REA response to Defra's consultation on the future for food, farming and the environment

The Renewable Energy Association (REA) is pleased to submit this response to the above consultation. The REA represents renewable electricity, heat and transport, as well as Electric Vehicle companies, Energy Storage, and the low carbon organic fertilisers and soil amendments production sector. Members encompass a wide variety of organisations, including generators, project developers, fuel and power suppliers, investors, equipment producers, service providers and operators. Members range in size from major multinationals to sole traders. There are around 550 corporate members of the REA, making it the largest renewable energy trade association in the UK.

The consultation document can be downloaded here.

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Highlights from the REA response to this consultation

- For the series of reasons set out in this response, on-site renewables, in particular on-farm anaerobic digestion (AD), are key technologies to achieve the goals set out by Government in its 25 year Environment Plan and the Government policy on the Future of Food, Farming and the Environment should recognise this. Please particularly see our recommendations set out in the answer to question 5.
- Volatile commodity prices, and uncertainty over Brexit trade deals, coupled with the high capital costs for this technology, the reduction in current renewable energy subsidy support and the upcoming closure of the Feed-in Tariffs and Renewable Heat Incentive schemes, makes it very difficult to justify investment in this technology in the agricultural sector.
- A plan for the next 10-15 years that is tangible, realistic with goals and ambition and a delivery plan to implement this would do much to increase investor confidence. The current 25 year Environment Plan, although high on ambition, is lacking in a delivery mechanism.
- We urge Government to take firm measures to tackle GHG emissions from the agricultural sector. On-farm AD is a cost effective way to abate GHG emissions: if slurries from all UK medium and large dairy farms were treated in AD plants, 1.8 Mt CO_2e could be saved each year across the UK, which is the equivalent of taking 900,000 cars off the road.
- Government should set a support scheme to drive measures to tackle GHG emissions from the agricultural sector and this should be aimed at supporting the most cost effective ways to abate carbon ie technologies or methods that are able to achieve the greatest levels of GHG reduction at the lowest possible cost, particularly on-farm AD, as well as solar PV, low-carbon heat technologies and energy efficiency.
- There is extensive scientific evidence available showing the benefits to soil health and crops of repeated organic materials applications to agricultural land. These include

reduced soil erosion and compaction, increased soil biodiversity, improved soil physical and biological processes and organic matter, improved nutrient availability.

- Composts and digestates are renewable and sustainably produced biofertilisers/soil amendments that can help farmers deliver more and better food with fewer manufactured fertiliser inputs. Their application to land should be encouraged by Government, provided good agricultural practice is followed. For the reasons outlined above, we recommend that the Government consider introducing a support payment scheme that rewards farmers that use renewable biofertilisers and soil amendments eg 'a renewable/low carbon biofertiliser and soil amendment credit scheme' or similar. We would also suggest that farmers should be rewarded the payments only as long as they can show they follow good agricultural practice and meet all the relevant regulatory controls.
- In addition to evidence from the DC-Agri project on composts and digestates, we have included two case studies highlighting the benefits of digestate applications, set out in Appendix 1.
- There is also significant evidence available showing the benefits of growing crops (such as cover crops ahead of maize) for anaerobic digestion, including (but not limited to) enhanced soil fertility, rebuilt soil structure, added organic matter and reduced soil erosion.
- Because of the numerous benefits highlighted in this response, use of biofertilisers and soil amendments, as well as growing crops for AD in rotation, should be encouraged by only rewarding farmers that adopt a number of measures showing that soil health is at the heart of their business strategy. These should include application of organic materials such as composts and digestates and crop rotations. In this respect, incorporating soil indices into some form of farm payment scheme would be desirable, but it is extremely complex and may add significant extra burden for farmers, so this needs to be considered carefully.
- Funding should be provided to enable farmers and AD operators to build sufficient and fit for purpose storage for digestate, so that this material can be stored as long as needed and spread when there is a crop nutrient requirement. Funding should also be provided to support the purchase of high precision equipment so that nitrogen uptake from crops can be maximised and emissions from this activity can be minimised.
- Government needs to undertake a separate piece of work and a consultation to understand the cost and time that it may take to move the industry from the current situation to a position where these materials are only applied when the crops require them. Evidence has shown this may require an additional 1.4 m^3 of additional storage.

Answers to Questions

Our answers to the consultation questions are mainly focused on the proposals set out in chapters 4, 5 and 6. These are highlighted in blue in this response.

Chapter 2 Reform within the CAP (page 17)

Please rank the following ideas for simplification of the current CAP, indicating the three options which are most appealing to you:

a) Develop further simplified packages

b) Simplify the application form

c) Expand the online offer

d) Reduce evidence requirements in the rest of the scheme

How can we improve the delivery of the current Countryside Stewardship scheme and increase uptake by farmers and land managers to help achieve valuable environmental outcomes?

No comment

Chapter 3 An 'agricultural transition' (page 20)

What is the best way of applying reductions to Direct Payments? Please select your preferred option from the following:

a) Apply progressive reductions, with higher percentage reductions applied to amounts in higher payment bands *

b) Apply a cap to the largest payments

c) Other (please specify)

No comment

* please provide views on the payment bands and percentage reductions we should apply.

What conditions should be attached to Direct Payments during the 'agricultural transition'? Please select your preferred options from the following:

a) Retain and simplify the current requirements by removing all of the greening rules

b) Retain and simplify cross compliance rules and their enforcement

c) Make payments to current recipients, who are allowed to leave the land, using the payment to help them do so

d) Other (please specify)

What are the factors that should drive the profile for reducing Direct Payments during the 'agricultural transition'?

How long should the 'agricultural transition' period be?

No comment

Chapter 4 A successful future for farming (page 24)

Farming excellence and profitability

How can we improve the take-up of knowledge and advice by farmers and land managers? Please rank your top three options by order of preference:

a) Encouraging benchmarking and farmer-to-farmer learning

b) Working with industry to improve standards and coordination

c) Better access to skills providers and resources

d) Developing formal incentives to encourage training and career development

e) Making Continuing Professional Development (CPD) a condition of any future grants or loans

f) Other (please specify)

Our top three options would be a), b), and e).

a) Encouraging benchmarking and farmer-to-farmer learning

A member of the REA working with hundreds of farmers in England highlighted that it would be extremely useful to encourage the implementation of benchmarking for crop supplied to anaerobic digestion (AD) – this could be measured not only by yield but also by means of sustainability, particularly carbon balance based on use of cover crops, Soil Organic Matter (SOM) improvement, digestate use, crop and varietal choice. This member does a great deal of work (which they would be willing to share) with farmer communications through meetings, field trials, publications and regular communications. Last year they extended this to growers and AD plants that are not run by this company in an attempt to start with cross industry benchmarking.

Farmers are always very keen to learn from case studies and understand what other farmers are successful at. There will be farmers on similar soil types, crop rotations that can learn from one another, examples of this can be seen in regards to blackgrass control across the county of Lincolnshire.

b) Working with industry to improve standards and coordination

Industry, trade bodies and Government (e.g. REA, ADBA, DEFRA, MGA, Agritech (East)) should work together to continue and expand work that has already started on standards on crop growing, storage, transport, wastage etc.

Improving practical skills within the sector and standards will drive efficiency improvements so should be encouraged at every opportunity.

What are the main barriers to new capital investment that can boost profitability and improve animal and plant health on-farm? Please rank your top three options by order of the biggest issues:

a) Insufficient access to support and advice

b) Uncertainty about the future and where to target new investment

c) Difficulties with securing finance from private lenders

d) Investments in buildings, innovation or new equipment are prohibitively expensive

e) Underlying profitability of the business

f) 'Social' issues (such as lack of succession or security of tenure)

g) Other (please specify)

In our opinion the top barriers are b), d) and e). Our answer to this question focuses on anaerobic digestion as in our view this technology is key to achieve the goals set out by the Government in its 25 year Environment Plan.

How AD can boost farm profitably

It is widely acknowledged that anaerobic digestion can help boost farm profitability, by helping farmers diversify their businesses and bring additional income whilst creating skilled and unskilled jobs. Direct income or savings can be made by the farmer through on site use or export of low carbon energy (power, and heat), and savings on the cost of artificial fertilisers when digestate is applied to the farmer's land. On farm AD can also help farmers improve animal slurry handling and management on the farm, plant nutrient efficiency, reduce GHG emissions and water pollution, and therefore significantly reduce the farm carbon footprint.

In addition to reducing reliance on chemical fertilisers through the use of digestates, AD can also improve soil health, by targeting selected agricultural biomass for energy production within crop rotations. It also has the potential to improve biodiversity, increase the agricultural system's resilience and make the farm profitable.

Uncertainty about the future and where to target new investment

Volatile commodity prices with further uncertainty over Brexit trade deals and the reduction in farm subsidy support make forward investment plans for most farm enterprises difficult to make. The rapid change in support for AD via the Renewable Heat Incentive (RHI) and Feed-in Tariffs (FITs) coupled with the volatility in farm profit margins make it difficult to justify investment in and secure funding of AD plants even where there is a clear environmental benefit, for example in terms of reducing methane and ammonia emissions by treating manure/slurries and other surplus agricultural products and wastes.

Historically, on-farm anaerobic digestion has been mainly relying on the support provided by the Feed-in tariff Scheme for the power generated and exported, and by the Renewable Heat Incentive for the heat generated. However, the support provided via the Feed-in Tariff Scheme is coming to an end for new entrants in April 2019 and, in any case, due to significant degressions over time, the tariffs have reached a level that is no longer viable. In its autumn 2017 budget Treasury announced that no new low carbon electricity levies would be introduced until at least 2025. The existing Renewable Heat Incentive is also ending in April 2021, and long delays in implementing the RHI reforms consulted on in 2016 have temporarily brought the AD sector development to a halt. To date the Government has not set a clear plan on how and if it intends to support the anaerobic digestion sector beyond these schemes' closure so there is significant uncertainty for this sector that deters further investment.

AD projects are complicated and often take a long time (typically years) to come to fruition. The dramatic reduction in tariffs has reduced confidence in investing in this area. Given there is currently no support for small scale on farm AD (as highlighted above

FITs is unviable and only available for a short period and biomethane to grid is not an option for smaller plants due to costs being prohibitive) farmers have typically stopped considering AD as an option in the last few years.

For many smaller farms, the annual cash surplus – if there is one – is less than the value of the Basic Farm Payment. Investing significant amounts of capital to enhance productivity when there is no clarity or visibility on what future earnings will be is difficult for all farmers, and impossible for some. Many farms are taking a risk adverse decision to reduce farm leverage over the next few years in order to prepare for leaner times, rather than borrowing more to invest.

There have also been a number of significant regulatory changes within the organics recycling sector which, combined with the factors outlined above, have impacted on biowaste management as a whole and not just AD. Charging schemes for green waste collections by local authorities have meant that less green waste is collected and converted into sustainable fertilisers and soil amendments. Industry requires clarity, transparency and above all, medium to long term vision in order to invest in the future.

Investments in buildings, innovation or new equipment are prohibitively expensive

The high capital costs of AD[1] definitely represent a barrier to the uptake of this technology on farms.

Cost reductions for AD have not happened as quickly as for other technologies (like solar or wind). Costs are generally not reducing (due to lack of mass deployment and as unlike other technologies AD relies on a range of raw materials and components like concrete or aggregates all of which are driven by price inflation and plant such as CHP which are easily deployed for other projects unlike solar panels/wind turbines), and it is difficult to achieve cost reductions without mass deployment.

In addition, operation of biogas plants on low energy density materials such as manures and slurries gives only a marginal or negative return on capital investment, so If we want anaerobic digestion to be integrated in a farm as a tool to abate GHG emissions (GHG mitigation method) and to better manage slurries/manures and other agricultural residues, some form of support must be provided at a level that genuinely reflects the level of risk being taken by the investor and operator.

Support for on-farm AD has historically been focused on energy generation, which fails to recognise the numerous, multiple additional benefits this technology can deliver. As highlighted above, on farm AD will always generate a small amount of energy compared to other types of AD because of these feedstocks' inherent low biogas yields, so a reward system on a per kWh of energy generated is not the best way to encourage deployment of this technology on farms.

What are the most effective ways to support new entrants and encourage more young people into a career in farming and land management?

Does existing tenancy law present barriers to new entrants, productivity and investment?

[1] Civil engineering works, process equipment, storage tanks, electrical and mechanical parts, the biogas conversion technology and connection to the gas, electricity or heat distribution networks tend to be considerable. To these costs must be added all costs incurred in feasibility studies m planning and permit applications and any environmental assessment and licenses.

Training for young entrants into agricultural industries is adequate, however the incentives to work in the sector are still not comparable to other sectors mainly in respect to the remuneration offered. Cheaper capital for new entrants would be welcomed as is the case in other EU countries such as Holland where loans are amortised over 25-30 years. This long term vision provides greater certainty for those entering the sector from an early age.

Agricultural technology and research

What are the priority research topics that industry and government should focus on to drive improvements in productivity and resource efficiency? Please rank your top three options by order of importance:

a) Plant and animal breeding and genetics

b) Crop and livestock health and animal welfare

c) Data driven smart and precision agriculture

d) Managing resources sustainably, including agro-chemicals

e) Improving environmental performance, including soil health

f) Safety and trust in the supply chain

g) Other (please specify)

In our view the three top options are c, d and e. The reasons for this are outlined below.

c) Data driven smart and precision agriculture

Members of the REA have said they would welcome opportunities to better understand crop management improvements through soil sensing, plant nano technology, drones, hands free farming, targeted application technology and nutrient targeting to increase nitrogen (N) and phosphorus (P) use efficiency and reduce losses to the environment. This field has already seen giant steps in recent years and with it has come much greater resource efficiency in the use of agro chemicals for herbicide and pesticide control. The benefits of this work will include not only resource efficiency but also reduced environmental impact through the overuse of chemicals in the natural environment.

d) Managing resources sustainably, including agro-chemicals

A member of the REA has highlighted that research should consider the impact of the introduction of cropping for anaerobic digestion, particularly in the east of England where this practice has been more widespread than in the west of the Country. Results of such studies are likely to show a positive effect overall. Measurements have already been made of improvements in maize and rye returns to growers, 25 % improvements in sugar beet yield after introduction of cover crops and digestate application. Members of the REA have seen an uplift in demand for liquid and solid digestate and would be keen to understand the wider implications of building more resilient crop rotations and nutrient supply on wider crop vigour indicators such as establishment, growth, veracity and yield across whole rotation.

e) Improving environmental performance, including soil health

A member of the REA would be keen to share work on the impact of AD crops on field biodiversity. Carried out over three years, this work compared the impact of maize and rye with perennial sources of feedstock for AD such as cup plants (Sylphium spp), Szarvasi grass and Pollen/Nectar mix.

They have also commissioned work showing the positive impact on Cation Exchange Capacity in light soils after introduction of digestate over two years. This member would be keen to share this research with broader carbon balance studies.

There is an environmental improvement overall from use of the correct type of fertilisers on cropped land which they have employed across cropping in recent years. There needs to be a focus on reducing nitrous oxide emissions (N_2O), which they have tried through inclusion of N- inhibitors in digestate or use of advanced technology such as Alzon or Koch Advanced Nitrogen fertiliser.

Another member of the REA has suggested that R&D funding should be used to assess the issue of nutrient Imbalances in the soil. For example, the move to intensive livestock systems especially in grassland areas may be creating nutrient surpluses of phosphates which results in raised soil phosphate levels and also, in some circumstances the application of large amounts of organic nitrogen result in poor nitrogen use efficiencies due to losses to the environment. Animal manures are bulky, making it uneconomic to move them any distance. Government funds could be used to assess the potential problem of nutrient imbalances and, if appropriate, develop the relevant technology to assist the agricultural and waste industries solve these problems.

One of the key services AD could provide is as a means of moving nutrients from surplus to deficit areas. Unfortunately dewatering digestate is still uneconomic and until this is the case economic transport distances for digestate will remain small. If the solid fraction could be separated from digestate economically, nearly all the phosphate would end up in the solid fraction. There would also be far less need for sophisticated storage systems which in themselves pose a risk to the environment.

Soil health and the protection of this undervalued 'Natural Capital' is an imperative and there needs to be incentives to promote the protection and enhancement of our soils. This could include incentivising the use of higher Organic Matter materials such as compost which not only improve depleted OM levels but also assist with increasing beneficial microbes to the soil microflora and subsequent soil health. Compost has additional benefits in reducing erosion and aiding tillage and soil porosity with much of this already quantified from the DCAgri[2] work funded by Defra in recent years

How can industry and government put farmers in the driving seat to ensure that agricultural R&D delivers what they need? Please rank your top three options by order of importance:

a) Encouraging a stronger focus on near-market applied agricultural R&D

b) Bringing groups of farms together in research syndicates to deliver practical solutions

c) Accelerating the 'proof of concept' testing of novel approaches to agricultural constraints

d) Giving the farming industry a greater say in setting the strategic direction for research funding

e) Other (please specify)

No comment

[2] http://www.wrap.org.uk/content/digestate-and-compost-agriculture-dc-agri-reports

What are the main barriers to adopting new technology and ideas on-farm, and how can we overcome them?

On-site renewable energy such as smaller scale solar, biomass boilers and AD can deliver technological improvements and benefits to farms. As previously highlighted, the main barriers for on-farm anaerobic digestion (and also associated bioenergy technologies) are:

Uncertainty about the future and where to target new investment

Volatile commodity prices with further uncertainty over Brexit trade deals and the reduction in farm subsidy support make forward investment plans for most farm enterprises difficult to make. The rapid change in support for AD via the RHI and FITs coupled with the volatility in farm profit margins make it difficult to justify investment in and secure funding of AD plants even where there is a clear environmental benefit, for example in terms of reducing methane and ammonia emissions by treating manure and other surplus agricultural products and wastes.

In addition, AD projects are complicated and often take a long time (typically years) to come to fruition. The dramatic reduction in tariffs has reduced confidence in investing in this area. Given there is currently no support for small scale on farm AD (FIT is unviable and only available for a short period and biomethane to grid is not an option for smaller plants due to costs being prohibitive) farmers have typically stopped considering AD as an option in the last few years.

Farmers are by nature innovative and experimental. New techniques are continuously adopted and refined. New technology is also assessed and adopted. However, the more significant the cost of investment, the more important being able to predict future cash flows becomes. Uncertainty about future farm incomes (arising from a lack of clarity on the shape/impact of Brexit – cost of inputs, value of outputs - and the impact of whatever schemes replace BFPs) makes committing to significant capex more difficult and risky. Grant support to improve the risk adjusted return on capital would (and is) helping.

High capital costs

The high capital costs of AD[3] definitely represent a barrier to the uptake of this technology on farms.

Cost reductions for AD have not happened as quickly as for other technologies (like solar or wind). Costs are generally not reducing (due to lack of mass deployment and as unlike other technologies, AD relies on a range of raw materials and components like concrete or aggregates all of which are driven by price inflation), and it is difficult to achieve cost reductions without mass deployment.

In addition, operation of biogas plants on low energy density materials such as manures and slurries gives only a marginal or negative return on capital investment, so If we want anaerobic digestion to be integrated in a farm as a tool to abate GHG emissions (GHG mitigation method) and to better manage slurries/manures and other agricultural residues, some form of support must be provided.

Support for on-farm AD has historically been focused on energy generation, which fail to recognise the numerous, multiple benefits this technology can deliver. As highlighted

[3] Civil engineering works, process equipment, storage tanks, electrical and mechanical parts, the biogas conversion technology and connection to the gas, electricity or heat distribution networks tend to be considerable. To these costs must be added all costs incurred in feasibility studies m planning and permit applications and any environmental assessment and licenses.

above on-farm AD predominantly based on livestock slurries and farm residues will always generate a small amount of energy compared to other types of AD because of these feedstocks' low biogas yields, so a reward system on a per kWh of energy generated is not the best way to encourage deployment of this technology on farms.

Other barriers identified by members are: limited time to spend on new technology, the need for adopting appropriate type and delivery of communications, finding a source of technology and very little, independent research undertaken.

How to overcome these barriers

These barriers could be overcome firstly by providing a policy framework which delivers long-term certainty to investors and stable growth and reduces the risks when developing new technologies and projects, as well as the cost of financing.

Secondly by rewarding technologies for the environmental goods and services they can deliver. In the case of anaerobic digestion these include but are not limited to, cost-effective climate change mitigation, increased soil health, reduced water pollution, nutrient recycling and increased biodiversity whilst delivering jobs and boosting farm profitability. All these benefits are outlined in more depth elsewhere in this document.

Greater certainty in the direction of travel for the sector will improve investment confidence. Brexit for example has cast a dark cloud over UK agriculture on account of the uncertainty as where we are heading and what this will mean in reality to our trading relationships both overseas and with the remaining 27 Member States.

A plan for the next 10-15 years that is tangible, realistic with goals and ambition and a delivery plan to implement this would do much to increase investor confidence. The current 25 year Environment Plan, although high on ambition, is lacking in a delivery mechanism.

Labour: a skilled workforce

What are the priority skills gaps across UK agriculture? Please rank your top three options by order of importance:

a) Business / financial

b) Risk management

c) Leadership

d) Engineering

e) Manufacturing

f) Research

g) Other (please specify)

In our view, the main gaps are a, b and d.

Some members have highlighted that Health and Safety and stockmanship (beef and cattle) are key skills gaps.

What can industry do to help make agriculture and land management a great career choice?

How can government support industry to build the resilience of the agricultural sector to meet labour demand?

Supporting new entrants into the sector through some form of apprenticeship scheme that rewards both the trainer and new entrant would be beneficial. Improving the merits of employment within the sector as the job requirements increase will help improve the perceived job status which will attract more applicants over time. Managing a commercial composting or AD facility on and off farm today requires a wide set of skills from computer literacy through to people management skills and this is a long way from the early days biowaste management.

5. Public money for public goods (page 32)

Which of the environmental outcomes listed below do you consider to be the most important public goods that government should support? Please rank your top three options by order of importance:

a) Improved soil health

b) Improved water quality

c) Better air quality

d) Increased biodiversity

e) Climate change mitigation

f) Enhanced beauty, heritage and engagement with the natural environment

All public goods listed above are very important, thus in our opinion ranking them is not appropriate. However, if we have to choose the top three, these would be:

1) Climate change mitigation

2) Soil Health

3) Air quality

Below we explain why we consider these to be the most important.

1. Climate change mitigation

According to the latest data released on the UK Greenhouse Gas Emissions (GHG) from 1990-2016[4] methane accounted for 11% of the overall emissions. In 2016 agriculture generated 46.5 million tonnes of CO_2e and is responsible for 10% of the GHG emissions generated in the UK. Emissions from methane (57%) and Nitrous Oxide (32%) dominate the sector.

Regarding methane, the agricultural sector accounted for 51.6% of the total methane generated across the UK. Although the most significant source of methane emissions is enteric fermentation (cattle), emissions from slurry stores and livestock, manure handling and spreading also provide a significant contribution. Over 90 million tonnes of slurries and manures are generated in the UK each year.[5]

As shown in these statistics, there has been no progress from the agricultural sector in GHG emission reduction over the past 6 years. The sector achieved an overall reduction in GHG emissions of just 16% from 1990. **Therefore, if the UK is to meet its carbon budgets, it is**

[4] https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-2016
5 Source: Anaerobic digestion Strategy Action Plan, 2011.

paramount that GHG emissions generated from this sector are tackled, especially its methane emissions.

In their response to the Clean Growth Strategy, the Committee on Climate Change highlights that strong policies to deliver emissions reductions in agriculture need to be developed to help close the remaining 'emissions gap' to the fourth and fifth carbon budgets. An excerpt from the independent report is:

"Agriculture and land use. *A stronger policy framework for reducing emissions from agriculture and land use in all UK nations to 2022 should also be delivered.*

There has been no progress in reducing agricultural emissions over the past six years. The publication of a new Strategy for Agriculture and Land Use must set out policy proposals, to take effect by 2022, for the delivery of emissions reduction and increased carbon sequestration. Informed by improved information from the forthcoming Smart Inventory, this Strategy should set out measures to implement a range of cost-effective emissions reductions from soils, crops, and livestock. In forestry, appropriate incentives and measures to address non-financial barriers should be ...."

As highlighted in the Government 'Indicator framework'[6], there are a wide range of farm practices that can reduce GHG emissions from agriculture. It is widely acknowledged that the capture of methane from livestock slurry in anaerobic digestion represents an opportunity to abate significant GHG emissions, whilst delivering several other environmental and economic benefits to the farm.

The Indicator framework states that "the use of slurries for anaerobic digestion (AD) has significant GHG reduction potential, far outweighing the reduction from improved storage of slurries and manures[7]. As much as 30% of the current emissions of methane and nitrous oxide associated with manure management could be mitigated by full development of current technology AD, including anaerobic digestion and composting"[8].

Methane emissions and diffuse pollution from the storage and handling of slurries and manures are reduced and methane generated from livestock manures during AD can be used to replace fossil fuel use. In addition, there is the potential to increase the proportion of readily available nitrogen, and hence enhance nitrogen use efficiency replacing a greater proportion of fossil fuel based fertiliser use, when the resulting digestate is spread to land. However, significant start-up and running costs are barriers to uptake. 2015 survey data indicated that just 2% of farms processed slurries through AD". The fifth annual report on anaerobic digestion deployment published by the NNFCC shows that 1.9 million tonnes of manures and slurries were treated through AD, which remains long way short of the significant resource available in the UK of up to 90 million tonnes.

The scientific work carried out by Bangor University in 2015 shows that there are significant GHG savings resulting from anaerobic digestion of manures/slurries mainly due to avoided methane emissions from conventional manure/slurry management and storage. Use of methane from manures/slurries (on their own or in combination with crop feedstocks and residues) not only removes a direct source of GHG emissions, but also displaces the use of fossil fuels in terms of fertiliser and energy production, thus further reducing net GHG emissions.

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[6] The indicator framework has been designed to provide a leading indication of agriculture's progress in reducing its greenhouse gas (GHG) emissions. It can be found here.

[7] When manure is stored or treated as a liquid in a lagoon, pond o tank it tends to decompose anaerobically and produce a significant quantity of methane.

[8] EC, 2010 Evaluation of the livestock sector's contribution to the EU greenhouse gases emissions. Final report: EC Joint Research Centre

In addition to reducing emissions from manure/slurry management, reduction in GHG emissions is also made through fossil fuel displacement (methane is captured and used as a clean fuel, both to replace fossil natural gas and more polluting fuels. All nutrients contained in the feedstocks are passed into the digestate and are therefore available to be recycled back to the land in the form of biofertiliser, which can be used to replace mineral fertilisers. So, AD has the potential to improve GHG emissions by replacing nitrogen produced from fossil fuels although these savings are dependent on optimum timing of application.

With regard to Nitrous Oxide (N_2O) emissions, it is very important to note that the DC-Agri project funded by the Waste and Resources Action Programme has shown that N_2O' losses from the food based digestates were low, with measured emission factors all less than the current default value of 1% set by the Intergovernmental Panel on Climate Change. This is consistent with data from on-going research into livestock manures and slurries undertaken as part of the Agricultural GHG Research Platform. Methane emissions from digestates were lower than from livestock slurry, as expected.

Anaerobic digestion as a net, cost effective GHG removal technology

Farm AD largely based on manures/slurries is typically less cost-effective in cost per unit of electricity generated (kWh) than large scale electricity generation. However, as highlighted in the scientific work published by Bangor University, it has a greater potential to abate GHG emissions and it is more effective when viewed in terms of carbon savings. **In other words, On-farm anaerobic digestion is a cost effective way to abate carbon.** The Bangor report shows that small scale farm AD, primarily by slurry/manure and waste residues, even at a Feed-in Tariff rate of 20 p/kWh[9] would only cost £60 per tonne of CO_2 saved, which compares very favourably to GHG reduction costs accepted for other renewable energy technologies.

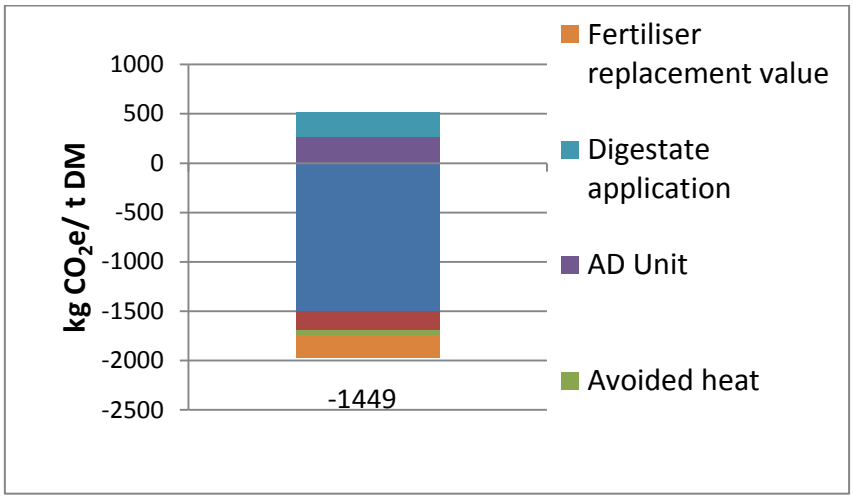
As shown in the chart below (illustrating the contribution of different processes to changes in GHG emissions for one tonne of dry matter dairy slurry), the main process affecting GHG abatement is the avoidance through AD of GHG emissions that would otherwise be released from traditional manure/slurry management systems ("avoided manure storage and application") – including storage, transport and spreading of manures.

If slurry from all UK medium and large dairy farms was treated in AD plants, 1.8 Mt CO_2e could be saved each year across the UK, which is the equivalent of taking almost 900,000 cars off the road. This represents much larger savings compared to those specified by the Climate Change Committee, which restrict the maximum potential to a range of 0.1 to 0.3 Mt CO_2 saved. The main process affecting GHG abatement is the avoidance through AD of GHG emissions that would otherwise be released from traditional manure/slurry management systems ("avoided manure storage and application") – including storage, transport and spreading of manures.

If UK policy encouraged construction of a larger number of smaller scale decentralised on- farm biogas plants, it would reduce the environmental impact of farming (reducing pollution from slurries, with some energy production and reduced fossil fuel derived fertiliser use), plus the carbon impact from the digestion of locally sourced organic wastes), resulting in a measurable impact on national emissions targets. Decentralisation should

[9] This cost is based on a subsidy level of 20 p/ kWh, which is an illustrative FIT rate and, based on industry suggestions, is that level that would be required to make small scale AD < 100 kWh financially viable. Sensitivity analyses across a range of FIT rates (between £ 0.16 and 0.20 / kWh) were undertaken and are shown in Appendix 2 of the report.

also reduce the carbon foot print of such projects given optimised proximity to feedstock materials.



Our proposals for a support scheme aimed at tackling GHG emissions from agriculture

A support scheme aimed at encouraging measures to tackle GHG emissions from the agricultural sector should be aimed at supporting the most cost effective ways to abate carbon i.e. technologies or methods that are able to achieve the greatest levels of GHG emissions at the lowest cost. Anaerobic digestion of slurries and manures on their own or in combination with other agricultural residues and crops is a cost effective measure.

In addition, support for precision application equipment and covers for digestate stores, previously targeted at the livestock industry would optimise the storage and use of digestate. A large proportion of livestock manures and digestate is applied to land by contractors who invest in precision equipment to service many farms. These individuals are then unable to access funding targeted at farmers. The government should support all rural enterprise, specifically the valuable; support industries for farmers.

We have seen a significant growth in AD plant numbers since 2009. Many AD plants could be improved by adopting new and emerging technologies for storage and use of digestate and this could be supported by capital grants to enable them to operate to Best Practice Guidance which has been developed after their AD plant had been built or equipment purchased.

Some members of the REA have also suggested that Government bonds could be invested in slurry fed AD plants. In effect, this would be AD plants as national assets, representing a bankable commodity for UK plc.

2. Improved soil health

Preserving and improving the health of the UK's soils is a fundamental public good. Healthy soils are essential for healthy plant growth, human nutrition, ecosystem services such as water filtration and supporting a landscape that is more resilient to the impacts of drought and floods. Healthy soil helps to regulate the Earth's climate and stores more carbon than all of the world's forests combined. Healthy soils are fundamental to our survival.

There are different methods that can be used to help preserve and improve soil health. We highlight below the role that some organic materials can play in maintaining or increasing levels of soil organic matter, soil biology, and improving physical properties.

The DC-Agri project funded by the Waste and Resources Action Programme was commissioned in 2010 and was completed in 2015. All the experiments were underpinned by robust scientific methodologies. The information below is entirely taken from the project summary report, but we would recommend reading the report for further detail.

Soil Organic Matter, biology and physical properties represent good indicators of soil health.

Soil Organic Matter

Soil organic matter content is a key indicator of soil health, and increasing soil organic matter is generally associated with stronger, more resilient crops. This is as a result of the combined improvement in soil physical and biological properties.

When the soil had a known history of organic material applications prior to the experiments carried out within DC-Agri, there was clear evidence that repeat applications of bulky organic materials for nine years or more increased topsoil organic matter contents. Composts made from separately collected garden wastes ('green composts') and farmyard manure, in particular, resulted in a c. 20-25% increase in soil organic matter relative to the control treatment, which only received bagged fertilisers.

Whole food-based digestates and livestock slurries used did not have a significant impact on soil organic matter levels, however the project was only conducted over small time frames. Compost is generally 60% dry matter. Digestate fibre was not included within the field experiments but would be closely comparable to green/food-based compost in its soil improver attributes. Whole digestate is typically 6% dry matter and would therefore improve soils over much longer timeframes that were not identified in the experiments. Anecdotal evidence highlighting the benefits of digestate applications to clay and silty soils can also be found in Appendix 1.

Although the nine years of green compost applications supplied only half the organic matter that had been supplied by the almost 20 years of farmyard manure applications, it resulted in a comparable increase in total soil organic matter levels and organic matter levels more quickly than other materials. Retention of the organic matter supplied by the green compost was almost double that of farmyard manure, which suggested that green compost was more resistant to decomposition, and therefore a faster soil improver.

Soil biology

Measurements of the size of the soil microbial pool, as determined by its carbon and nitrogen content, indicates a soil's ability to store and recycle nutrients, and is also important in the development of soil structure, with higher content linked to better soil quality.

Statistically significant increases in soil microbial biomass were found where green compost had been applied for nine years. The increases were greater where farmyard manure had been applied for 20 years, despite similar increases in soil organic matter on the green compost treatment. This is most likely because the farmyard manure applications comprised a more readily decomposable source of organic matter that was able to support a bigger microbial population than that produced by the green compost additions.

Soil physical properties

Soil density, particularly topsoil bulk density, has a direct impact on a number of essential soil physical and biological processes. These include root penetration, water infiltration rates, gas exchange and soil biological activity. Soil density is usually a key measure in the assessment of soil compaction and tends to be inversely related to soil organic matter content.

Published research has shown that decreases in soil density will reduce the amount of force required for ploughing and other tillage operations. This can generate financial savings for farmers as a result of the related reductions in machinery wear and fuel costs.

At the arable sites, improvements in soil organic matter and soil biological functioning on the long-term green compost treatment (and farmyard manure treatment) were associated with a decrease in bulk density. These decreases were greater on the farmyard manure treatment, which had similar soil organic matter contents, although the time-frame over which this was achieved and the total organic matter load required to achieve it was almost double that of the green compost treatment.

At the grassland sites, compost and farmyard manure additions also decreased bulk density i.e. improved the structure of the soil.

Finally, it is worth highlighting that all the experiments showed that there was no effect of the compost and digestate additions on topsoil total metal contents, and all measurements remained well below maximum permissible limits set in relation to applications of sewage sludge.

Crop rotations

Some degree of cropping is often desirable to achieve reasonable biogas yields. Crops can be grown specifically for anaerobic digestion, for stabilising or supplementing other feedstocks such as low yielding slurries. Typically farmers growing crops for AD commit a small proportion of their land to growing energy crops with the rest growing traditional crops. Growing sustainable crops for anaerobic digestion in rotations with food crops has numerous benefits, including improving soil quality through crop diversification, recycling organic matter back into the fields and improving soil structure. Break crops in rotation help secure better yields from the food crops that follow, by restoring soil fertility, reducing disease and pest pressure, and thereby reducing the need for expensive crop protection products. Break crops also reduce monoculture and contribute to biodiversity.[10]

We would recommend that Government consider the BiogasDoneRight model, which.is an Italian concept developed by the Italian Biogas Association (CIB). It describes how anaerobic digestion technologies integrated into existing farming systems can increase the economic viability and stability of agriculture by reducing farm input costs and enabling farmers to produce food and fuel more sustainably. It highlights how properly managed AD benefits everyone: local communities, businesses, the farming sector and the environment.

Growing cover crops before maize has numerous benefits, including helping rebuild soil structure, enhancing soil fertility, stabilising the soil and reducing erosion, adding to the organic matter in the soil, holding nutrients and prevent leaching, and, in addition, they can suppress weeds (they can help tackle the spread of blackgrass and nematodes, reducing the need to use pesticides. The main disadvantages of growing cover crops for farmers are the associated workload, a growing season with a tight schedule and the

[10] https://www.cla.org.uk/sites/default/files/Energy_crops_and_AD_%20briefing_April_2011.pdf

extra expense. Since cover crops can result into reduction of nutrient leaching into water courses, a member suggested that this measure could be supported/subsidised by water companies.

Farmers that improve soil health should be rewarded

Firstly, we would like to see the regulatory burden of applying organic materials to land reduced. Recent increases to Environment Agency charges have at least doubled the cost of gaining permission to spread compost and digestate based on typical application rates of 30 t/ha to £1.15/t from £0.52/t. This may deter farmers from improving their soils from valuable recovered materials.

Secondly, there have been initial discussions of incorporating soil quality indices into some form of farming payment scheme. In principle, rewarding farmers that look after their land and implement measures to improve or maintain the soil health would be really welcome by industry as this would encourage, where there is a crop requirement, the application of beneficial, low carbon biofertilisers and soil amendments to agricultural land and other measures such as growing cover cops ahead of maize. However, this is a very complex issue and should not be overlooked. It is not clear at this stage what would need to be measured, how frequently, how many samples would need to be taken and what changes would be considered as an improvement in soil health. In addition, any sampling and monitoring regime could prove to be very costly.

There is no one answer to improve the health of a wide range of soil types across the varying climate of the UK. A recent article in the Farmers Weekly by David Richardson discussed the benefits and drawbacks of minimal tillage techniques on soils, yields etc. The main conclusion from this debate was that there is no one size fits all answer for all farms, even at a regional level.

Further discussions with experts in this field and industry are therefore required to identify what would be the most cost effective and meaningful way to link a support scheme with soil health. Such a scheme should be proportionate and not pose significant extra burden on farmers and/or industry.

Farmers could prove they have soil health at the heart of their business strategy, by undertaking the following measures:

1. Soil sampling and measurement – this can then result in soil mapping, GPS field operations and optimisation of seed, fertiliser and agrochemical inputs
2. Rotation –fertility building, cover crops, perennial crops, fallows or spring cropping may help indicate a focus on soil health
3. Appropriate cultivation, machinery, tyre pressure, CTF, harvest timings
4. Crop nutrition and organic matter – use of organic manures/composts and digestate, timing of applications, application rates (to include increases where yields justify), incorporation of manures
5. Regular farm audits and memberships of assurance schemes such as LEAF

All of the above is probably on many farmers to do lists and needs to be adapted to weather, market, labour, machinery availability, therefore it is difficult to envisage a mechanism that could reward based on output or delivery, particularly when improvements will take years to show. Therefore, proof of intent or delivery of actions may be the best option.

3. Better air quality

Air quality has negative impacts on human health and the environment and can be life-threatening, so it needs to be given priority.

As highlighted in the latest Government statistics on air quality[11] , emissions from agriculture accounted for 88% of total ammonia emissions in 2016 and are the main driver for the emissions increase observed in the last three reported years, with emissions from agriculture increasing from 226 kilotonnes in 2013 to just under 253 kilotonnes in 2016. The increase in agricultural emissions over this period is thought to be mainly due to the manure management of larger dairy herds (emissions increase by 2.3 kilotonnes), and an increase of 25 kilotonnes from spreading of fertilisers. Other significant contributions to the total come from waste disposal and road transport (4 per cent and 2 per cent respectively in 2016).

The UK currently meets the 2010 ceilings for emissions in EU and international legislation to reduce emissions of ammonia. However the revised Gothenburg Protocol requires the UK to reduce ammonia emissions by 8% compared to 2005 emissions by 2020.

We understand Defra is currently concerned about tackling this issue and that there is a need to minimise ammonia emissions from the spreading of slurries, digestates and other fertilisers. With regard to digestates, based on a number of assumptions Defra have calculated that most of the ammonia emissions associated with anaerobic digestion come from the landspreading digestate (approximately 9kt of ammonia emissions come from the spreading of digestate and 0.5kt from digestate storage assuming all digestate stores are covered). However, it is understood that these figures are based on the assumption that digestate is spread with a low trajectory splash plate. This is not the case in reality.

The DC-Agri project found that the spreading of food-based digestates generates greater ammonia emissions than livestock slurries. However, the project did not look at the separated fractions from the whole digestates (e.g. separated fibre and liquid fractions) and no scientific work has been carried out on digestates that are not based on food wastes.

The project also highlighted that, provided digestates are spread using precision application methods such as bandspreading or shallow injection, ammonia emissions are significantly reduced.

There has been significant investment in the sector within the last five years in equipment which assists in mitigating emissions during spreading such as direct injection. Many farmers now have a much better understanding of the benefits of digestate and its correct application and have invested accordingly.

It is understood that there is limited data currently available on the extent to which precision application methods are used on farm. This information might change the betrayal of air quality impact from the livestock and AD sectors.

11

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/681445/Emissions_of_air_pollutants_statistical_release_FINALv4.pdf

Our proposals for a support scheme aimed at improving air quality

What is highlighted above, in red, is absolute key to minimise ammonia emissions from the spreading of slurries and digestates and any new environmental and land management scheme aimed at delivering an improvement in air quality should provide an adequate level of support to ensure:

- digestates and slurries are only applied when there is a crop nutrient requirement, and
- these materials are only spread using precision application methods.

This can be done through:

- Funding to enable farmers and anaerobic digestion operators to build sufficient storage provisions on site for this material, so that it can be stored for as long as needed and spread when there is a crop nitrogen requirement. The Farming Ammonia Reduction Grant Scheme[12] has been providing practical help to farmers by funding slurry store covers which can reduce emissions during storage by up to 80%, however the Scheme closed to new applicants on January 2017. In any case, we understand from Defra that the main issue is not so much ammonia emissions arising from the storage but rather the ammonia emissions arising from the spreading of these materials when this activity is not timed correctly. One of the main reasons farmers or AD operators may apply slurries and digestates when there isn't a crop nitrogen requirement is often the lack of sufficient storage to store this material until it is needed. We also understand that retrofitting farm stores (e.g. by covering them) is significantly expensive and can lead to management difficulties (e.g. if the store is not kept stirred, as you tend to have crusting on the surface, especially in the case of slurries). Feedback from members is that store covers have the main effect of keeping rainwaters out (and therefore avoid slurry or digestate dilution with water) but because of the layer of crust that forms on the surface of the store, losses of ammonia are not significant.
- Funding to support the purchase of high precision equipment so that nitrogen uptake from crops can be maximised and emissions for this activity can be minimised. We are pleased that the Government, through its Countryside Productivity Scheme, has provided grants that can support digestate processing and spreading. This includes equipment for the processing of digestate, for example to improve its fertiliser value, or advanced equipment for spreading digestate. However we are concerned the short timescales available for applying and a much longer application window needs to be provided to make a real difference.
- In respect to landspreading and storage of liquids/slurries/digestates, it is essential that a separate piece of work/consultation is undertaken by Government to understand the cost and time that it will take to move the industry (farmers and others involved in landspreading) from the current situation to a position where these materials are only applied when the crops require them. An independent piece of research commissioned by Regen last Autumn estimated that **1.4 million cubic meters of additional storage** would be required if spreading to stubbles in the autumn was to be stopped. That figure may be conservative – but under current planning regulations, it would take many years, and many millions of pounds to construct that infrastructure. This spring (12 inches of rain since February) has highlighted the risk of attempting to spread liquids to land in the spring; and targeting more materials to be spread to land in this window is not without significant potential environmental risk.

[12] https://www.gov.uk/government/publications/farming-ammonia-reduction-grant-scheme-claim-form-and-offer-terms

Defra have recently mentioned their intention to require all farmers to use a landspreading contractor certified under the NAAC Assured Land-Based Contractor (Agricultural Operations) Scheme. However we have already highlighted to Defra that this would place an unnecessary burden and penalise those farmers or operators that have invested in high precision equipment and are spreading the material themselves, in the best possible way and in a timely fashion to optimise the nutrients it supplies.

A better option would be to ensure a baseline standard for the operation of spreading equipment for farmers, contractors and operators by extending the scope of the NRoSO Scheme for spraying pesticides to include a qualification to cover the application of livestock slurries, manures, and all organic materials including digestates.

In addition to the above, any new environmental and land management system should include a requirement that slurry and digestate are spread in compliance with all the relevant agricultural regulations and rules as well as in line with good agricultural practice.

Of the other options listed below, which do you consider to be the most important public goods that government should support? Please rank your top three options by order of importance:

a) World-class animal welfare

b) High animal health standards

c) Protection of crops, tree, plant and bee health

d) Improved productivity and competitiveness

e) Preserving rural resilience and traditional farming and landscapes in the uplands

f) Public access to the countryside

In our view, d) improved productivity and competitiveness should be the focus.

Digestates and composts can help farmers deliver more and better food fewer manufactured fertiliser inputs.

Research funded by WRAP[13] has demonstrated digestates and composts can increase crop yields with no negative impact on crop quality and safety.

According to the DC-Agri project, digestate is a particularly valuable source of readily available nitrogen (N) and provides a 'low-carbon' alternative to manufactured nitrogen fertiliser. Laboratory analysis has shown that typically 80% of the total nitrogen content of food-based digestate is present in a readily available form, compared with around 70% for pig slurry and 45% for cattle slurry. Nitrogen is the single most important nutrient influencing crop yields and, when applied at the optimum economic rate, will typically double crop yields.

The Digestate & Compost in Agriculture field experiments have confirmed that 80% of the total potash from a range of digestates and composts can be considered crop available. As a general rule, 50% of the total phosphate in compost is crop available.

Anaerobic digestion represents an opportunity for farmers to diversify activities, reducing heating costs on farm, improve management and handling of slurries and manures and potentially generate revenues from the sale of electricity and gas to the grid. AD can support profitable farming in the future, helping to manage volatility in the weather as well

[13] The DC-Agri project, already mentioned elsewhere in this response.

as in commodity prices and input costs, and helping to make our agricultural sector more resilient.

Are there any other public goods which you think the government should support?

No comment

6. Enhancing our environment (page 36)

From the list below, please select which outcomes would be best achieved by incentivising action across a number of farms or other land parcels in a future environmental land management system:

a) Recreation

b) Water quality

c) Flood mitigation

d) Habitat restoration

e) Species recovery

f) Soil quality

g) Cultural heritage

h) Carbon sequestration and greenhouse gas reduction

i) Air quality

j) Woodlands and forestry

k) Other (please specify)

Soil quality, greenhouse gases reduction and air quality would be best achieved by implementing a number of measures as we described in our response to the questions in chapter 5. Supporting a range of renewable technologies could help reduce GHG emissions.

If the measures suggested were implemented by the Government, this would also result in:

- in less diffuse pollution and better water quality resulting from better handling of slurries and manures and landspreading,
- less emissions from inorganic, fossil-based fertilisers, and
- economic benefits and savings associated with renewable energy generation and use on site, less use of inorganic fertilisers and increased in crop yields.

What role should outcome based payments have in a new environmental land management system?

These should indeed play an important role as they would help the farming industry to deliver the identified public goods and objectives.

As highlighted below, farmers delivering cost effective carbon abatement measures to maintain or restore soil health and to improve air quality, should be supported through

outcome based payment schemes. However, the challenge will be in bench marking these objectives and quantifying improvements effectively.

As highlighted elsewhere in this response, anaerobic digestion can bring numerous economic and environmental benefits to farms, including (but not limited to) those outlined below:

- It enables farmers to diversify their business, bring additional income and deliver cost savings e.g. from onsite use and/or export of low carbon energy and displacement of chemical, fossil fuel based fertilisers.
- It enables net removal/mitigation of GHG emissions mainly by capturing methane from animal slurries and manures but also from the replacement of fossil based, intensive artificial fertilisers.
- It improves animal slurry handling and management on the farm, reducing water pollution, and the farm carbon footprint.
- It contributes to better nutrient management by recycling digestate nutrients and trace elements to crops and returning organic matter to the soil.
- It improves farm profitability and resilience by growing crops for energy production and incorporating these within crop rotations.
- Other renewables such as Solar PV and energy storage help farmers reduce running costs and GHG emissions and should also be supported.

As highlighted somewhere else in this response, subsidies based on kWh of energy generated have failed to recognise the multiple benefits that AD and digestates deliver.

For the reasons outlined above, we recommend that the Government consider introducing a support payment scheme that rewards farmers that use low carbon biofertilisers and soil amendments eg 'a low carbon biofertiliser/soil amendment credit scheme' or similar. We would suggest that farmers should be rewarded the payments only as long as they can show they follow good agricultural practice and meet all the relevant regulatory controls.

How can an approach to a new environmental land management system be developed that balances national and local priorities for environmental outcomes?

How can farmers and land managers work together or with third parties to deliver environmental outcomes?

Think global, act local should be the approach. Any local priorities will benefit the national environmental outcome and reflect the local needs more accurately than a national, blanket based approach. Catchment Sensitive Farming was such an approach, although some of the benefits weren't adequately thought through as local knowledge wasn't properly considered. Local wildlife groups would be best approached in this regard.

7. Fulfilling our responsibility to animals (page 43)

Do you think there is a strong case for government funding pilots and other schemes which incentivise and deliver improved welfare?

Should government set further standards to ensure greater consistency and understanding of welfare information at the point of purchase? Please indicate a single preference of the below options:

a) Yes

b) Yes, as long as it does not present an unreasonable burden to farmers

c) Perhaps in some areas

d) No, it should be up to retailers and consumers

e) Other (please specify)

*if you answered 'perhaps in some areas', please elaborate.

What type of action do you feel is most likely to have the biggest impact on improving animal health on farms? Please rank your top three choices from the below list, in order of importance:

a) Use of regulation to ensure action is taken

b) Use of financial incentives to support action

c) Supporting vets to provide targeted animal health advice on farm

d) Making it easier for retailers and other parts of the supply chain to recognise and reward higher standards of animal health

e) An industry body with responsibility for promoting animal health

f) Research and knowledge exchange

g) Transparent and easily accessible data

h) An understanding of animal health standards on comparable farms

i) Other (please specify)

j) N/A – Cannot rank as they are all equally important.

How can the government best support industry to develop an ambitious plan to tackle endemic diseases and drive up animal health standards?

8. Supporting rural communities and remote farming (page 46)

How should farming, land management and rural communities continue to be supported to deliver environmental, social and cultural benefits in the uplands?

There are a number of challenges facing rural communities and businesses. Please rank your top three options by order of importance:

a) Broadband coverage

b) Mobile phone coverage

c) Access to finance

d) Affordable housing

e) Availability of suitable business accommodation

f) Access to skilled labour

g) Transport connectivity

h) Other, please specify

B) Broadband coverage, and g) transport connectivity, d) affordable housing, with broadband coverage being the most important to support rural communities and businesses.

With reference to the way you have ranked your answer to the previous question, what should government do to address the challenges faced by rural communities and businesses post-EU Exit?

Ensure communications networks are in place to allow rural communities and businesses to interact effectively and market their production worldwide.

9. Changing regulatory culture (page 49)

How can we improve inspections for environmental, animal health and welfare standards? Please indicate any of your preferred options below.

a) Greater use of risk-based targeting

b) Greater use of earned recognition, for instance for membership of assurance schemes

c) Increased remote sensing

d) Increased options for self-reporting

e) Better data sharing amongst government agencies

f) Other (please specify)

Which parts of the regulatory baseline could be improved, and how?

How can we deliver a more targeted and proportionate enforcement system?

10. Risk management and resilience (page 52)

What factors most affect farm businesses' decisions on whether to buy agricultural insurance? Please rank your top three options by order of importance:

a) Desire to protect themselves from general risks (e.g. – revenue protection)

b) Desire to protect themselves from specific risks (e.g. – flooding, pests or disease)

c) Provision of government compensation for some risks

d) Cost of insurance

e) Complexity and administrative burden of insurance

f) Availability of relevant insurance products

g) Other (please specify)

What additional skills, data and tools would help better manage volatility in agricultural production and revenues for (a) farm businesses and (b) insurance providers?

How can current arrangements for managing market crises and providing crisis support be improved?

11. Protecting crop, tree, plant and bee health (page 55)

Where there are insufficient commercial drivers, how far do you agree or disagree that government should play a role in supporting:

a) Industry, woodland owners and others to respond collaboratively and swiftly to outbreaks of priority pests and diseases in trees?

b) Landscape recovery following pest and disease outbreaks, and the development of more resilient trees?

c) The development of a bio-secure supply chain across the forestry, horticulture and beekeeping sectors?

Where there are insufficient commercial drivers, what role should government play in:

a) Supporting industry, woodland owners and others to respond collaboratively and swiftly to outbreaks of priority pests and diseases in trees?

b) Promoting landscape recovery following pest and disease outbreaks, and the development of more resilient trees?

What support, if any, can the government offer to promote the development of a bio-secure supply chain across the forestry, horticulture and beekeeping sectors?

12. Ensuring fairness in the supply chain (page 57)

ANM Group provides members and customers with the infrastructure, skills and systems needed to trade their livestock, goods and services openly and fairly. Profits are used to sustainably grow and develop the business.

How can we improve transparency and relationships across the food supply chain? Please rank your top three options by order of importance:

a) Promoting Producer Organisations and other formal structures?

b) Introducing statutory codes of conduct?

c) Improving the provision of data on volumes, stocks and prices etc.?

d) Other (please specify)?

What are the biggest barriers to collaboration amongst farmers?

What are the most important benefits that collaboration between farmers and other parts of the supply chain can bring? How could government help to enable this?

The framework for our new agricultural policy

13. Devolution: maintaining cohesion and flexibility (page 59)

With reference to the principles set out by JMC(EN) above, what are the agriculture and land management policy areas where a common approach across the UK is necessary?

What are the likely impacts on cross-border farms if each administration can tailor its own agriculture and land management policy?

14. International trade (page 61)

Consultation questions

How far do you agree or disagree with the broad priorities set out in the trade chapter?

How can government and industry work together to open up new markets?

How can we best protect and promote our brand, remaining global leaders in environmental protection, food safety, and in standards of production and animal welfare?

15. Legislation: the Agriculture Bill (page 64)

How far do you agree with the proposed powers of the Agriculture Bill?

What other measures might we need in the Agriculture Bill to achieve our objectives?

~~~~~~~ End of consultation questions ~~~~~~~~~
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Appendix 1

Euston farms case study

Part of the historical 4,500 ha Euston Estate, Euston Farms extend to around 2,650 ha in the Suffolk countryside, 10 miles north of Bury St Edmunds. The majority of the soil across the farm is generally typical Breckland – sand over chalk.

The farm also has a smaller proportion of slightly heavier soil, containing an element of clay, ideal for growing sugar beet and cereals.

The focus for Euston Farms is very much on improving the quality of the soil through the acquisition and inclusion of organic matter from numerous sources and growing almost 200ha of green cover crops annually.

The farm is part of a wide range of research activities with various partners to ensure continual improvement in what they do. This includes vvarious BASF crop trials, and Innovative Farmers, Field lab work on digestate sponsored by the Soil Association.

Euston Farms cropping programme includes:

Roots (with a third party grower)	550 ha
Wheat	420 ha
Barley	150 ha
Sugar Beet	225 ha (16,000 tonnes)
Forage Maize/Rye	400 ha (for biogas)
Stewardship Grassland	643 ha
Game Strips	50 ha
ELS/HLS margins etc	70 ha
Pigs/Chickens (third party)	120 ha
PV (Solar Panels)	22 ha (13 MW)

There is an onsite 5MW AD plant and numerous livestock enterprises, including a small herd of pedigree Red Polls, a Suffolk Punch stud, breeding sheep, 1,200 outdoor breeding sows and 50,000 free range broiler chickens

Within the last 10 years Euston Farms has built two reservoirs with a total capacity of 900 million litres to store winter water. This water is channelled throughout the farm through more than 50km of underground piping. The farm is part of five separate Higher Level Stewardship Schemes and in 2016 Euston Farms were the winners of the Greenest Farming Business category of the 'Suffolk – Creating the Greenest County'.

Euston Farms are particularly proud of their work in the local community, especially with schools to ensure that farming is recognised for its significant importance.

The Euston Team

Estate Director: Andrew Blenkiron
Farm Manager: Matthew Hawthorne

Team: Jonathan Bedford, Peter Boreham, Ian Denny, Pete Matsell, Matthew Whiting & Oliver Tyrell.

The effects of digestate applications from the farmer's perspective

'At Euston Farm we have been effectively utilising digestate for three years now. We tend to apply 30 t/ha of solid digestate "under" autumn sown cereals and spring sown sugar beet, i.e. it is incorporated prior to planting of the seed. Although it is very difficult to quantify we have noticed marginally better moisture retention on our light sand soils as a result of this application, our aspiration is obviously to be able to demonstrate quantifiable improvements in soil organic matter over the fullness of time. Over the last two seasons we have also applied liquid digestate to growing crops of wheat, barley and sugar beet, indeed this season approximately 100ha of wheat will be grown with liquid digestate supplying 70% of the crops total nitrogen requirement. So displacement of artificial fertiliser has been significant, this is not just nitrogen of course. In another of our farm trails (50ha of wheat) we are also top dressing wheat with one application of solid digestate as well as one of liquid. We do find that the constraints applied by adhering to NVZ rules as a restriction to what could be a "changing" amount of solid, i.e. if we could put more solid material on then I'm sure that we would see quicker results.

We are also taking part in a research project .Innovative farmers field lab, organised by Agritech East and funded by the Soil Association that is being presently being carried out to demonstrate the positive effects of liquid digestate applied to summer/autumn sown cover crops. The objective is to demonstrate positive effects on the subsequent maize crop, this is just being planted, so we should have some results this autumn, in addition to yield there are a number of other factors being monitored, including full soil nutrient/pH analysis, worm populations/analysis, soil structure/porosity microbial work.'

Worth Farms Limited case study

This is an arable farm in South Lincolnshire run by a member of the REA. The 1.5 MWe AD plant is a joint venture with A.H. Worth, the parent company of QV Foods, one of Lincolnshire's largest food growers and processors and Biogen.

There is an onsite 1.5MW AD plant processing 30,000 tonnes of feedstocks, 10,000 of which are maize and rye grown on the farm, 10,000 of which are vegetable processing residues/by-products (e.g. vegetable peelings and trimmings from QV Foods' food processing operation) and the remainder 10,000 are vegetable and fruit and food wastes from the local area.

95% of the renewable power generated by the AD plant is used for the farm and vegetable factory's own uses (e.g. packing site).

The digestate is separated into a solid output (cake, 1,500 tonnes per annum) and a liquid output (around 30,000 tonnes per annum). They have been applying digestate for 3 years onto silt soils, mainly onto Wheat and Rye, and had good yield benefits over the seasons. This is applied using the farms underground irrigation main and 18 metre umbilical system.

The cake is spread onto stubbles after harvest, and the liquid digestate is stored in an onsite lagoon and spread in the spring, onto winter wheat and rye, and in the autumn, onto stubbles and ahead of cover crops.

The effects of digestate applications from the farmer's perspective

The digestate has had benefits mainly in terms of increased crop yields (estimated 0.5 - 1.5 tonne increase in crop yields), significant savings in the cost of inorganic fertilisers (roughly £60,000 saved every year, ~ £3.50 m^3 of is a rough nutrient value of the digestate applied) and increase in the soil organic matter levels which have improved the soil biology (increase in the number of earthworms).