

Health and harmony: the future for food, farming and the environment in a Green Brexit

Consultation response from Friends of the Earth May 2018

1. Executive Summary

It is a crucial time for the UK environment, as we prepare to leave the EU. Independent research¹ for Friends of the Earth, concluded that in all areas of environmental protection including those highly relevant to the farmed environment, such as safeguarding our most important nature sites and the status of our water bodies, Brexit is a risk.

Friends of the Earth therefore welcomes the opportunity provided by the reform of agricultural policy to bring about a positive change in the UK for environmental protection, public health and animal welfare. However at the same time positive outcomes for farming will also depend on an robust level of regulation being retained, improved and enforced.

Our farmed environment certainly needs urgent action. Farmland birds have been in decline since the 1970s, our pollinators – and other insects - are struggling and our soils are degraded. Intensive farming has driven most of these losses, relying too heavily on damaging inputs of pesticides, artificial fertilisers and antibiotics. The Committee on Climate Change has warned that we are missing even the modest voluntary targets set for the reduction of Greenhouse Gas emissions (GHGs) from agriculture.

Friends of the Earth welcomes the commitment to use public money for the delivery of public goods. There must be a clear understanding of what public goods are. Public money should not be used to simply support food production which is already rewarded in the market place, although the Government must do much more to ensure fairness in supply chains. Critical public goods include improving soil health and water quality, cutting climate change emissions, enhancing biodiversity, animal welfare and public health.

Solutions can and should deliver on multiple public goods – and they are often connected. Our wellbeing is closely linked to contact with the natural world. We will all benefit from having thriving nature in our countryside. Lower input farming will boost nature, help clean up our water and produce healthier food. Sustainable livestock production (which cuts pollution and GHG emissions) goes hand-in-hand with healthier, lower meat diets. An approach that rewards recognised systems such as organic, agroforestry or pasture-fed livestock can be one way of ensuring multiple benefits are delivered. A whole farm approach must be taken – intensive production with greening around the edges will not bring about the change that is needed in our countryside. Pesticide reduction would deliver on many public goods – there should be a commitment to setting an ambitious reduction target in the Agriculture Bill.

¹ <https://friendsoftheearth.uk/brexit/uk-environmental-policy-post-brexit>

The new policy needs to be guided by a new definition of productivity which is not based on short term yield increase requiring more inputs. Resilient food production needs natural resources to be in good condition – healthy soils and pollinators for example. Over-reliance on inputs like pesticides that damage these natural resources will damage, not help, long term food security.

Critically, future trading arrangements must not be allowed to undermine the ambition for higher environmental and welfare standards in the UK. There should be a focus on producing high quality food for the UK public to eat, in a way that enables nature and natural resources to thrive, and that rewards producer fairly, not an attempt to compete on the basis of exporting large volumes of intensively farmed produce.

Innovative farmers are already showing that farming works better with nature rather than against it. But for this approach to be adopted more widely, farmers need support from Government including the right kind of research into farming practices that don't rely on harmful inputs, access to knowledge, and independent advice. This should encourage and build on farmer-led innovation. Friends of the Earth is working with farmers to find solutions that work for farming and nature and we will submit further details from this process in due course.

This consultation relates to England but it is important that there is some commonality of farming policies across the UK to meet international obligations and deal with cross boundary issues – this must be developed via a shared process with devolved administrations and must respect the rights of devolved nations to retain stronger rules in some areas such as the growing of GM crops.

2. Reform within the CAP

Q: Please rank the following ideas for simplifications of the current CAP.

- i) (b) Simplify the application form
- ii) (a) Develop further simplified packages
- iii) (c) Expand the online offer

Additional information

We would be concerned about any reduction in evidence requirements (option d) because this risks loss of public trust in ensuring that the money is well spent. Moving to a new system, greater levels of public trust will need to be built in order to show that supporting an Environmental Land Management System set up to deliver public goods is a good use of public money.

3. An agricultural transition

Q: What is the best way of applying reductions to Direct Payments?

Friends of the Earth has supported the capping of payments to farmers and landowners receiving the highest payments during CAP reform consultations. This is still an approach we support to help ensure fairer distribution of money and greater delivery of public goods. It could be complimented during the transition period by a gradual reduction in payments to all farmers, with higher percentage reductions applied to larger recipients. The lowest bands and farmers who rely on direct

payments for the majority of their income, such as upland livestock farmers, could potentially be exempt from reductions for longer.

Q: What conditions should be attached to Direct Payments during the 'agriculture transition'?

Simplify cross compliance and improve/streamline enforcement (not reduce enforcement)

Greening should be retained during the transition until new, stronger measures are put in place. Greening was an attempt to improve environmental outcomes, so although it has failed to have a significant positive impact due to the proposals being severely watered down, the UK cannot be seen to be relaxing environmental requirements when they need to be vastly improved and strengthened.

Cross compliance rules should also be retained but could be simplified and should start to introduce elements of the new Environmental Land Management scheme during the transition.

Q: How long should the 'agricultural transition' be?

Farmers clearly need time to plan and evolve their practices in line with the requirements of the new policy. The earlier the Government can give clarity to farmers on these requirements, the sooner this transition can start and the shorter it will need to be. We suggest a period of around 3-5 years should be possible. Much longer will risk a delay in the move towards the new system and a subsequent delay in seeing the benefits from the public goods being delivered. That said, the big unknown is where the UK will be in terms of trading arrangements with the EU and other countries. Trading relationships will have a huge impact on farmers, and the longer uncertainty over future trade agreements exists, the more challenging the transition will be.

4. A successful future for farming

Knowledge and advice

Education and information provision must be improved, more independent, with better emphasis on environmental sustainability. We prioritise:

- Farmer to farmer learning, and
- Better access to skills providers and resources.

Farmer education and access to information is undoubtedly key to delivering better farming systems that protect and improve the environment, and at the same time ensure productive and profitable farms. For many years there has been undue emphasis on increasing yields as the over-arching priority – this must change. We need a cultural shift that recognises the importance of environmental and economic sustainability and acknowledges the capacity of lower-input systems to deliver our food needs.

Farmers currently experience a number of problems in accessing adequate and affordable information regarding best practice, and some key aspects of sustainable farming, such as Integrated Pest Management (IPM), receive insufficient attention from information providers. IPM is currently given low priority as part of current BASIS and FACTS training, despite the UK's commitment to IPM under the Sustainable Use Directive. This needs to change. IPM needs to be clearly defined (see section 11) and must become a key guiding principle of pest and disease control. Some farmers have become disengaged from decision-making, often due to the complexity of chemistry involved.

Farmers very often rely on advice from agronomists, and this may be linked to the sale of agrochemicals. Risk aversion may also play an undue role in advice given, making agronomists less likely to advise farmers to reduce inputs for example, even where reductions would make economic sense and lower risk to the environment. There's a clear need for access to independent advice at a low cost. Better pest and disease monitoring and forecasting is also required.

We recommend the Government strengthens existing institutions to provide better, independent advisory services, possibly based on existing provision offered by AHDB, coordinating organisations including ADAS and NIAB, to disseminate knowledge. There are proven benefits to combined research, advice and education services, which ensure young farmers are trained in the most up to date techniques.

Farmer-to-farmer learning is established as a key and proven method of information sharing. For example, the 'Field Labs' pioneered by the Innovative Farmers Network are a grassroots farmer-farmer research and innovation model that stands out as particularly successful. The government should support this approach to knowledge transfer.

As best practice is often location-specific, dependent on factors such as soil type, climatic conditions, or pest abundance, advice provision should be tailored to local/regional conditions, with regional benchmarking, and regionally based staff. This will also be of benefit where farmers may be working to achieve catchment-related outcomes. Provision of information and advice at a regional level has been identified as a successful strategy in both Germany and Italy. Ref: [Overview report Sustainable Use of Pesticides - European Commission](#), Oct 2017

The most effective way of supporting new entrants

Many factors act as barriers to entry into farming, and the Government should commission a review to establish where help can be given.

The costs of land and equipment are a key barrier to new entrants. Provision of access to grants or low interest loans would act as a significant driver to small businesses, especially those based on land areas of less than 5 hectares, which currently receive no support. Such schemes would need to be simple and easy to access. Small land parcels could be made available for new entrants. Access to information on low-cost agricultural practice is essential.

Does existing tenancy law present barriers to new entrants?

Yes, short-term business tenancies prevent farmers investing for the future, and thus deter those wishing to make improvements to their land, including those providing public goods, such as organic conversion, or even creating habitat such as beetle banks.

Technology and Research

We believe the key priorities for research topics which will best deliver benefits for environment and farming should be:

- Improving environmental performance, including soil health
- Managing resources sustainably, including agro-chemicals
- Crop and livestock health and animal welfare.

We support aspirations to promote better, more efficient farming which leads to the production of high quality food. However, we're concerned that the emphasis within the command paper is on high technology approaches, often requiring significant investment. This approach runs the risk of repeating past errors in farm policy which prioritised yield, and created a farming system dominated by high inputs and high costs, with consequent high risk and reduced returns for farmers. High yield should no longer be the yardstick by which farmers are measured. Efforts to improve farming and environmental returns should go hand-in-hand, to maximise features such as soil health, genetic diversity and wildlife abundance and thereby maximise ecosystem services, and minimise costs and risks to farmers.

We agree that excellence and innovation should be acknowledged, embraced and shared and it is essential that farmers have access to the latest tools and technologies. It is clear that high tech approaches offer great potential in terms of increasing efficiency and reducing resource use in pest management, fertiliser application, etc. However, equal attention needs to be paid to highly innovative low-risk, low-cost solutions, and a much greater focus of innovation should be on low-input systems that are environmentally and economically sustainable.

Practices such as more diverse and broader crop rotations, cover crops and companion planting are just some of the low technology options which deserve greater attention. Such techniques have demonstrable ability to improve soil health, encourage natural predators, and reduces pests and diseases. It's clear that farming systems using these practices, such as conservation agriculture, have the potential to improve yields while significantly reducing fuel costs, pesticide and fertiliser use, and consequently reducing financial burden on farmers. In addition, significant risks may be associated with advanced technologies, and these need to be properly evaluated. It's essential that low-cost, low-tech approaches receive equal attention and investment.

The current approach to farming research is not fit for purpose. Farming is complex a system, with many interacting factors, however current research tends to be conducted in silos, investigating single variables in a binary approach, and integrated pest management has been woefully underfunded for several decades. Research should focus on investigating practices that deliver better environmental and financial rewards for farmers. More emphasis should be placed on farmer-led, holistic, systems-based research, over longer time periods, and appropriate to local conditions, with appropriate oversight from scientific institutions.

Q: How can industry and government put farmers in the driving seat to ensure agriculture R&D delivers what they need?

We prioritise:

- (b) Bringing groups of farms together in research syndicates to deliver practical solutions
- (c) accelerating the proof of concept testing of novel approaches
- (d) giving the (whole) farming industry a greater say in setting the strategic direction for research funding.

A greater priority should be placed on more environmentally sustainable, agroecological farming systems. In addition, emphasis should be changed from one prioritising yield, to an approach that takes better account of alternative economic models, and delivers better gross margins for farmers. Low-input systems have shown proven success in this regard and should be promoted.

Farmer-led innovation should be better encouraged, but it would be important to ensure this genuinely met needs identified by individual farmers, and not just mainstream farming bodies.

Friends of the Earth considers the Agri-tech strategy no longer fit for purpose. A new Research and Development strategy should replace it to support the new land management approach and provide primary and applied science to support the needs of agro-ecological and organic farming. Defra and relevant agencies should allocate a significant proportion of the current R&D budget to farmer-led innovation and farmer training on how to apply the findings of new research. And crucially, they should involve famers (individuals, not just the big farming bodies) in identifying research needs at the outset to ensure that relevant research is carried out. Agri-tech strategy no longer fit for purpose. A new Research and Development strategy should replace it to support the new land management approach and provide primary and applied science to support the needs of agro-ecological and organic farming. Defra and relevant agencies should allocate a significant proportion of the current R&D budget to farmer-led innovation and farmer training on how to apply the findings of new research. And crucially, they should involve famers (individuals, not just the big farming bodies) in identifying research needs at the outset to ensure that relevant research is carried out. agro-ecological and organic farming. Defra and relevant agencies should allocate a significant proportion of the current R&D budget to farmer-led innovation and farmer training on how to apply the findings of new research. And crucially, they should involve famers (individuals, not just the big farming bodies) in identifying research needs at the outset to ensure that relevant research is carried out. Agri-tech strategy no longer fit for purpose. A new Research and Development strategy should replace it to support the new land management approach and provide primary and applied science to support the needs of agro-ecological and organic farming. Defra and relevant agencies should allocate a significant proportion of the current R&D budget to farmer-led innovation and farmer training on how to apply the findings of new research. And crucially, they should involve famers (individuals, not just the big farming bodies) in identifying research needs at the outset to ensure that relevant research is carried out.

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

Peer pressure, risk aversion, and existing culture are key barriers to change in farming. High technology options are over-emphasised in the Command Paper. More emphasis should be placed on agroecological, low-input systems and practices. As well as delivering environmental outcomes, these can achieve significant cost reductions for farmers and improve profitability, but require legitimisation through a change in culture, which could be aided by better government support. Adoption of targets for organic production and pesticide reduction, as well as a clear prioritisation of IPM as a guiding principle, would help promote their adoption.

In some cases, new approaches are blocked by outdated legislation. For example, there is an urgent need to explore lifting the current ban on using catering waste, and other food surplus, as feed for omnivorous non-ruminant livestock, such as pigs and chickens. Instead, the ban could be replaced with robust legislation regulating the treatment of this food waste so that it can be safely fed to omnivores. This is current practice in Japan, where they have adopted a high-tech heat-treatment and biosecurity model which Defra should investigate adapting for the UK.

This would contribute to reducing climate emissions and global biodiversity impact (reducing the need for imported soy feed), reduce feed costs for producers and use food that is not fit for consumers in the most efficient way. Using food waste as animal feed scores better than anaerobic digestion or composting on 12 out of 14 environmental and health indicators, including greenhouse gas emissionsⁱ.

Q: How can government support industry to build the resilience of the agriculture sector to meet labour demand?

The Government needs to enforce the highest labour standards ensure that value in the supply chain reaches farmers and workers. All workers should be paid the real Living Wage as a bare minimum, as well as benefiting from conditions that other people consider to be perfectly normal, such as pay progression for long service, toilet breaks, decent housing (where provided), sick pay, holiday pay and maternity/paternity rights and robust protection from modern slavery and abuse. Action to improve the situation should include:

- **Better farm pay and working conditions:** Formation of a new farmworker collective bargaining body for England (as a replacement for the old Agricultural Wages Board) and a reversal of the cuts in enforcement agencies that protect workers from abuse. We need a new body for sector bargaining, with arbitration, for agricultural workers in England.
- **Better farm jobs:** The Government and farming industry needs to recognise and invest in the opportunities presented by new sustainable farming systems, delivering new skills in agri-environment and conservation on and around farm; organic farming; sustainable horticulture; marketing opportunities and growth in SME, better food manufacturing for local and regional markets; as well as opportunities for new-entrant farmers. agri-environment and conservation on and around farm; organic farming; sustainable horticulture; marketing opportunities and growth in SME, better food manufacturing for local and regional markets; as well as opportunities for new-entrant farmers. farmers. agri-environment and conservation on and around farm; organic farming; sustainable horticulture; marketing opportunities and growth in SME, better food manufacturing for local and regional markets; as well as opportunities for new-entrant farmers.
- **Better data:** Criminality in the gang master sector is high given the potential gains to be made and the lack of enforcement of employment law. We need better measurement and far more

resources to enforce labour standards to eliminate modern slavery and end worker abuse at home, in the UK food system.

5. Public Money for public goods

Environmental enhancement and protection

A focus on 'public money for public goods' has been a core demand from environmental and food organisations for many years so this approach is welcome. Friends of the Earth agrees that protection and enhancement of our environment should be a pre-eminent public good. We also suggest that public health is an important public good and that measures to boost public health are often in line with measures aimed at environmental outcomes.

Friends of the Earth does not wish to prioritise from the list of soil health, water quality, air quality, biodiversity, climate change mitigation and enhance beauty, heritage and engagement with the natural environment,. It is welcome that these elements are acknowledged in the Health and Harmony paper. The Government should be developing a policy that delivers on all these critical issues. The right measures can deliver on multiple public goods. Agroecological approaches in particular should be pursued for their holistic, resilient approach.

It is vital that agriculture's contribution to climate change is tackled in the new policy as well as measures to mitigate impacts. The Committee on Climate Change has warned that we are missing even the voluntary targets set for GHG reduction from agriculture. We need legally binding targets for emissions reductions targeted at both food production and consumption, with livestock as a particular focus.

As stated above one crucial public good that is missing from the Health and Harmony paper is public health. This should include the promotion of sustainable, healthy diets (with less and better meat and dairy as advocated by the Government's Eatwell Guide), support for horticulture reduction in the use of antibiotics in livestock farming and improvement of mental health and wellbeing through access to nature. These measures would address public health and environmental outcomes in an integrated way.

There should be support for activities that:

- Contribute to healthy sustainable diets by reducing the health and economic cost of diet-related disease and making healthy sustainably produced, fresh food available, affordable and accessible to all, specifically with more and diverse plant-based foods available and with production based on sustainable methods
- Help farmers transition from high levels of production (particularly from intensive systems) of products we should be reducing in our diets, such as high levels of meat and dairy consumption
- Reduce or eliminate risk of food related diseases (such as E.coli, salmonella, campylobacter) Encourage growth in acreage of beneficial farm systems that can deliver some – or all – of these outcomes such as organic, agro-ecological and agro-forestry.agro-ecological and agro-forestry.agro-forestry.agro-ecological and agro-forestry.

Friends of the Earth agrees that woods and forests offer many benefits to society and the economy. The deliberate integration of trees within agricultural crops and livestock in an agroforestry system

also delivers many benefits and can increase productivity whilst also managing risk against climate change as well as enhancing nature, and the attractiveness of the farming landscape. This kind of systems approach can deliver multiple benefits.

Better animal and plant health and animal welfare

We are extremely concerned about the rise in intensive livestock production units across the country, and the impact these systems have on the local environment, public health and animal welfare. Of particular concern are the accumulation of wastes such as ammonia and slurry, polluting air and water, and the over-use of antibiotics which is fuelling the global public health crisis around antibiotic resistance.

A focus in the new policy on quality² not quantity of livestock would be better for animal welfare and also consistent with the need to reduce meat and dairy consumption for health and environmental reasons. The Government should research and aim for achieving sustainable levels of livestock production in line with the carrying capacity of land and climate change goals, the principles of sustainable diets and public expectations for high quality, high welfare livestock products.

Protection of crops is suggested as a public good in the Health and Harmony paper. Of course it is vital that farmers are able to protect their crops against pests and diseases. But this is not in itself a public good. The emphasis in future farming policy must be on protecting crops in a way that does not harm the environment and this will require a significant reduction in the use of pesticides. This would deliver multiple benefits for many critical public goods like the provision of clean water, healthy soils, thriving wildlife and public health. It would also help to secure a more resilient approach to crop protection in the future, avoiding the increase in resistance to chemical controls and at the same time lowering input costs to farmers.

Pesticide reduction is an important example of taking a whole farm approach – combined with habitat creation it will help to ensure that the whole farmed landscape is safe for beneficial flora and fauna – not just the uncropped field edges.

An ambitious target should be set for pesticide reduction (taking into account frequency of use and risk to health and the environment rather than simply weight of products used – see section 11). Farmers should be supported to move away from over reliance on pesticides to the wide take up of Integrated Pest Management (IPM). Farmers will need a clear definition of IPM that puts the emphasis on non-chemical means of control and a system approach (e.g. more diverse rotations, maximising natural predators, companion planting) with chemical pesticides as a last resort (see section 11 for more detail).

Improved productivity and competitiveness

Promoting agricultural productivity in a narrow sense (i.e. higher food production without any requirement for it to be sustainable) is not a public good and implies a level of intensification which runs counter to the delivery of other genuine public goods which are based on environmental and public health outcomes. Long term productivity will actually rely on healthy soils and a recovery in the services provided by nature such as pollination and natural pest control so delivering on these public goods will help secure production in the future. This has been recognised by the Food and Agriculture Organisation of the United Nations (FAO) which has concluded that “while the last half-century has witnessed striking increases in global food production through intensive use of inputs,

² <https://www.eating-better.org/2018/04/Less-and-Better-Report.html>

such practices may deplete natural resources and impair the ability of agro-ecosystems to sustain production into the future.”³-ecosystems to sustain production into the future.”⁴

Public goods should also have outcomes for which farmers are not rewarded by the market. Farmers are rewarded for food production in the market place, although more must be done to ensure fairness in the supply chain. Many farmers are subjected to unfair buying practices by supermarkets and processors. The introduction of the Groceries Supply Code of Practice enforced by the Groceries Code Adjudicator has had some positive impact, but it only applies to the largest retailers. The Agriculture Bill should introduce a properly enforced statutory code of conduct to ensure fair buying practices across the whole supply chain.

Preserving rural resilience and traditional farming and landscapes in the uplands

Friends of the Earth recognises that public goods are delivered by upland farmers and that they face particular challenges. But environmental damage is also caused in the uplands, such as overgrazing. The new farming policy should aim to support farmers to boost public goods delivery and reverse existing damage. For example introducing silvopastoral agroforestry systems would help stabilise soils and reduce flood risk. In other cases a well-managed and supported transition to other land-use such as rewilding and low-impact tourism may be more appropriate. In other cases a well-managed and supported transition to other land-use such as rewilding and low-impact tourism may be more appropriate. In other cases a well-managed and supported transition to other land-use such as rewilding and low-impact tourism may be more appropriate.

Rural resilience, linked to environmental resilience, should be a priority in lowland areas too.

Public access to the countryside

There is increasing evidence that time spent in contact with nature is good for our wellbeing. It is therefore important that urban and rural communities have access to natural spaces. Specific measures to ensure a good network of public rights of way would help to contribute to this. However much of our intensively farmed landscape is denuded of nature. Restoration of biodiversity across our farmed landscapes will help to boost people’s wellbeing when they visit the countryside and again shows how different public goods are linked to each other.

6. Enhancing our environment

Friends of the Earth welcomes the commitment in the Health and Harmony paper to make environmental protection and enhancement the principle public good to be supported in the future. We agree that the new farming policy will have a key role in delivering the ambitions set out in the 25 Year Environment Plan.

Q: 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 ELMS.

³ <http://www.fao.org/agriculture/crops/thematic-sitemap/theme/biodiversity/ecological-intensification/en/>

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

Friends of the Earth considers that all the outcomes listed should be incentivised for action by single farms or groups of farms. However we do have concerns that an attempt to prioritise individual public goods and focus on those outcomes could lead to a complicated and piecemeal approach

We would therefore suggest adding systems-based outcomes including:

- Agroforestry
- Pasture based livestock system
- Whole farm organic system outcomes
- Integrated Pest Management.

There are many benefits of a whole farm or systems approach, which could also be simpler to administer. For example, certified organic, agroforestry, and pasture-fed livestock production systems deliver multiple beneficial outcomes and being part of a robust scheme should be enough to secure funding support.

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

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

An outcome based approach to payments could work in an area based scheme where there are clearly defined aims for a group of farmers to deliver on. Collaboration between farms to deliver an agreed set of public goods should be encouraged, particularly for clearly defined areas such as catchments or National Character Areas (NCAs). There are 159 NCAs in England – their borders follow natural landscape features not administrative boundaries. But this should not be the only approach as it favours farmers based on their geographical location, and because some issues such as soil health are too ubiquitous to be approached only in particular places.

At the farm/estate level, a whole farm approach will be important to delivering environmental outcomes. There is a place for farmers taking small scale, relatively simple interventions, such as hedgerow restoration, or the creation of sown mixes. However there is a risk that if a single measure is focussed on e.g. planting wildflowers or hedgerows, but the rest of the farm is intensively managed with a high level of inputs, then the benefits to biodiversity could be reduced or even negated. Evidence for this risk comes from research into neonicotinoid pesticides which found residues of these insecticides in wildflowers and hedges next to arable fields [ref].

A whole farm plan under a Land Management Scheme agreement could be made between the farmer and the wider community. Each farmer/farm would ideally have a single point of contact representing the public sector, with support from Government Agencies, Government Departments and Local Authorities

We support the Government investigating innovative mechanisms which may attach private funding and encourage private companies to take more responsibility for environmental outcomes.

However, this approach also needs caution to avoid a very narrow (rather than whole farm) approach being taken. For example, a successful model has been demonstrated by some water utilities in compensating farmers against the cost of adapting their pesticide policy – especially the use of metaldehyde molluscicide⁵. But the same companies may show less interest in reducing the use of other pesticides where clean-up costs are lower or there is no legal obligation to remove them from water, even though harm to aquatic organisms may result from their use. This suggests the partnership model with government agencies and NGOs playing a role could work best for achieving multiple benefits. obligation to remove them from water, even though harm to aquatic organisms may result from their use. This suggests the partnership model with government agencies and NGOs playing a role could work best for achieving multiple benefits.

7. Fulfilling our responsibility to animals

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

Yes.

The UK should aim for the highest possible animal health and welfare standards. Animal welfare is an issue that resonates strongly with the public, and given our standards are already relatively high, this puts the UK in a strong position for our food to be recognised as the highest quality.

We are extremely concerned about the rise in intensive livestock production units across the country, and the impact these systems have on the local environment, public health and animal welfare. Of particular concern are the accumulation of wastes such as ammonia and slurry, polluting air and water, and the over-use of antibiotics which is fuelling the global public health crisis of antibiotic resistance.

A focus in the new policy on quality⁶ not quantity of livestock would be better for animal welfare and also consistent with the need to reduce meat and dairy consumption for health and environmental reasons (for details see <https://www.eating-better.org/2018/04/Less-and-Better-Report.html>). The Government should research and aim for achieving sustainable levels of livestock production in line with the carrying capacity of land and climate change goals, the principles of sustainable diets and public expectations for high quality, high welfare livestock products.

Delivering high welfare is likely to deliver other public benefits, as it will tend to (and should) favour more natural and lower impact systems, for example by reducing the use of antibiotics in farm animals.

Q: Should government set further standards to ensure greater consistency and understanding of welfare information at the point of purchase?

Yes.

⁵ <https://media.anglianwater.co.uk/got-a-spare-600million-how-water-companies-are-working-to-tackle-the-slugs-of-the-pesticide-world/>

⁶ <https://www.eating-better.org/2018/04/Less-and-Better-Report.html>

The current system fails to create a level playing field which creates confusion for the public and is unfair on many producers. Terms such as ‘outdoor reared’ The terms ‘outdoor bred’, ‘free-range’, ‘grass fed’ can be used without having to adhere to clear standards and can have very different meanings. For example, the Pasture Fed Livestock Association certify 100% grass-fed meat and dairy⁷ but meat produced from livestock fed on grass just 51% of the time can be called ‘grass-fed’. Mandatory method of production labelling should be introduced so that the public can clearly see the difference between e.g. intensively farmed chicken or pork and higher welfare. This could be done in a similar way to the method of production system for eggs.

Q: What type of action do you feel is most likely to have the biggest impact on improving animal health on farms?

- i) (a) Use of regulation to ensure action is taken
- ii) (b) Use of financial incentives to support action
- iii) (f) Research and knowledge exchange.

Animal health and welfare should be addressed together.

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

Animal health and welfare should be addressed together. High animal welfare outcomes should be a public good and rewarded as part of the Environmental Land Management Scheme, including support to high welfare systems such as organic, PFLA and others – as their standards inherently deliver high animal health and welfare.

The draft Animal Welfare Bill needs significantly strengthening in order to maintain the recognitions and protections afforded to animals once we leave the EU. For example, it should create a new statutory duty requiring public bodies, in formulating and implementing policy, to take all reasonably practicable steps to achieve the highest possible standards of animal welfare.

Mandatory method of production labelling for meat and dairy should be introduced which should include a clear definitions of terms so that there is a level playing field for producers.

The Government should actively seek to dis-incentivise the production and consumption of high volumes of low quality meat and actively promote changes in people’s eating patterns to less and better meat based on the recommendations in Public Health England’s Eatwell Plate and Eating Better’s guide to better meat (see <https://www.eating-better.org/2018/04/Less-and-Better-Report.html>). <https://www.eating-better.org/2018/04/Less-and-Better-Report.html>).

8. Supporting rural communities and remote farming

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

Whilst the uplands are worth particular consideration due to the combination of the significant ecosystem services they deliver, the occurrence of High Nature Value farming and the particular

⁷ <https://www.pastureforlife.org/>

dependence of farming on financial support, the Government must ensure that sustainable farming and land management, and rural communities can survive across all areas of the UK.

In particular, measures are needed to support and strengthen small and medium farms and rural enterprises in upland and lowland areas, as well as mixed farms, because of the environmental and social benefits they provide. A diversity in farm size is important for protecting landscapes and natural resources as well as rural economies and communities. Smaller farms are also needed to help attract new entrants to farming.

9. Changing Regulatory Culture

A new farming policy however progressive will not work in isolation. It is vital to look again at the regulatory baseline as there is a limit to how much the new Environmental Land Management scheme can deliver, given that not all farmers will participate in it.

Recent analysis for Friends of the Earth⁸ concluded that all areas of environmental protection are at risk by leaving the EU, including those highly relevant to the farmed environment such as safeguarding our most important nature sites and the status of our water bodies. It is vital that existing environmental protections are maintained, strengthened where necessary, and properly enforced.

Q. How can we improve inspections for environmental, animal health and welfare standards?

Earned recognition may be appropriate for certified and clearly defined farming systems which have evidence of benefits to the environment such as organic or agroforestry. But we would have concerns about earned recognition for assurance schemes which may simply be ensuring compliance with the regulatory baseline, or be a 'tick box' list of measures rather than a holistic sustainable farming system. The desire for a streamlined approach to inspections is understandable, but streamlining must not compromise on ensuring compliance with regulation which must be a basic requirement for all farms. Whilst we are supportive of data sharing but this should not lead to the quality of inspections being reduced. Government agencies will need to be adequately resourced and hold relevant expertise, including on relevant environmental outcomes such as species recovery. The cuts to agencies in recent years has already raised concerns about their ability to fulfil their role as farm advisors or environmental watchdogs.

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

Any suggestion towards a more voluntary and industry led approach to regulation must be treated with extreme caution. All farms must be required to meet certain minimum standards for all categories of wider public benefit including soil, slurry management, reduced antibiotic use, animal welfare, food safety, reduced pesticide use, reduced GHG emissions, water management, and nature protection.

Labelling standards, such as organic, must also be set out in regulations. The regulatory baseline should include a commitment to fully implementing the precautionary and polluter pays principles, hazard-based approaches and responding to external markets e.g. changing European regulations.

For instance, it is not yet clear how the pesticide authorisation process will work after we leave the EU. However it is essential that this is in line with a precautionary and hazard based approach. The

⁸ <http://friendsoftheearth.uk/brexit/uk-environmental-policy-post-brexit>

UK has recently backed a ban on the use of 3 neonicotinoids on all outdoor crops but pesticide companies are developing new neonicotinoid insecticides that could be equally harmful⁹ – a test of the UK’s commitment to a strong regulatory baseline will be that it does not allow these products on to the UK market.

Defra’s Chief Scientist has also noted the need for pesticide regulations to be improved, citing in particular the lack of any limit on the total amount of pesticides used and the virtual absence of monitoring of their effects in the environment: “The current assumption underlying pesticide regulation – that chemicals that pass a battery of tests in the laboratory or in field trials are environmentally benign when they are used at industrial scales – is false.”¹⁰

The polluter pays principle could also be used to good effect to support a pesticide reduction target. The Voluntary Initiative, which was set up as an alternative to the pesticides tax, has so far failed to reduce pesticide use and promote alternatives¹¹. The Government should investigate how the taxation of pesticides works in other countries and consult on whether this approach could be applied effectively in the UK. In July 2013, Denmark introduced a pesticide tax, where taxation is linked to their environmental and health toxicity. It would be important to the acceptance and effectiveness of a tax to ensure that the money raised was used to support research and advice to farmers to help them cut pesticide use.

11. Protecting crop, tree, plant and bee health

Crop protection

Friends of the Earth agrees with the statement in the Health and Harmony paper that farmers must be able to protect their crops and at the same time people must be protected from the risk that pesticides can pose to them and the environment. Wildlife also needs to be protected – for our own wellbeing and for the services it provides to farmers but also in its own right. We also agree that strong pesticide regulations are needed (see section 9) but that farmers should at the same time be supported to take up Integrated Pest Management (IPM) with an emphasis on reducing chemical inputs.

There is therefore a key role for Government in its new farming policy to support farmers to manage their land in a way that firstly prevents pest and disease build up, and then manages any remaining pest and disease problems using non-chemical means of control wherever possible. This will include a range of measures including diversifying crops and species used, altering rotation length and diversity, maximising natural predation, companion planting and trap cropping. Technology may have a role to play in the future with technical solutions helping farmers to monitor and control pests and diseases but, with the right research and knowledge transfer in place, the adoption of agroecological farming practices will be available to more farmers and sooner.

If farmers are to be incentivised to take up Integrated Pest Management a clear definition of IPM will be needed with an emphasis on a systems approach and non-chemical means of control with chemical pesticides being a last resort. The UN’s definition of IPM emphasises “the growth of a healthy crop with the least possible disruption to agro-ecosystems and encourages natural pest

⁹ <https://www.reuters.com/article/us-france-pesticides/french-court-suspends-two-dow-pesticides-over-potential-harm-to-bees-idUSKBN1DO1M9>

¹⁰ <https://www.theguardian.com/environment/2017/sep/21/assumed-safety-of-widespread-pesticide-use-is-false-says-top-government-scientist>

¹¹ http://issuu.com/pan-uk/docs/our_toxic_future_-_full_briefing?e=28041656/44514842

control mechanisms”. “the growth of a healthy crop with the least possible disruption to agro-ecosystems and encourages natural pest control mechanisms”. -ecosystems and encourages natural pest control mechanisms”. “the growth of a healthy crop with the least possible disruption to agro-ecosystems and encourages natural pest control mechanisms”.

Friends of the Earth also recommends wording in the EU Sustainable Use Directive to guide the Government’s ambition for IPM¹²:

“Member States shall take all necessary measures to promote low pesticide-input pest management, giving wherever possible priority to non-chemical methods, so that professional users of pesticides switch to practices and products with the lowest risk to human health and the environment among those available for the same pest problem. Low pesticide-input pest management includes integrated pest management as well as organic farming according to Council Regulation (EC) No 834/2007 of 28 June 2007 on organic production and labelling of organic products”.

IPM is about a holistic approach to crop protection and not about selecting a couple of options as a ‘tick-box exercise’. If farmers are expected to take up IPM and deliver on pesticide reduction then the Government will need to shift the focus of its research and improve knowledge transfer.

The current focus of the Agri-Tech budget is on technological solutions but this can cause Government and industry to overlook low-tech methods of crop protection such as companion planting and maximising the effectiveness of natural predators. Although in some ways these are ‘tried and tested’ methods research is still needed into maximising their benefits. For example, it is known that in general there is a positive relationship between the heterogeneity of a landscape and natural pest control within crops. But farmers would benefit from more research into how incorporating particular habitats into the farmed area boosts predators and yield. Farmers are finding that no-till or minimum till systems can boost natural predator populations and cut insecticide use, therefore lowering input costs, showing how it is also important to learn from what farmer led research and disseminate the findings (see section 4 for more on research).

Knowledge transfer needs to be improved and re-focussed. Where advice comes from is also important. Too many agronomists currently advising farmers are directly linked to companies selling pesticide products. Progressive farmers have highlighted the need for this link to be broken. There is a case for subsidised independent advice, delivering on multiple public goods outcomes, to be at least part funded by public money. Alternatively a pesticides levy could be a means of raising money for advice or targeted research and encourage farmers to reduce their use (see section 4).

Bee health

Bees are a critical for farming for their pollination services. Imported bees – honeybees and bumblebees - can spread disease to indigenous bees. Commercial bumblebee importers claim that their stock is disease-free, but a recent published study by the University of Sussex has shown this to

¹² https://ec.europa.eu/food/plant/pesticides/sustainable_use_pesticides_en

be incorrect¹³. Using locally bred, indigenous bees would avoid this problem, as a first step much higher standards of biosecurity on bee imports would reduce the risk¹⁴.

12 – Ensuring fairness in the supply chain

- i) (b) Introducing Statutory Codes of conduct
- ii) (c) Improving the provision of data on volumes, stocks and prices
- iii) (a) Promoting producer organisations.

Additional information

Many farmers are not rewarded fairly for the food they produce and are subjected to unfair buying practices by supermarkets and processors. Supply chains can and should operate in such a way that farmers, processors, manufacturers, retailers are able to get a fair deal whatever their size and wherever they are situated around the world. Treated fairly, farmers are more likely to be able to turn more of their attentions to improving the environmental impact of their business.

The introduction of the Groceries Supply Code of Practice enforced by the Groceries Code Adjudicator has had some positive impact, but its power is limited as it only applies to the largest retailers.

The Government should use this opportunity to extend legal protections and introduce through the Agriculture Bill, a statutory code of conduct to ensure fair buying practices across the whole supply chain. This code of conduct must be properly enforced by an independent regulatory body and ensure fair treatment for suppliers regardless of where they are and which sector they work in.

There is much support amongst farmers, farming organisations and NGOs for enforced regulation of unfair trading practices, yet there is still a culture of fear around actually reporting such practices. If the Government does not think that the available evidence justifies further intervention, we would encourage it to fund an in-depth survey of suppliers similar to that commissioned by the Competition Commission during the Groceries Market Investigation of 2006-2008. During that time, evidence was gathered of abuses in supermarket supply chains, partly through placing legal orders on suppliers and others to get more precise evidence which was, critically, then kept confidential.

The consultation document refers to codes, but Friends of the Earth supports the introduction of one single code to cover all sectors to ensure fairness and consistency, as well as being simpler for businesses and for government. A new code of conduct should also complement the Groceries Supply Code of Practice, and any enforcer should have a collaborative working relationship with the Groceries Code Adjudicator.

¹³ Graystock, P., Yates, K., Evison, S. E. F., Darvill, B., Goulson, D. and Hughes, W. O. H. (2013) [The Trojan hives: pollinator pathogens, imported and distributed in bumblebee colonies](#). J Appl Ecol, 50: 1207–1215. doi:10.1111/1365-2664.12134, S. E. F., Darvill, B., Goulson, D. and Hughes, W. O. H. (2013) [The Trojan hives: pollinator pathogens, imported and distributed in bumblebee colonies](#). J Appl Ecol, 50: 1207–1215. doi:10.1111/1365-2664.12134, S. E. F., Darvill, B., Goulson, D. and Hughes, W. O. H. (2013) [The Trojan hives: pollinator pathogens, imported and distributed in bumblebee colonies](#). J Appl Ecol, 50: 1207–1215. doi:10.1111/1365-2664.12134

¹⁴ Goulson, D., Hughes, W.O.H. (2015) [Mitigating the anthropogenic spread of bee parasites to protect wild pollinators](#). Biol. Conserv. 191, 10–19. [Mitigating the anthropogenic spread of bee parasites to protect wild pollinators](#). Biol. Conserv. 191, 10–19.. Biol. Conserv. 191, 10–19.

13. Devolution: maintaining cohesion and flexibility

Friends of the Earth supports the approach to a common framework for environmental protection post Brexit which has been set out by Wildlife and Countryside Link:

- A degree of commonality is required between the UK Government and devolved administrations to meet the UK's international obligations, and to manage common resources sustainably
- A common framework must be developed and agreed jointly by the UK Government and devolved administrations via a shared and transparent process. We recommend that the three components of a common framework between the UK and devolved governments are a shared regulatory baseline, common objectives (including environmental), and accountability mechanisms.

Q: 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?

We regard the environment as 'essential' in the context of commonality of agriculture policies across the four countries of the UK, on the basis of two key factors relating to the JMC(EN) principles –

- Agriculture, and therefore future farming and land management policies, will be central to the ability of the UK to meet international obligations associated with biodiversity, climate change and sustainable development
- Similarly, many environmental factors do not respect national boundaries. Ensuring sustainable management of common resources, particularly biodiversity and water quality, will be essential in securing a common level of environmental ambition, and reducing the scope for one part of the UK to gain a short-term competitive advantage based on policies that encourage unsustainable use of natural resources, to the detriment of environmental outcomes and long-term productivity.

There are some issues where the four countries have differing views. For instance, Scotland, Wales and Northern Ireland are more cautious than England on GM crops and have enacted national bans on a type of GM maize under EU law. Any common framework must ensure that the rights of the devolved nations to restrict GM crops is maintained including the introduction of strong coexistence and liability regulations to protect non-GM crops, farms and nations.

14 International trade

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

Friends of the Earth does not agree with the priorities set out. The over-emphasis on driving down prices for consumers and boosting production for export markets does not fit with the rest of the consultation document and the aims of building a farming system with the environment at its heart.

New markets could be created in the UK by addressing areas currently served by imports. Home grown livestock feed is one such area. Currently the majority of livestock feed is based on imported soy, which contributes to large scale global deforestation. Switching to home-grown proteins, such as field beans, lupins, etc, would have huge benefits by not only by creating new markets for these crops and improving farming financial security by reducing dependence on oilseed rape, but also the

increasing options for alternative break crops would promote broader crop rotations, which are a key component to managing pests and diseases and promoting better soil health.

More emphasis should be given to reducing overall demand, by promoting sustainable, healthy diets in accordance with the Eatwell Guide, as well as putting in place ambitious targets for reducing food waste. The Government should introduce legally binding targets to halve UK food waste from farm to fork by 2030, against 2015 baselines.

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

Friends of the Earth does not agree with the strong emphasis in the document on producing and exporting ever more food. The UK should seek to define its produce, whether for export or for home consumption, as high quality, high animal welfare – and not attempt to compete on the basis of large volumes of lower quality produce (eg intensively farmed livestock). The same high quality food should be available to the UK public at an affordable price (which will require interventions in the market that also ensure producers are rewarded fairly), and Government buying standards should be strengthened to encourage and provide a market for healthy, sustainable food in public sector food procurement. This should also support the necessary shift to healthy and sustainable eating (as recommended by the Government’s revised 2016 Eatwell Guide).eg intensively farmed livestock). The same high quality food should be available to the UK public at an affordable price (which will require interventions in the market that also ensure producers are rewarded fairly), and Government buying standards should be strengthened to encourage and provide a market for healthy, sustainable food in public sector food procurement. This should also support the necessary shift to healthy and sustainable eating (as recommended by the Government’s revised 2016 Eatwell Guide).eg intensively farmed livestock). The same high quality food should be available to the UK public at an affordable price (which will require interventions in the market that also ensure producers are rewarded fairly), and Government buying standards should be strengthened to encourage and provide a market for healthy, sustainable food in public sector food procurement. This should also support the necessary shift to healthy and sustainable eating (as recommended by the Government’s revised 2016 Eatwell Guide).

Friends of the Earth wants to see practices that ensure nature can thrive and soils are rebuilt, but this should not mean a continuation of the trend of increasing food imports, especially of fruit and vegetable production. The UK should not be exporting to other countries the production impacts of the food we eat. Given uncertainties over future trading arrangements with the EU let alone other countries, it makes sense to focus on a policy of producing high quality, healthy food for UK consumption, in a way that enables nature and natural resources to thrive and that rewards producers fairly.

A clear vision of UK land use priorities would be helpful to guide decision-making in this area, such as:

- What proportion of land should we use to produce food for home consumption?
- What should be the balance of horticulture, livestock production and feed crops?
- What proportion of our food should we import?
- Should land be used for bioenergy production or given over to rewilding?

Q: 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?

This is best achieved by committing to upholding and improving standards of environmental protection, public health/food safety and animal welfare.

Critical to this will be ensuring that any new trade agreements support, and do not undermine, a prosperous, healthy and sustainable future for UK food and farming. Any new trade agreements must be based upon the principle that our current standards of environmental protection, animal welfare and food safety must be maintained, and in a UK-EU deal, include a non-regression clause (as supported recently by Michel Barnier

<https://www.theguardian.com/environment/2018/apr/10/eu-will-seek-non-regression-clause-to-tie-uk-to-environmental-standards>)

New trade agreements must also:

- Be subject to a sustainability assessment which includes consideration of the environmental impacts in the UK as well as the global natural environment
- Require imports to meet animal welfare and environmental standards equivalent to domestic standards so as not to undermine UK production with lower-quality imports
- Be transparent – and negotiated through parliamentary scrutiny and proper democratic oversight.

The Government should amend the existing trade bill so that it legislates for the negotiation of future trade deals including parliamentary oversight, transparency and public consultation, as well as the grandfathering of existing deals.

Maintaining high standards must also include retaining GM food and feed labelling regulations. The UK public have consistently shown their strong support for the right to choose and for robust and clear labelling of GM food ingredients.

A real commitment to improved fairness in the supply chain would also help producers to maintain and improve environmental and animal welfare standards - the Agriculture Bill should introduce a properly enforced statutory code of conduct to ensure fair buying practices across the whole supply chain (see Fairness in the supply chain section).

Q Any further comments?

None.

15. Legislation: The Agriculture Bill

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

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

The Bill should set out a clear purpose to deliver on environmental, animal welfare and public health outcomes. It should make clear how it will ensure coherence with other policies on relevant environmental, social and health issues. As stated above neither the Agriculture Bill nor the new farming policy can deliver the necessary level of environmental protection and restoration needed in isolation. It is also essential that there is commitment to:

- Upholding and strengthening existing environmental protections as we exit the EU

- A new strong, well resourced, independent watchdog, co-designed with devolved nations, and able to hold Government to account for failure to meet targets set for reducing agriculture's impact on the environment
- Full transposition of all EU environmental principles that are legally binding.

There are therefore regulations, principles and standards that need to be part of the legal underpinning of the Agriculture Bill including some that are particularly relevant to farming such as:

- The Polluter Pays principle, the Precautionary Principle and animal sentience
- Maintenance and improvement of existing environmental regulations (including all environmental protections stemming from the EU) including those for the regulation of pesticides, water protection, animal welfare, and protection for nature sites and species.

We agree that the Bill should include legislative powers to create new schemes to preserve, protect and enhance the environment, support rural communities, improve animal welfare and public access. The list provided in the Health and Harmony paper is currently missing reference to public health (see section 5). As set out earlier in this response (section 5) Friends of Earth disagrees that productivity per se is a public good and therefore we think that section (iii) needs to be rewritten to focus on promoting resilient and sustainable farming or to set out a definition of 'productivity' which includes the need to lower damaging inputs and protect and restore natural resources such as soil health and biodiversity which are essential to future food production. We have already set out concerns about how stripping bureaucracy must not lead to lower standards (see section 9).

The Bill should also include the following measures:

- A requirement on Ministers to develop and adopt targets and milestones, especially where the targets will deliver on 25 Year Environment Plan ambitions and deliver multiple public goods outcomes. This should include a commitment to set an ambitious target for pesticide reduction and to increase the percentage of farmland under organic production
- A review of funding to be carried out every five years
- Set out how the Bill will enable citizens to hold Government to account on delivery of public goods.

Any common framework for future policies across the UK – developed collaboratively between the UK Government and devolved administrations – should include a shared, high level of environmental ambition, (see section 13). With the full involvement and consent of the devolved administrations in the drafting of relevant clauses, this framework should be legislated for through the Agriculture Bill.

ⁱ Salemdeeb, Ramy, Erasmus K.H.J. zu Ermgassen, Mi Hyung Kim, Andrew Balmford, and and Abir Al-Tabbaa. 2017. 'Environmental and Health Impacts of Using Food Waste as Animal Feed: A Comparative Analysis of Food Waste Management Options.' *Journal of Cleaner Production* 140 (March): 871–880. Ermgassen, Mi Hyung Kim, Andrew Balmford, and and Abir Al-Tabbaa. 2017. 'Environmental and Health Impacts of Using Food Waste as Animal Feed: A Comparative Analysis of Food Waste Management Options.' *Journal of Cleaner Production* 140 (March): 871–880., Mi Hyung Kim, Andrew Balmford, and and Abir Al-Tabbaa. 2017. 'Environmental and Health Impacts of Using Food Waste as Animal Feed: A Comparative Analysis of Food Waste Management Options.' *Journal of Cleaner Production* 140 (March): 871–880. Ermgassen, Mi Hyung Kim, Andrew Balmford, and and Abir Al-Tabbaa. 2017. 'Environmental and Health Impacts of Using Food Waste as Animal Feed: A Comparative Analysis of Food Waste Management Options.' *Journal of Cleaner Production* 140 (March): 871–880.