



Department
for Environment
Food & Rural Affairs



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Department of
**Agriculture, Environment
and Rural Affairs**

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Call for evidence on methane suppressing feed products

August 2022



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Any enquiries regarding this publication should be sent to us at

Agriclimat@defra.gov.uk

www.gov.uk/defra

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Summary

Methane suppressing feed products are defined here as natural or synthetic compounds added to or included in animals' diets which lead to less methane being produced whilst the animal is digesting the feed. They include a range of products including methanogenesis inhibitors, seaweeds, essential oils, organic acids, probiotics, and antimicrobials.

This call for evidence will explore the potential for methane suppressing feed products with the aim to gather views from across the agri-food chain which will help inform our ongoing consideration of this topic and future policy development.

It will consider questions of awareness and perception, the current role of feed additives within our farming systems, and the potential barriers that could prevent the introduction of methane suppressing feed products in both the near- and long-term future.

Finally, we are seeking views on whether uptake could best be driven by government interventions, industry or voluntary led solutions and what might these interventions entail.

Call for evidence details

Geographical scope

1. United Kingdom wide.

Responsible body

2. This call for evidence is being carried out by Defra's Agriclimate Team, Consumers and Sustainability Division, on behalf of the UK government.

Audience

3. This is a public call for evidence, and it is open to anyone with an interest to provide comments. The call for evidence should be of particular interest to livestock farmers, businesses involved in the agr-food supply chain, and non-governmental organisations (NGOs) concerned about climate change, with a particular interest in GHG emissions derived from food and farming sectors.

Duration

4. This call for evidence will run for 12 weeks. This is in line with the Cabinet Office's 'Consultation Principles' which advises government departments to adopt proportionate consultation procedures. The call for evidence open Tuesday 23rd August 2022 – The call for evidence closes Tuesday 15th November 2022.

Responding to this call for evidence

5. Please respond to this call for evidence using the citizen space consultation hub at: <https://consult.defra.gov.uk/agriclimate/methane-suppressing-feed-products>

By email to Agriclimate@defra.gov.uk

Or in writing to Call for evidence on methane suppressing feed products., Consultation Coordinator, Defra, 2nd Floor, Foss House, Kings Pool, 1- 2 Peasholme Green, York, YO1 7PX.

After the call for evidence

Confidentiality and data protection

6. A summary of responses to this call for evidence will be published on the government website at: www.gov.uk/defra. An annex to the call for evidence summary will list all

organisations that responded but will not include personal names, addresses or other contact details.

7. Defra may publish the content of your response to this call for evidence to make it available to the public without your personal name and private contact details (for example, home address, email address, etc).
8. If you click on 'Yes' in response to the question asking if you would like anything in your response to be kept confidential, you are asked to state clearly what information you would like to be kept as confidential and explain your reasons for confidentiality. The reason for this is that information in responses to this call for evidence may be subject to release to the public or other parties in accordance with the access to information law (these are primarily the Environmental Information Regulations 2004 (EIRs), the Freedom of Information Act 2000 (FOIA) and the Data Protection Act 2018 (DPA)). We have obligations, mainly under the EIRs, FOIA and DPA, to disclose information to particular recipients or to the public in certain circumstances. In view of this, your explanation of your reasons for requesting confidentiality for all or part of your response would help us balance these obligations for disclosure against any obligation of confidentiality. If we receive a request for the information that you have provided in your response to this call for evidence, we will take full account of your reasons for requesting confidentiality of your response, but we cannot guarantee that confidentiality can be maintained in all circumstances.
9. If you click on 'No' in response to the question asking if you would like anything in your response to be kept confidential, we will be able to release the content of your response to the public, but we won't make your personal name and private contact details publicly available.
10. There may be occasions when Defra will share the information you provide in response to the call for evidence, including any personal data with external analysts. This is for the purposes of call for evidence response analysis and provision of a report of the summary of responses only.
11. This call for evidence is being conducted in line with the [Cabinet Office "Consultation Principles"](#).
12. Please find our latest privacy notice uploaded as a related document alongside our call for evidence document.
13. If you have any comments or complaints about the call for evidence process, please address them to: Call for evidence on problematic plastics and commonly littered items, Consultation Coordinator, Defra, 2nd Floor, Foss House, Kings Pool, 1- 2 Peasholme Green, York, YO1 7PX Or email: consultation.coordinator@defra.gov.uk

About you

1. Would you like your response to be confidential?

- Yes
- No

If you answered yes to this question, please give your reason

2. What is your name?

3. What is your email address?

4. It would be helpful for our analysis if you could indicate which of these sectors you most align yourself/your organisation with for the purpose of this call for evidence (please tick / circle one which is most applicable to you):

- Farm business (please specify)
- Farm supply chain
- Farm advisor
- Retail industry
- Manufacturing industry
- Public body
- Trade body
- Academic body
- Non-governmental organisation
- Member of the general public
- Other (please state)

5. If you are responding on behalf of an organisation, what is its name?

6. In which part of the United Kingdom are you based? (Please tick all that apply)

- England
- Wales
- Scotland
- Northern Ireland
- Other (please state)

Background Context

In 2019, the agricultural sector was responsible for 10% of UK greenhouse gas (GHG) emissions (around 46 Mega Tonnes CO₂e)¹. Emissions from agriculture arise from a range of different sources including livestock, with methane accounting for a significant proportion (54%) of agricultural emissions².

On 27 June 2019, the UK became the first major economy in the world to set a legally binding target to achieve net zero greenhouse gas emissions from across the whole UK economy by 2050. The UK was also amongst the first signatories of the Global Methane Pledge launched at COP26, aiming to reduce global methane emissions by at least 30% by 2030, against 2020 levels.

As part of the effort to achieve our net zero ambitions the UK Government and the Devolved Governments are considering a wide range of measures for how to reduce emissions from our agricultural sectors. The use of feed additives and other animal feed with methane suppressing properties have been shown to potentially reduce methane emissions, especially from dairy and beef cattle, and is one such measure being explored.

This call for evidence will further explore the potential for methane suppressing feed products with the aim to gather views from across the agri-food chain which will help inform our ongoing consideration of this topic and future policy development.

The call for evidence also recognises and considers the interconnections between people, animals, plants and their shared environments, taking a one health approach.

Emissions from Livestock

Livestock contribute a considerable proportion of the agricultural sectors GHG emissions. Overall, UK livestock is responsible for 66% of agriculture's total greenhouse gas emissions. Ruminant livestock are also the primary source of UK methane emissions, accounting for roughly half of all emissions³.

Ruminant livestock mostly emit methane through eructation (a form of silent "burping") and to a lesser extent also through flatulence. This gas is a natural by-product of the digestive processes of all ruminants and is known as enteric fermentation. This is where micro-organisms within the rumen breakdown feeds in the animal's diet in the absence of oxygen to produce methane. Emissions from enteric fermentation account for around 70% of all livestock emissions, with the remaining 30% arising from the storage and application of manures to land.

¹ [Final UK greenhouse gas emissions national statistics: 1990 to 2019](#)

² UK Atmospheric Emissions Inventory

³ UK Atmospheric Emissions Inventory – This includes emissions from enteric fermentation, manure and manure management

A range of opportunities exist to support a reduction in enteric methane emissions from livestock including a series of interventions on livestock diets and nutrition.

Adjustments to livestock diets can be introduced to address ongoing inefficiencies. For example, precision feed, utilising technology and nutritional advice may help to minimise emissions and waste from livestock systems. The introduction of high-quality feed and forage (e.g., rotational grazing, high digestibility grass silage, forage maize silage) have also been shown to minimise emissions in both housed and grazing systems.

The introduction of feed products with methane suppressing properties is another way of supporting the livestock sector to decarbonise, allowing us to continue to produce healthy, nutritious food while meeting our GHG emissions targets.

Methane Suppressing Feed Products

For the purposes of this call for evidence, methane suppressing feed products are defined as natural or synthetic compounds added to or included in animals' diets which lead to less methane being produced whilst the animal is digesting the feed.

Methane suppressing feed products could include feed additives, or feed materials within the animal feed. Feed additives would typically be classified as processed, purified and standardised substances which are authorised for specific functions under existing legislation. In contrast, feed materials are generally crude, minimally processed and naturally variable with the primary function of meeting the animals' nutritional needs.

Methane suppressing feed products typically work through the regulation, inhibition or disruption of methane producing micro-organisms in the rumen, thus reducing the volume of methane produced. In practice, a broad range of products and groups of products have claimed to provide methane suppressing properties. Key examples of these products are as follows:

- **Methanogenesis inhibitors** (e.g., 3-nitrooxypropanol (3-NOP), bromoform, nitrate, urea) include a range of products that evidence shows can reduce methane formation by disrupting enzymes or blocking methane production. Commonly cited methanogenesis inhibitors include the chemical product 3-nitrooxypropanol (3-NOP) and nitrates, and inorganic salts commonly found within chemical fertilisers.
- **Probiotics** or live microorganisms (e.g., live yeast or bacterial cultures) have been shown to promote a rumen biome that is less prone to methane production.
- **Plant 'secondary metabolites'** (e.g., essential oils, tannins, saponins) a group of chemicals produced by plants that are not used for energy. Research has shown that these products may be able to suppress methane production by a range of actions, including by reducing the number of methanogens in the rumen.
- **Propionate Precursors** (e.g., fumaric Acid, malate, aspartate) or organic acids have been shown to reduce methane formation by diverting hydrogen. One example, fumaric acid is commonly used as a preservative.

- **Seaweeds** (e.g., *Asparagopsis*). Research has shown that the naturally occurring bromoform in certain species of seaweed may inhibit methane production during digestion. Seaweeds are typically dried or powdered before being added to the animal feed.
- **Antimicrobials or Ionophores.** Bio-active substances used to affect ruminal fermentation in cattle and have been shown to reduce the activity of methanogenic gut flora. The use of these products should be done so as not to compromise the Government's commitment towards addressing antimicrobial resistance.
- **Garlic** demonstrates some anti-microbial properties and has been shown to reduce presence of methanogenic microbes within the rumen, reducing the volume of methane produced during digestion.

The varied characteristics of these products will have impacts on the perception and potential on-farm uptake of these products. Key areas of consideration include:

- **Efficiency in reducing greenhouse gas emissions from farming:** Many of the products cited as methane suppressing feed products have made ambitious claims on the extent to which they can reduce emissions from livestock. However, it is important to note that efficacy may vary greatly when used under different circumstances or farm systems.
- **Naturalness:** Methane suppressing feed products include a wide variety of products including both naturally occurring, cultivated and synthetically manufactured products which may impact consumer and industry perception of the respective benefits.
- **Price:** The financial burden of incorporating methane suppressing feed products will be of concern to industry and consumers alike. The affordability of these products for farm businesses, their availability and the impact on business profitability will likely weigh heavily on an individual farmers willingness to incorporate the products.

Government Interests & Responsibilities

Feed additives are authorised for specific functions, including for nutritional purposes or in maintaining quality of feed but also includes the function to favourably affect the environment. Food Standard Agency (FSA) and Food Standards Scotland (FSS) are responsible for the authorisation process of feed additives in Great Britain. This ensures feed additives may only be placed on the market if safe and if shown to be efficacious.

A robust risk assessment and approval process is adopted for these products considering amongst other things:

- **Animal health and welfare risks** including but not limited to the impact on short- and long-term animal health, nutritional disadvantage, and the potential to cause harm or stress to the target species.

- **Food safety risks** including potential risks to human health from consuming animal products from animals fed methane suppressing feed products.
- **Risks to users and workers** exposed to the additive when handling the feed additive during the production, mixing and feeding processes.
- The wider **environmental risk and environmental impact** of these product, including potential for detriment or harm to the natural environment through unsustainable resource consumption, pollution or wider emissions.
- **Efficacy** demonstrated for the feed additive function(s) under approval according to common feed manufacturing, animal husbandry and farming practices

The FSA and FSS launched its Regulated Products Application Service on 1 January 2021, allowing for the submission of regulated product dossiers as part of the authorisation process. An application for use of the product 3-nitroxypropionol (3-NOP) – a methanogenesis inhibitor - is currently under consideration for use as a methane suppressing additive in dairy cows and cows for reproduction, by both the Food Standards Agency (FSA) and Food Standards Scotland (FSS). It has not yet been approved for use within Great Britain but has recently received approval from the European Commission for use in the European Union (and under the terms of the Northern Ireland protocol, Northern Ireland).

Food Standards Agency (FSA) and Food Standards Scotland (FSS) The FSA's function, set out in law for England, Wales and Northern Ireland, is to safeguard public health and protect the interests of consumers in relation to food. They work closely with other departments and the Governments in Wales and Northern Ireland, but they act independently and transparently, led by science and evidence. The FSA's fundamental mission is 'food you can trust'. Food Standards Scotland takes on a similar role in Scotland.

A new pillar within in the FSA's recent strategy (2022-2027) is to ensure that food is healthier and more sustainable. Other departments have primary responsibility for health and sustainability, but as the only government body that looks solely at food, the FSA can help to support efforts by the three governments to make food healthier and more sustainable.

Since leaving the European Union (EU), the FSA and Food Standards Scotland (FSS) have taken on responsibility for assessing food and animal feed safety in the UK. Feed additives are one group of regulated products which are authorised through our risk analysis process to ensure high standards of food and feed safety in order to protect consumers. The process follows international best practices and closely resembles the EU authorisation system.

The wider UK Government and Department for Environment, Food and Rural Affairs (Defra), as well the Devolved Governments of Scotland, Wales and Northern Ireland all maintain interest in this area as it relates to the development of policy and consideration of methane suppressing feed products as a possible opportunity to support the delivery of UK government commitments to deliver net zero and wider Agricultural decarbonisation.

The Department for Environment Food and Rural Affairs (Defra) has commissioned research to review suitability, scalability, and mitigation effects of methane-inhibiting livestock feed products in a UK context. This research focuses primarily on cattle, as this reflects where the majority of greenhouse gas savings can be achieved and also the practicalities of administering additives.

Questions

7. Do you currently incorporate feed additives (e.g. for nutritional, productivity or health reasons) as part of the usual feeding regime of your farm and/or supplying farms?

- Yes always
- Yes usually
- No not routinely
- No never
- Don't know
- Prefer not to say

If yes, please provide details on the feed additive used, for what purpose, and how frequently?

8. Were you previously aware of methane suppressing feed products?

- Yes
- No
- Don't know
- Prefer not to say

9. If yes, which of the following methane suppressing feed products are you are aware of? (Please tick all that apply):

- Methanogenesis Inhibitors (e.g., 3-NOP, Nitrate)
- Probiotics
- Plant secondary metabolites (e.g., Essential Oils, Tannins, Saponins)
- Propionate Precursors (e.g., Fumaric Acid, Malate, Aspartate)
- Seaweeds (e.g., Asparagopsis)
- Antimicrobials or Ionophores
- None of the above
- Other (please state)

Please provide any other examples below.

10. Are you planning to or already trialling the use of any of methane suppressing feed products on your farm or within your supply chain?

- Yes, have previously trialled
- Yes, currently trialling
- Yes, planning to trial
- Not planning to trial
- Don't know
- Prefer not to say

If yes, do you have any information which you would like to share?

11. How would you describe your current perception of using methane suppressing feed products in livestock diets?

- Very positive
- Mainly positive
- Neither positive nor negative
- Mainly negative
- Very negative
- Don't know
- Prefer not to say

Please give reasons for your answer below.

12. Which of the following attributes are important to you when considering methane suppressing feed products? (Please tick all that apply):

- The effectiveness (efficacy) of reducing greenhouse gas emissions from livestock farming
- Wider environmental impact
- Animal health and welfare
- Livestock productivity
- Food safety and consumer protection
- Consumer perception
- Certification
- Naturalness
- Cost
- Ease of use
- Other (please state.)
- None of the above

Please give reasons for your answer below.

13. If given the choice, would you have any preference for natural or synthetic methane suppressing feed products?

- Natural
- Synthetic
- Either / no preference
- Neither
- Don't know

14. Do you think consumers would be willing to purchase meat or dairy products produced by cattle and sheep which are regularly fed methane suppressing feed products?

- Yes definitely
- Maybe
- Uncertain
- Not likely
- Definitely not
- Don't know

- Prefer not to say

Please give reasons for your answer below.

Application and use

Methane suppressing feed products will commonly be offered mixed in feed or under certain authorised conditions. As such it is often more practical to administer these products in housed systems as these maximise the opportunity for supplementation and have therefore been shown to delivery greatest emissions reduction potential.

Owing to the current limitations of introducing methane suppressing feed products at pasture it is likely that some farmers could encounter challenges when considering the introduction of these products.

Despite this, introduction of methane suppressing feed products may still be possible in pasture-based systems, but this would typically still rely on the introduction of composite feed. Research continues on more novel methods to administer additives at pasture, for example through incorporation into mineral licks, feed pellets or boluses which are already used to administer anthelmintic treatment and for trace element supplementation.

Farms across the United Kingdom are extremely diverse, with livestock farmers adopting a broad range of production systems and management practices. Most livestock farms will adopt a mixed feeding regime, with the degree to which livestock are at pasture and openly grazing varying between individual farms and over time.

Whilst many farms with cattle will have a summer period of grazing pasture, most farms will also implement some period of winter housing to support the welfare of animals and to protect soils during unfavourable weather conditions. During these periods of housing livestock are fed a diet of conserved forage, either with or without an additional concentrate supplement.

The following questions seek views on the current feeding regime adopted on farm and applicability and potential barriers to introducing methane suppressing feed products.

Questions

15. How would you describe the current feeding regime on your farm or in your supplying farms? (Please tick all that apply):

- Outdoor all year round
- Grazed with silage-based winter ration
- Grazed with buffer feeding and silage-based winter ration
- Housed all year
- Some yard /barn finishing
- All yard/barn finishing
- Other (please state.)

If necessary, please provide additional detail below

16. In order to introduce methane suppressing feed products to your farm, or supplying farm did you (if adopted already) or would you (if not already) need to make changes to your feeding regime?

- Yes substantial changes
- Yes significant changes
- No major changes
- Already use
- Don't know
- Prefer not to say

Please give reasons for your answer below.

17. Do you envisage any of the following presenting a barrier to introducing methane suppressing feed products on your farm, or supplying farms? (Please tick all that apply)

- Current farm practice or feeding regime (e.g. Organic)
- Price
- Consumer perception
- No method for monitoring or measuring efficacy
- Other (please state)
- None of the above

Please give reasons for your answer below.

Governance and Policy

Where the introduction of a new technology or innovation provides a clear competitive advantage to farmers (e.g. significant reputational advantage, productivity, or efficiency improvements), uptake of this technology would likely be driven by market forces, limiting the need for additional intervention or action. However, where the market fails additional encouragement, incentives, or mandates may be required to ensure widespread use of these products.

In the case of methane suppressing feed additives uptake could be encouraged through a variety of different routes:

- **Industry:** the role of meat and dairy processors, cooperatives, retailers and other industry actors may prove instrumental in the increased use of these products. Voluntary or mandatory requirements included in agreements between these businesses and their supplying farmers could hold profound influence over the uptake of these products.
- **Standards and Certifications:** recognition and inclusion as part of industry accreditations, standards and certification schemes (e.g., Red Tractor) could also provide a valuable incentive.
- **Advice:** on-farm consultants and advisors could play a key role in encouraging uptake of these products on farm, with this advice included as part of broader advice and services provided.

- **Government Policy:** government interventions could help to encourage the uptake and use of methane suppressing feed products. This could take several forms ranging from incentives such as subsidies or grants to cover the cost of purchase and usage, to more stringent regulatory interventions.

This section aims to explore the forces that may influence adoption of methane suppressing feed products, the different routes and options available to encourage uptake of these products, whilst seeking initial views on the preferred approaches to this and whether there is a need for government intervention.

Questions

18. Which of the following options do you believe would be effective at increasing the use of methane suppressing feed products?

- Financial incentives
- Regulatory requirements
- Supplier contracts
- Standards, accreditations and certifications (e.g. Red Tractor)
- Voluntary commitments (e.g. Industry led targets or roadmaps)
- Independent advice (e.g. consultants, feed advisors).
- Do nothing
- Other (please state)

Please give reasons for your answer below.

Verification

Alongside possible policy or other market or industry led approaches to encourage the uptake of methane suppressing feed products, as these products come to market there is a growing need for the claimed efficacy of these products to be verified. This is important both to ensure farmer and consumer confidence in the product entering the market, and to enable, accurate reporting of emissions savings attributed to the uptake of these products in the UK greenhouse gas inventory.

There is currently no single agreed approval system to verify the efficacy of all products claiming methane suppressing properties. Whilst the regulatory approval process for feed additives includes consideration of efficacy, the same standard of assurance is not always guaranteed for feed materials. Beyond the regulatory process various independent certification schemes do exist, but these remain entirely voluntary.

The following questions seek views on potential approaches to verify the claims made of methane suppressing feed products and the potential role government can play in this area.

Questions

19. Which of the following options would help to assure you of the efficacy of methane suppressing feed products?

- Mandatory verification of product claims

- Independent standards for product efficacy
- On-pack labels backed by trade description legislation
- Other (please state).

Please provide any other examples below

20. Who do you feel is best placed to verify the efficacy of these products?

- Government and Government Agencies (e.g., Food Standards Agency and Food Standards Scotland)
- Independent research university/college farms
- Independent consultants
- Industry body/trade associations
- Farm assurance schemes (e.g., Red Tractor)
- Other (please state).

Please provide any other examples below

Additional Information

Questions

21. Do you have any additional views on methane suppressing feed products that you wish to share?

Consultee Feedback on the Online Survey

Thank you for taking your time to participate in this online survey. It would be appreciated, if you can provide us with an insight into how you view the tool and the area(s) you feel is in need of improvement, by completing our feedback questionnaire.

22. Overall, how satisfied are you with our online consultation tool?

- Very satisfied
- Satisfied
- Neither satisfied nor dissatisfied
- Dissatisfied
- Very dissatisfied
- Don't know

Please give us any comment you have on the tool, including suggestion on how we could improve it.