health across the UK. It is also one of the greatest threats to wild plant and fungi diversity; more than 90% of England's total land area has ammonia concentrations exceeding critical levels for lichens and bryophytes.[12]
        - Overuse of chemical fertilisers can degrade soil health, for example through hardening the soil and reducing important nutrients within it[13].
    - Excess phosphorus from fertilisers can run off into rivers, lakes, and other water bodies. These excess nutrients can cause eutrophication, which deplete the oxygen levels in the water,

[10] Grasslands as a Carbon Store. (2023). Available at: https://www.plantlife.org.uk/wp-content/uploads/2023/08/Grasslands-as-a-Carbon-Store.pdf.

[11] Makowski, D. (2019). N2O increasing faster than expected. *Nature Climate Change*, 9(12), pp.909–910. doi:https://doi.org/10.1038/s41558-019-0642-2.

[12] Rowe EC, Sawicka K, Hina NS, Carnell E, Martín Hernandez C, Vieno M, Tomlinson S, & Jones L (2023) **Air Pollution Trends Report 2023**: Critical load and critical level exceedances in the UK. Report to Defra under Contract AQ0849, UKCEH project 07617. https://uk-air.defra.gov.uk/library/reports?report_id=1130

[13] Pahalvi, H.N., Rafiya, L., Rashid, S., Nisar, B. and Kamili, A.N. (2021). Chemical Fertilizers and Their Impact on Soil Health. *Microbiota and Biofertilizers, Vol 2*, 2, pp.1–20. doi:https://doi.org/10.1007/978-3-030-61010-4_1.

causes algal blooms, and harms the ecosystem. The algal blooms risk an increase in methane emissions, experiments have found[14].

9. **Healthy, uncultivated soils can act as methane sink,** through oxidisation by soil bacteria. The cultivation of land for agriculture can significantly reduce soil's capacity as a methane sink. The soils under grasslands were identified in a study by the Royal Society[15] as being the strongest methane sink, after mineral soils under forests and natural vegetation – the weakest sinks were in cultivated soils and those receiving nitrogen fertiliser.
    - Therefore, species-rich grasslands – as un-tilled and unfertilized productive land – have the potential to be methane sinks.

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

10. The Environment Agency's Methane Action Plan 2024-2026 identifies cutting methane emissions as one of the most effective ways to reduce near-term global warming[16].

11. As a Party to the United Nations Framework Convention on Climate Change, the UK Government signed up to the Global Methane Pledge at the Conference of the Parties (COP26) in 2020, committing to collectively reduce global methane emissions by at least 30% by 2030[17]. The UK Government has also committed to reaching net zero emissions by 2050.

12. The **UK's agriculture sector contributes nearly 50% of the UK's total methane emissions**[18].

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[14] Chataut, G., Bhatta, B., Joshi, D., Subedi, K. and Kafle, K. (2023). Greenhouse gases emission from agricultural soil: A review. *Journal of Agriculture and Food Research*, 11, p.100533. doi:https://doi.org/10.1016/j.jafr.2023.100533.

[15] Smith, P., Reay, D. and Smith, J. (2021). Agricultural methane emissions and the potential formitigation. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 379(2210), p.20200451. doi:https://doi.org/10.1098/rsta.2020.0451.

[16] GOV.UK. (n.d.). *Environment Agency Methane Action Plan 2024 to 2026*. [online] Available at: https://www.gov.uk/government/publications/environment-agency-methane-action-plan/environment-agency-methane-action-plan-2024-to-2026 [Accessed 15 Apr. 2024].

[17] GOV.UK. (n.d.). *United Kingdom methane memorandum*. [online] Available at: https://www.gov.uk/government/publications/united-kingdom-methane-memorandum/united-kingdom-methane-memorandum.

[18] GOV.UK. (n.d.). *Environment Agency Methane Action Plan 2024 to 2026*. [online] Available at: https://www.gov.uk/government/publications/environment-agency-methane-action-plan/environment-agency-methane-action-plan-2024-to-2026 [Accessed 15 Apr. 2024].

13. The UK Government's ambition for the new Environmental Land Management Scheme (ELM) to 'maintain a resilient, productive agriculture sector over the long term and at the same time achieve our ambitious targets for the environment and climate'[19]. In addition, the UK Government has established the Farming Innovation Programme to award grants to projects that 'boost food production, move towards net zero, and create a more resilient and sustainable agricultural sector'[20]. However, **successful projects within this Programme focus on methane reduction through livestock feed innovations or slurry management, rather than exploring and rewarding the methane production potential for low-input grassland management**. Similarly, **ELM does not recognise the delivery of methane emission reduction as an explicit 'public good', which could be delivered through relevant grassland options**; for example, the Sustainable Farming Scheme 'low/no input grassland management' option or the Countryside Stewardship 'management of species-rich grassland' option.

14. This is a **missed opportunity to support and reward farmers** who manage species-rich pasture and meadows for the vital work they do to restore habitats, produce healthy and nutritious food, and reduce greenhouse gas emissions - including methane - through the low-input, low-carbon management practices.

Recommendations:

- In order to drive methane reduction in agriculture, **Plantlife recommends taking an integrated approach as part of whole farm planning based on agroecological principles**. This will help to take into account the co-benefits of methane reduction, such as the reduction of other greenhouse gases and air and water pollutants, more sustainable farming (economically and environmentally) and the recovery of biodiversity and ecosystem services. An integrated approach will also help to identify and mitigate any gaps or trade-offs between different farming policies and make the range of policy mechanisms more accessible for farmers.

    - An approach to driving methane reduction through nature-based solutions such as low-input grassland management will help to deliver the Government's targets for biodiversity, air and water quality under the Environment Act 2021 and the Global Biodiversity

[19] Gov.uk (2023). *Environmental Land Management (ELM) update: how government will pay for land-based environment and climate goods and services*. [online] GOV.UK. Available at: https://www.gov.uk/government/publications/environmental-land-management-update-how-government-will-pay-for-land-based-environment-and-climate-goods-and-services/environmental-land-management-elm-update-how-government-will-pay-for-land-based-environment-and-climate-goods-and-services.

[20] GOV.UK. (n.d.). *Cutting-edge farming projects to get share of £30 million*. [online] Available at: https://www.gov.uk/government/news/cutting-edge-farming-projects-to-get-share-of-30-million.

Framework (GBF) targets, such as GBF Target 7 to reduce pollution by 50% by 2030.

- **ELM and other Farming Innovation Programme grants (or similar) must not solely focus on feedstock or slurry management innovations as a means to reduce methane emissions, but they should also explicitly encourage and reward farmers for the potential methane emission reductions that can be delivered through the management of species-rich or semi-natural grassland.**