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The implications of four Brexit scenarios for the sustainability of UK food and farming

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by James Elliott and William Andrews Tipper

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Summary

For the government to deliver its promise of a 'green Brexit', UK agriculture will have to change, from a sector which depletes natural assets to one that protects and restores them.

There is already ambition to do this and policies are emerging to make it possible. Most notably, the Department of Environment, Food and Rural Affairs (Defra) has said it will focus future farm payments on environmental public goods.

But, there are two big unanswered questions. First, how will a new system improve the environmental performance of UK food production? In a previous report, we highlighted the danger it could lead to high quality environmental 'oases' surrounded by tracts of degraded farmland. [1]

The second, which we focus on here, is how future UK agriculture and trade policy will interact. We import half of the food we eat.[2] Most food imports currently come from other EU countries, where it is largely produced to the same environmental and welfare standards as the UK.

After Brexit, depending on which new trading relationships the UK pursues, we may end up importing much more of our food from countries outside the EU with demonstrably lower production standards, or which are exposed to significant environmental risk factors like water stress.

The impact of future trade relationships on UK food and farming

While the government has given assurances that future free trade agreements (FTAs) will not compromise the sustainability of UK food and farming, it has not said how it will ensure this.

Our study shows, that in some scenarios, there would be limits to the government's ability to protect environmental standards. And that, even where powers do exist, it would be likely not to exercise them in circumstances where concluding a trade deal depended on compromise.

We have analysed the potential implications of four trade scenarios the UK might pursue if it leaves both the single market and customs union, two of which would mean the UK defaulted to trading on World Trade Organisation (WTO) terms with the EU.

Four scenarios:

Only Europe: an EU-UK FTA with no new deals outside Europe
Europe and beyond: as above, but with new FTAs with the US and other countries
WTO rules, no EU deal: WTO rules with no EU-UK FTA
WTO rules, no UK tariffs: WTO rules and the UK unilaterally cuts food tariffs

Risks to the sustainability of the UK's food system

The government's consultation on the future of food, farming and the environment in the UK, *Health and harmony*, proposes using trade policy to lower UK food prices.[3] This could be achieved by cutting import tariffs on food or reducing standards and checks on imports to give cheaper produce easier access, or by doing both. Two of our scenarios, 'Europe and beyond' and 'WTO rules, no UK tariffs', reflect these strategies.

Our analysis of the impacts shows a variable level of risk depending on the scenario, as shown in the table below. But it is clear that where the UK market is opened up to food imports produced to lower environmental standards there would be major risks for the sustainability of the UK's food system.

Summary of risks associated with different trade scenarios

1. Lower resilience

Greater reliance on food produced in countries particularly vulnerable to climate change impacts, water scarcity and soil degradation will increase the risk of disruptions to UK food supplies.

2. Lower standards

Understandably, our future trading partners will be reluctant to agree to bespoke food standards for the UK, as we are a small country of only 66 million people. In the case of US production, even if there is no public consent in the UK for meat produced using chlorine washing or growth hormones, as long as these practices are legal in the US, British consumers will have to accept them.

3. Less control

There is evidence that food from countries outside the EU is less compliant with its legal standards designed to protect consumers and the environment, so a food system based on more imports from other countries is likely to be riskier overall.[4]

4. Loss of information

Food labelling and information about a food's origin and content could be restricted due to non-discrimination rules agreed to in trade deals.

5. More environmental damage in the UK

If UK farmers have to compete against lower cost overseas producers, there will be strong pressure to lower domestic standards to cut costs in the short term. Many farmers will want to maintain high environmental standards and compete on quality, but this is a limited market and requires upfront investment, so most farmers are likely to be forced to follow a cost cutting strategy leading to further degradation of the farmed environment.[5]

6. Offshoring impacts

Unless UK trade policy is built around high production standards, domestic food purchases could support unsustainable or undesirable farming practices overseas, such as deforestation or excessive antibiotic use in livestock production.[6]

A good future for UK food and farming

Our analysis demonstrates the huge tension in the government's preferred option of high domestic standards coupled with cheap imports. A trade strategy that is blind to environmental harm could undermine or even negate the sustainable farming policy that Defra has begun to implement.

Since agriculture does not make a significant contribution to the UK's GDP, there is a high risk it will be used as a bargaining chip by the government to secure preferential access to foreign markets for the more lucrative finance and professional services sectors. [7] This raises the likelihood that the government will accept lower standards of production for food imported from abroad.

These consequences are not inevitable. A well designed trade strategy, aligned and integrated with domestic agriculture and growth policies, and supported by appropriate food regulations and standards, would benefit UK farmers, consumers and the environment.

Our recommendations:

Support high quality UK food and farming through markets, funding and regulation

- Introduce new environmental quality metrics and reporting standards to make it easier for businesses and consumers to judge the environmental sustainability of all the food they buy, whether produced at home or abroad.
- Use the new farm payments system to encourage the shift to sustainable food production, not just greening field margins and non-agricultural land.
- Maintain existing food regulations and continue to strengthen them over time, based on scientific advice and consumer expectations.
- Give the Food Standards Agency (FSA) more resources and a wider remit to oversee environmental risks to the integrity of UK food.

Develop trade policy which supports high quality food and environmental standards

- Guarantee UK food and environmental standards will not be weakened in trade agreements, and that all imports meet the same environmental standards as UK produced food.
- Use the Trade Bill to require comprehensive, independent and expert-led Sustainability Impact Assessments prior to the conclusion of trade deals; and to mandate robust, meaningful and enforceable environmental sustainability chapters and clauses in all trade deals.

The impact of UK food production on the natural environment

"Harm to the natural environment will ultimately undermine the ability of UK farmers to provide plentiful nutritious food at affordable prices in future."

UK food and farming has an international reputation for quality and, from a global perspective, performs well environmentally.[8] Overall, it is sixth in the world in Yale University's Environmental Performance Index (EPI). It scores better than average on the agricultural performance component of the EPI (Sustainable Nitrogen Management) ranking 18th in the world overall.[9] It also scores better than average in UN assessments of the natural capital costs of producing beef, dairy, poultry and wheat.[10]

In the Brexit debates around food and farming, it has been suggested that high environmental standards are limiting the UK's farming sector. Some say abolishing environmental standards would remove unnecessary costs and free up farmers to compete more equally with international producers.

However, despite the impression given by the global rankings, all the evidence shows that the way the UK produces its food is causing severe and sustained harm to wildlife and the degradation of natural systems. As well as threatening our enjoyment of a healthy natural environment, these impacts also compromise the long term sustainability of our food system. Harm to the natural environment will ultimately undermine the ability of UK farmers to provide plentiful nutritious food at affordable prices in future. Of particular concern are declines in soil health, biodiversity, and water quality and availability.

Soils

Healthy soils are vital to maintaining the ability to produce nutritious food affordably. Poor soil management costs English farmers nearly £250 million per year through erosion, compaction and loss of organic matter, although these costs may not be visible to, or understood by, individual farmers.[11] An estimated one million hectares of soils in England and Wales are at risk of erosion from wind or water.[12] Problems are particularly acute for the productive arable land of eastern England, where 84 per cent of the peat stock in the Fens has been lost since 1850. Average net margins for arable agriculture are expected to fall from an estimated £480 per hectare to just £30 per hectare if highly productive peats waste away, which on current trends could happen over the next 25 to 50 years.[13]

Biodiversity

Diverse and abundant wildlife provides ecological services that have economic value for agriculture, such as pollination, natural pest management and maintaining soil health. Field studies show that setting aside land for nature on farms can increase crop yields.[14] Nineteen per cent of crops grown in the UK, by value, rely on natural pollinators.[15] Yet, wildlife, especially that associated with farmed environments, is in decline. Fifty nine per cent of invertebrate species have declined since 1970 and there is decline in wild bee diversity, and butterfly and moth populations, all of which are important pollinators. [16,17]

Water

Many farms rely on abstracting water from rivers or aquifers, principally for irrigation.[18] A quarter of the water abstracted for irrigation in England is located in just four catchments, all of which are water stressed.[19] Water quality is also a major concern. In 2016, 86 per cent of rivers were considered not to have good ecological status.[20] Agriculture is the single biggest contributor to water quality problems, like high pesticide, nitrate and phosphate levels.[21] A recent study found that half of the rivers tested in England were contaminated with neonicotinoids at chronic or acute levels.[22]

Environmental risk management within UK food and agriculture is not adequate to the scale of the environmental challenges faced by the sector. A recent report for the Global Food Security programme characterised industry attitudes as being based on "linear thinking", ie the belief that "it is as easy to move backwards and restore [eco]system functioning as it is to move forwards and reduce system functioning."[23] Yet environmental changes are often difficult or impossible to reverse. For example, in the event of an extreme drought, the likelihood of catastrophic failure leading to an East Anglian 'dustbowl' is highly plausible.[24]

Business approaches

Two particular approaches are widely used within the food and drink sector to manage the environmental footprint of food: labelling and certification schemes, like the Red Tractor marque, and industry collaborations, such as the Nestlé Milk Plan.

Assurance schemes and certification

Business to business assurance schemes, eg Global GAP (Good Agricultural Practice).
Consumer food labels, such as Red Tractor or LEAF (Linking Environment and Farming).

Industry collaborations

Whole-supply chain collaborations eg Courtauld 2025, a ten year commitment to cut the waste and greenhouse gas emissions associated with food and drink by at least one fifth per person in ten years and improve water stewardship.

Supplier-purchaser collaborations These can include supermarket 'growers groups' of farmers focused on specific produce or commodities, such as the Tesco, Sainsbury's and Co-op dairy groups; or food manufacturers working directly with farmers, eg Nestlé's Milk Plan, through which dairy farmers receive a sustainability payment.

Our discussions with experts have revealed several challenges with these approaches:

- Market fragmentation. There is a proliferation of labelling and certification schemes, and competing retailers running separate growers' groups. Opportunities for collaboration and integration are not being taken, or are not understood, perhaps due to the lack of a tangible

commercial driver to do so. Many third party assurance schemes do not require data collection on important environmental indicators, meaning that suppliers and retailers have to develop their own tools for monitoring progress in areas such as greenhouse gas emissions and water usage.

- Weak environmental criteria. Many labelling and certification schemes are criticised for being too weak in their environmental requirements, often focusing more on good management for hygiene and workers' welfare. Further, in most cases there is not a sufficient price difference between certified and non-certified products to drive change.

"Achieving significant reductions in environmental harm will require new interventions from government."

- Ineffective enforcement. For example, pollution incidents are still reported on some farm businesses which are part of assurance schemes. Allegations of poor food safety practice at the 2 Sisters West Bromwich chicken processing plant, even though it was certified by Red Tractor, also demonstrate this problem.[25]

- Difficulty building relationships. It can be difficult for food businesses, especially retailers, to build effective relationships in sectors, such as beef, where they do not usually have a contract directly with the farmer or producer. It is also a challenge for sectors where there are many small, individual suppliers, particularly where produce is sourced from abroad. For example, Nestlé works directly with around 760,000 farmers and growers globally. It can also be difficult to build collaboration between competing food sector businesses as there is not always agreement on where the pre-competitive space lies, hampering collaboration.

While there is much good practice to build from, there seems little prospect of these approaches being able to deliver environmental improvements at a sufficient scale, quickly enough to manage the existing environmental risks. Achieving significant reductions in environmental harm will require new interventions from government.

The government's response

The UK government is showing ambition and leadership beyond anything seen in recent years to address the sustainability challenges of food and farming, with the following recent initiatives:

25 year environment plan This commits to ensuring that UK food "is produced sustainably and profitably", that all soils are managed sustainably by 2030 and to achieving clean and plentiful water by improving three quarters of water bodies to be close to their natural state.

Clean Growth Strategy This puts carbon sequestration on land and enhancing natural capital at the heart of a strategy for growth. Specific commitments include massively increasing tree cover in England, to 12 per cent by 2060, and innovation investment focused on areas including low carbon fertilisers, soil health and low emission farming.

Industrial Strategy This includes a new 'Transforming food production: from farm to fork' programme, including £90 million as part of the Industrial Strategy Challenge fund to bring together artificial intelligence,

robotics and earth observation to improve supply chain resilience in the agri-food sector. It has created a new Food and Drink Sector Council to capture leadership opportunities in sustainable food and agriculture.

Agriculture command paper This sets out proposals for a new environmental land management system to replace the Common Agricultural Policy, which would replace subsidy for land ownership with targeted payments for farming that provides "environmental public goods", such as improved soil health, improved water quality and increased biodiversity.

"The effectiveness of domestic policy to protect and improve the environment will be hugely influenced by the terms of the UK's exit from the European Union."

Given this level of ambition and commitment, the prospects for reversing the environmental decline of UK farmland should be brighter than at any point in recent history.

Yet, as we will show, the effectiveness of domestic policy to protect and improve the environment will be hugely influenced by the terms of the UK's exit from the European Union. In particular, future trade policy, and the terms of any free trade agreements signed by the UK, could run counter to the intentions of these policies.

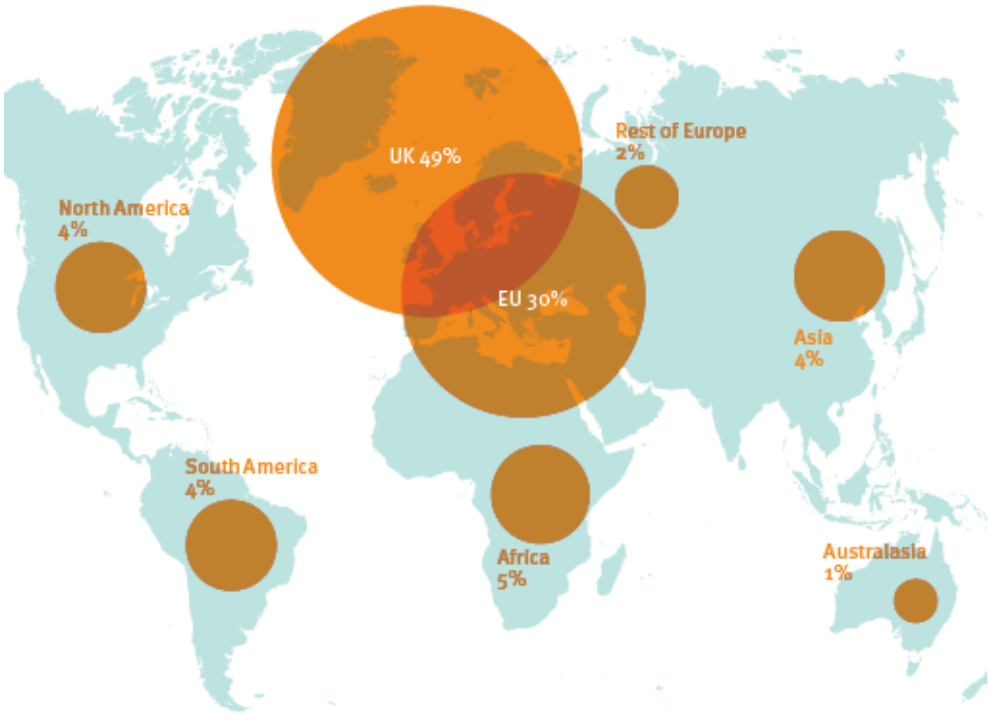
How trade policy could reshape UK food and farming

The UK's exit from the European Union could reshape the UK's farming sector and natural environment in profound and lasting ways.

The change that has received the most attention is farm subsidy reform. The current system (the Common Agricultural Policy) which distributes most money to farmers on the basis of the area of land they farm, will be abolished. It will be replaced with a new scheme in which farmers are rewarded based on the level of environmental public goods that they provide.

However, the debate over what form the payments should take in future has deflected attention away from another area of change, which may prove to be even more significant, namely, changing terms of trade with the rest of the world. As shown below, half of all the food consumed in the UK is imported. [26] While we import food from 168 countries around the world, 90 per cent of this comes from just 24 countries.[27] New trading relationships with the EU and the rest of the world after Brexit could dramatically change where the UK's food comes from, as shown on page 23.

Where our food comes from now[28]



The Environment Secretary Michael Gove has spoken of his determination for UK food to be synonymous with quality, and for the UK to set the global standard for environmental protection and animal welfare. As a member of the EU the UK currently enjoys some of the highest food safety, consumer

and environmental standards in the world (Annex 1). He has promised that these standards will not be sacrificed or compromised in the name of securing trade agreements with new global partners.

However, the reality is that the rules and conventions of trade agreements will determine what the government can and cannot do, and the efficacy of its domestic policy. There is a tension between domestic environmental standards and liberalising trade in food and agriculture. This will be settled as choices are made about our future trading relationships with the EU and the rest of the world.

"There is a tension between domestic environmental standards and liberalising trade in food and agriculture."

Our future trade relationships can and should be based on deliberate choices which lead to a more resilient, sustainable food system for the UK.

Leaving the EU and the new trading relationships the UK seeks also have significant implications for the devolved nations. While we do not directly address the challenges posed by Brexit to the devolved administrations in this report, it seems clear that many of the issues highlighted will need to be resolved jointly. Most of the policy areas relevant to food and farming are devolved and are currently underpinned by EU law. Processes include various aspects of agricultural policy, the regulation and use of fertilisers and pesticides, food safety and standards, and food labelling.

Furthermore, negotiating new trade deals will impact on the devolved nations. The agri-food and drink sectors are more significant to the economies of Scotland, Wales and Northern Ireland than to England, and, as demonstrated in this report, changes to trading relationships will significantly impact the development of these sectors in future. In addition, negotiations may involve changes to standards and regulations which fall under devolved competence, or restrict the ability to vary policy that is devolved.[29] These issues must be resolved between the governments of the UK and devolved nations.

Finally, the issue of the border between Northern Ireland and the Republic of Ireland is also particularly significant for food and agriculture. Again, we do not address this directly, but it relates closely to our assessment of the resilience of UK food supply in future and the need to maintain a close trading relationship with the EU. The agri-food sector is particularly integrated on the island of Ireland, with food, drink and tobacco accounting for 43 per cent of all goods traded between Northern Ireland and the Republic of Ireland.[30] Agricultural products cross the border for processing and food may cross several times before being consumed. For example, a quarter of the milk produced in Northern Ireland crosses to the Republic of Ireland for processing.[31]

Four potential future trade scenarios for the UK

We have analysed four potential scenarios for the UK's future trade relationships. They are not predictions, or our view of the likely outcomes of Brexit, but are intended to illustrate a range of possible options and their impacts, to highlight where government or business intervention may be necessary to maintain a sustainable UK food system in future.

A fifth scenario could be that the UK remains in the EU's single market or customs union, although currently this has been ruled out by the government. However, as most food and agricultural products are excluded from EU agreements with non-EU countries, we would expect that trade in food, in this case, would have similar effects to those we outline in our first scenario, although the impact of customs checks may be lessened. Depending on the level of access sought for food trade, the UK may continue to follow aspects of EU food law, as Norway and Switzerland do for example, and membership of the European Economic Area would also mean the UK continuing to take part in the European Food Safety Authority.

We have explored the impacts of two scenarios in which the UK successfully negotiates a deal with the EU, and two scenarios in which there is no deal with the EU after Brexit. Our scenarios are broadly in line with other scenario studies focused on Brexit and agriculture.[32]

Only Europe

- The UK leaves the single market and customs union but quickly signs a free trade agreement with the EU which comes into force after a short transitional period.
- Customs checks are introduced on EU trade.
- Trading relationships with the rest of the world remain largely the same, including successful renegotiation of existing EU trade agreements with third countries.

Europe and beyond

- As with the previous scenario, the UK leaves the single market and customs union and quickly signs a free trade agreement with the EU
- In this scenario, the UK is also successful in negotiating new free trade agreements with other significant trading partners, most notably the US.
- Customs checks are introduced on EU trade. These are more stringent than in the previous scenario because UK and EU standards diverge.

WTO rules, no EU deal

- The UK leaves the single market and customs union, fails to negotiate a free trade agreement with the EU, and both the UK and EU apply reciprocal most favoured nation (MFN) tariffs. This is the baseline WTO rules trading relationship.
- Stringent customs checks are required to ensure compliance with regulations and standards.

The UK renegotiates existing free trade agreements with third countries on less favourable terms.

WTO rules, no UK tariffs

- The UK leaves the single market and customs union and fails to negotiate a free trade agreement with the EU.
- To keep food prices low the UK establishes MFN tariffs for food at 50-100 per cent lower than current EU levels for all trade.
- A significant increase in capacity for border checks is required to ensure compliance of imports with regulations and standards

Baseline: business as usual

We also consider business as usual as a baseline against which to assess the scale of the changes implied in the scenarios.

How we assessed the scenarios

We have assessed how the outcomes of each scenario will compare to the status quo in five key elements of a resilient and sustainable food system:[33]

Affordability We assess how different trading relationships might impact on the market price of agricultural goods and the prices consumers pay as proxy indicators for affordability of food. The affordability of food is also determined by a number of other factors, including how much disposable income people have, foreign exchange rates, inflation and world commodity prices.

Standards, choice and control We assess impacts on the rules and regulations designed to protect consumers and particularly those which may be significant for the environment (Annex 1). This includes food safety standards, the maximum amount of certain chemicals such as pesticides or veterinary products allowed in food ('maximum residue levels' or MRLs), traceability of food, and restrictions on certain production practices.

Stability and resilience of food supply The security of the UK's food supply is generally considered to be enhanced by importing food from a range of different countries. However, being closely integrated in a globalised food system also exposes the UK to systemic risks such as the world food price spikes of 2007-08 and 2010-11.[34] We consider possible disruptions to existing supply chains in each scenario, as well as possible future risks associated with importing food from countries with high environmental impacts or high exposure to fluctuations in global food supply, especially as climate change poses new risks to production and to long distance logistics.

Environmental sustainability of domestic production The UK's natural environment is experiencing declines which threaten the future productivity of farming. Reversing these declines will require changes to the way we farm the land. We explore how the different scenarios might affect the ability of farmers to make these changes and the efficacy of government policy designed to encourage them.

Environmental sustainability of imports Farming is more environmentally friendly in some countries than others. Reducing food production in the UK

to protect the domestic environment would not necessarily be environmentally beneficial if this resulted in higher environmental impacts abroad. We assess how changes in where food imports come from in different scenarios could change the overall environmental impacts of the food the UK consumes.

There are many other important aspects of the sustainability of food systems which we do not consider in detail - including human health and nutrition, workers' welfare, and animal welfare - although they often relate closely.

We have chosen to focus on the environmental impacts of agriculture, and the environmental risks to productivity and resilience of supply, as addressing these problems is a significant objective for the government as outlined above. We include an assessment of different scenarios' impacts on food standards, choice and control because this has direct and indirect effects on environmental sustainability. Also, consumer choice has been suggested by government as a way to improve the sustainability of food production. Finally, affordability is a factor because a system in which people struggle to afford food can hardly be considered sustainable. Achieving cheaper food options for consumers is an explicit aim of the government as laid out in its consultation on the future of food and farming in the UK.

Assessment of these five elements under different scenarios highlights the key drivers, tensions and trade-offs which new UK policy on food and trade must address to create a resilient and sustainable food system. The headline impacts of each scenario on the five elements are explored in detail below. From this analysis we identified six risks for UK food, farming and the environment which are outlined in section 4 below, and summarised in the table on page 28.

The scenarios

1. Only Europe

What is driving change?

"Domestic policy would be the most significant driver of sustainability of the food system in this scenario."

This scenario is the least disruptive to the UK's food system, as the trade relationships would not change enough to drive significant divergence from the status quo. There would be a small increase in the cost of trading with the EU because of new border checks disrupting some food supply chains, and this would increase the prices of some products. While some sectors and products may be heavily impacted, especially on the island of Ireland, overall the changes would not be enough for a significant shift in UK food trade overall. The limited impact of the new trade relationships in this scenario means that domestic policy would be a more significant driver of the sustainability of the food system in this scenario than in the following three we describe.

Summary of impacts

Affordability	Little or no change	=
Standards, choice and control	Little or no change	=
Stability and resilience of food supply	Slight decrease	
Environmental sustainability of domestic production	Remains the same or increases	
Environmental sustainability of imports	Little or no change	=

Affordability

There may be a slight increase in the market price of food and agricultural products for which the UK is a net importer from the EU such as beef and cheese.[35] It is possible that some of this increase in commodity prices may be absorbed by the food industry so that the impact on consumer prices would not be significant in general, although some products may be particularly affected. Overall, other factors, such as exchange rate fluctuations and global food prices, would be much more significant.

Food standards, choice and control

Food standards are unlikely to be significantly affected in this scenario. There would not be much change in where the UK's food comes from. Current food labelling rules such as country of origin labelling should also be maintained.

To keep trading with the EU, the UK would maintain food standards similar to those we currently enjoy or stronger. Technically, the UK could weaken its standards for products for domestic consumption and export outside the EU, but this would make exporting to the EU, our main export market, more difficult. The EU has clearly signalled its intent to ensure a level playing field in an agreement with the UK, preventing competitive advantage by reducing social and environmental standards.[36] In so far as EU standards are generally

high (Annex 1), the standard of UK food would remain similar, and could even go further than EU rules. On the other hand, the UK would lose its voice in setting EU standards.

Stability of food supply

The introduction of border checks and the increasing costs of trade with the EU could have significant implications for some food products which cross the border multiple times. For example, Bailey's Irish Cream has been widely cited as a product whose ingredients can cross the Irish border many times during its production. Many meat products are also exported to the EU for processing and then re-imported to the UK.[37] These supply chains would have to adapt in the absence of a special agreement on customs. The possibility of long border delays has also been widely reported. This disruption could reduce the stability of UK food supplies, especially in the short term as supply chains adapt to the new conditions and develop alternatives such as new processing facilities.

Environmental sustainability of domestic production

Since the economic impacts of this scenario would be smaller relative to the other scenarios, domestic policy changes would be likely to have the biggest effect on the environmental impacts of UK agriculture. Changes to farm payments and other financial incentives could encourage efficient, profitable farm businesses which protect wildlife and restore the natural assets on which they rely. Given the current strong level of ambition from the government on the environment, this should lead at least to maintaining current standards, and possibly to improvements in the environmental outcomes from farming.

Environmental sustainability of imports

The environmental sustainability of imports would not change significantly as the UK food system would remain strongly integrated with the EU, with little change in where food comes from.

2. Europe and beyond

What is driving change in this scenario?

The key driver of divergence from the status quo in this scenario would be the introduction of new free trade agreements with non-EU countries. The UK is said to be prioritising eleven non-EU trade agreements after Brexit: with the US, Australia, China, the Gulf Cooperation Council (GCC), Israel, India, Mexico, New Zealand, Norway, Turkey and South Korea. Of these, the US, Australia, China, India, Mexico and New Zealand are all in the top 20 major global food exporters.[38] It is, therefore, likely that trade in food and agricultural goods will form part of any trade deals with these countries, and that our food imports from them will increase.

"This scenario could see significant reductions in the standards of UK food, especially in relation to how food is produced and where it comes from."

Summary of impacts

Affordability	Increase possible in medium to long term	
Standards, choice and control	Decrease	
Stability and resilience of food supply	Slight decrease	
Environmental sustainability of domestic production	Decrease	
Environmental sustainability of imports	Depends on specific deals	

Affordability

While there may be a slight increase in the market price of food and agriculture products in the short term, due to increased trading costs with the EU, in the longer term trade deals with major agricultural exporters may lead to reductions in food prices, since some countries can produce food more cheaply than the UK. This will depend on the details of any deals struck and may vary between commodities.

The Resolution Foundation has estimated that, in a scenario where the UK reduces all tariffs, consumer food price reductions would range from 0.2 per cent for dairy to 3.2 per cent for meat.[39] However, with the reductions in non-tariff barriers likely in free trade agreements these price decreases could be greater, especially if food standards and regulations are reduced.

However, so called 'cheap food' can have hidden cost. Lower cost producers are often externalising the true cost of their production onto wider society. For example, the cost of producing beef in the UK for a typical farm has been estimated to vary between £3.50 per kg and £5.30 per kg, compared to between about £1.60 per kg and £2.20 per kg in Brazil and Argentina.[40] Yet the hidden environmental costs are estimated to be £50 per kg and £22 per kg respectively, compared to £18 per kg for the UK.[41] Thus, the apparent cost saving of the 'cheaper' beef is outweighed by the costs to society of the negative environmental impacts. This is explored further below.

Food standards, choice and control

This scenario could see significant reductions in the standards of UK food, especially in relation to how food is produced and where it comes from. Non-tariff, or technical, barriers to trade, such as food standards, information

and labelling requirements, are very significant for food and agriculture products, so reducing or removing them is likely to form part of any trade deal. Often this involves mutual recognition of each country's standards, for example allowing residues of chemicals which are safe but not used in the importing country. But it can also involve one country weakening its standards to enable trade in a certain product.

Facilitating trade may also involve changes to the information which consumers are given about the food they are eating. If regulations are relaxed in a trade deal then consumers would have access to less information about where their food comes from and how it was produced.

Areas of possible compromise in a UK-US trade deal[42]

The US has made it clear that securing a deal with the UK would depend on us opening up our markets to its food producers.[43] The US has strongly criticised EU rules in the following areas, so it is likely the UK would make changes to them to secure a trade deal with the US:

Maximum residue levels (MRLs) for certain pesticides Atrazine is a herbicide commonly used in the US but banned in the EU for health and environmental reasons, for example.

Bans on production practices Meat produced using hormones and pathogen reduction treatments, like chlorine washing. Regardless of a free trade agreement the UK may be challenged on these rules through the WTO which ruled against the EU's hormone beef ban in 1997, although an agreement was later reached. However, it is possible the ban may be challenged again.

Rules regarding the traceability of meat products The US sees country of origin labelling and animal welfare statements on import certificates as unnecessarily restricting.

Restrictions on somatic cell count in milk This indicates infection in an animal. The EU currently requires a much lower level than the US to ensure milk quality and animal welfare.

Attempts to ban or continue to restrict access to GMOs The EU's approach to GMO regulation allows individual member states to enforce bans on GMO cultivation. A precautionary approach to approvals has been criticised by the US. The WTO has previously ruled against an EU ban on GMOs as unscientific.[44]

Stability of food supply

New trade agreements may also have an impact on the future security of our food supply by increasing the UK's food imports from areas with high environmental risks. Water stress is a good example of this. Much of the US, Israel, India, Mexico, Turkey and parts of China and Australia are judged to be under extremely high water stress, meaning these areas are withdrawing more than 80 per cent of their renewable water supplies each year.[45] Importing more food from such areas exposes the UK to greater risks of interruption in the supply chain if agricultural production is disrupted in these countries by environmental pressures.

The chart on page 29 shows how water stress is considerably higher in most of the non-EU food producing countries with whom the UK is seeking post-Brexit trade deals. If trade agreements are concluded which lower tariffs or standards for food imports then more of our food can be expected to come from these countries after Brexit.

Environmental sustainability of domestic production

Cheaper produce may undercut UK farmers, leading to lower prices and decreasing incomes from farming. The ways farmers may respond to these pressures will depend on the sector and the performance of the individual business. Thus, environmental outcomes would be mixed. The environment would be affected by how farming practices change in response to competition, as explored on pages 30-31, and by the pressure exerted on domestic regulation:

1. How farming practice might change

On the one hand, some farms could focus on efficiency to compete, which could lower the risk of pollution. However, in the most productive areas some farmers could focus on maximising yield from their available land. At present many farmers have some of their land set aside to benefit the environment. In this scenario, more of this land is likely to be brought into production, destroying habitats and increasing the risk of pollution from run-off. Certain sectors, such as dairy and some lowland cattle and sheep businesses, are likely to intensify production, increasing stocking levels and using more fertiliser, increasing pollution risks.[46] These risks would go up if regulations were weakened to boost the competitiveness of UK farming in the short term.

2. Pressure on domestic regulation

As well as increasing competition from cheap imports, changes to standards could also have direct environmental impacts. For example, while rules for the maximum amount of pesticides allowed on food (maximum residue levels or MRLs) are largely aimed at protecting consumers, they also protect the environment by limiting the amount and type of pesticides used in food production. It is likely that future trading partners, such as the US, would seek to have MRLs and import tolerances set at levels that allow their own produce to enter the UK. This could make it difficult for the UK to uphold and strengthen its standards for domestic producers, as they would be put at a disadvantage if they are prevented from using pesticides that importers can still use. For example, the partial ban on neonicotinoid pesticide use in the UK is estimated to have created short term costs to UK farmers of £18.4 million in 2015-16 alone.[47] UK producers would be put at a competitive disadvantage if other countries exporting to the UK were still allowed to use them. Neonicotinoids are allowed in the US.

Environmental sustainability of imports

The environmental impact of food imports can vary significantly depending on the product and where it is from. Therefore, changing where food in the UK comes from would also affect the overall environmental impact. For example, Canada and Australia are both estimated to have higher environmental costs from producing beef than the UK and Ireland, where most of our beef imports currently come from. On the other hand, sustainability impacts from beef production in the US are about the same as the UK and those in New Zealand are estimated to be around a third lower than the UK.[48]

Dairy is another example where higher imports from certain countries could increase the environmental footprint of UK food abroad. The UK is a net importer of butter and cheese, and may import more of these from outside the EU if tariffs are reduced. Canada, the US, and New Zealand, likely candidates for increased dairy imports, are all estimated to have environmental costs for producing dairy higher than the UK and our closest EU partners.[49]

Future trade deals could increase the amount of food we import from non-EU trading partners. Because agriculture's environmental impacts are different between countries this could increase or decrease the environmental footprint of UK food overall depending on which countries we do deals with.

3. WTO rules, no EU deal

What is driving change in this scenario?

This scenario would see a significant increase in the cost of trade with the EU due to the introduction of tariffs. EU most favoured nation tariffs are high for many food and agricultural products, for example 65-87 per cent for beef, 43-50 per cent for pork, 66-88 per cent for processed chicken and 63 per cent for butter.[50] In many important sectors this would make trade with the EU in both directions prohibitively expensive. It would all but cease for beef, sheep, poultry, butter, wheat and barley, and pig and poultry imports from the EU could be cut by half.[51] Fruit and vegetable imports from the EU could fall by 45 per cent.[52]

"Significant increases in the price of food would be expected in this scenario."

Market prices would go up, raising incentives for some domestic production. While estimates vary, this is likely to be the case for beef, pork and poultry, as well as dairy products like butter and cheese, and some fruits and vegetables. In addition, since the UK does not have the capacity to meet its own food preferences, there will be a significant shift away from imports from the EU to imported food from the rest of the world, for example for beef and poultry, as well as some fruit and vegetables such as citrus fruits.[53,54]

Summary of impacts

Affordability	Decrease	↓
Standards, choice and control	Slight decrease	↓
Stability and resilience of food supply	Decrease	↓
Environmental sustainability of domestic production	Decrease	↓
Environmental sustainability of imports	Slight decrease	↓

Affordability

The Resolution Foundation has estimated that significant increases in the price of food would be expected in this scenario. The worst hit products are dairy, oils and fats, meat and vegetables, ranging from four per cent to 8.1 per cent increases in consumer prices.[55]

Food standards, choice and control

Importing more food from outside the EU means UK consumers would have less information and control over where and how it was produced, although in this scenario this is likely to only affect beef, poultry, fruit and vegetables. There is also a higher risk of foods which do not meet current EU and UK standards entering the UK's food system illegally, since not every food item can be checked. For example, in 2014, 6.5 per cent of imported foods being sold in the EU from non-EU countries exceeded legal limits for pesticide residues, more than four times higher than the failure rates for food produced within the EEA.[56]

There is also the possibility that the UK would weaken standards to facilitate trade with countries outside the EU to replace unaffordable EU imports. For

example, diphenylamine is a chemical commonly used on apples and pears but banned in the EU due to health concerns. The maximum residue level for this chemical is set at 0.1 ppm in the EU while the international standard is set at ten ppm. Diphenylamine is widely used in the US which has argued that the EU ban limits their exports of apples and pears. [57] This is an example of a standard which could be lowered to help replace EU trade in an important food product.

Resilience of food supply

Given that the EU accounts for 71 per cent of the UK's food and drink imports by value and 30 per cent of total food consumed, the loss of imports from the EU will reduce the resilience of the UK's food supply, at least in the short to medium term while supply chains adapt. [58,59] UK farmers and food producers will lose vital markets for products which are not in high demand in the UK. This may affect farmers' profits in some sectors.[60] Nevertheless, overall the prices farmers receive for their goods would be higher and the increasing demands on domestic supply will be significant. Rapidly rising production is likely to add to the current stresses on the farmed environment, reducing the resilience of UK agriculture in the long term.

Environmental sustainability of domestic production

This scenario would increase UK production in most sectors, including beef, pork, poultry and dairy, although the magnitude varies between studies. One study estimates increases of 22 per cent for pork, ten per cent for beef and 11 per cent for poultry.[61] Given the limited land available in the UK, it seems likely that production increases of this kind would lead to further intensification of UK livestock and dairy farming. If this happens in a policy and regulatory vacuum after Brexit there would be a higher risk of environmental damage such as pollution, as well as implications for animal welfare.[62]

Higher farm income could mean more money for environmental investments. Cumulus Consultants have found that "whilst limited, the available evidence does tend to suggest a positive correlation between economic and environmental performance, for some farms at least. However, with increased domestic demand, the incentive in this scenario would be to prioritise total production volume, rather than efficiency, which might also lead to the use of more harmful inputs, although this would depend on their availability and price, and on domestic regulation.

What would happen to sheep farming?

Depending on what happens to sheep meat quotas in this scenario, the sheep sector could be very badly hit. Around a third of sheep meat produced in the UK is exported, almost exclusively to the EU. Meanwhile, because of demand for certain cuts of meat and the seasonal nature of farming, the UK imports about a third of the sheep meat it consumes, mainly from New Zealand and Australia.[63] If UK exports to the EU are subject to tariffs they will become uneconomic and this export market will be lost. However, if the UK still has a tariff rate quota agreement with New Zealand as it currently does as part of the EU, UK farmers will not be able to compete and many farm businesses in the sector may fail.

Such effects would affect sheep farming communities and lead to land use change, particularly in upland areas. A new payment for public goods scheme may help hill farming communities to survive and, combined with

lower stocking levels, could lead to improvements in the environmental quality of extensively grazed and semi-natural habitats. Well managed forestry, as well as deliberate rewilding in some areas could also increase biodiversity, reduce flood risk and contribute to climate change mitigation. However, abandoned and unmanaged land is likely to have negative consequences for biodiversity.[64]

Environmental sustainability of imports

As noted above, the UK would be likely to import more beef, poultry, fruit and vegetables from outside the EU. This could increase the negative environmental impacts of the UK's food overall. For example, the UK is heavily reliant on imports of fruit and vegetables from both the EU and the rest of the world, with only 54 per cent of vegetables and 17 per cent of fruit being home grown.[65]

The Food Foundation has identified 15 types of fruit and vegetable likely to be imported from non-EU countries in this scenario.[66] The graph below shows environmental sustainability indicators for the EU and non-EU countries from which they are imported.

On average, non-EU countries where these fruits are imported from have higher water use, less sustainable nitrogen management and higher pesticide use (see below). This suggests that moving away from EU food imports will have negative consequences for the environmental sustainability impacts of UK food overall.

Sustainability performance of countries which export selected fruit and vegetables[67]

Water use: on average, the non-EU countries use 17 per cent of total renewable water supplies for agriculture, compared to an average 7.6 per cent in the EU and just 0.7 per cent in the UK.[68]

Fertiliser use: on average, the non-EU countries score worse than both EU countries and the UK in the Yale University 'Sustainable nitrogen management index.[69]

Pesticide use: on average, the non-EU countries use 6.5 kg of pesticides per hectare, compared to 4.5 kg per hectare in the EU and 3 kg per hectare in the UK.[70]

4. WTO rules, no UK tariffs

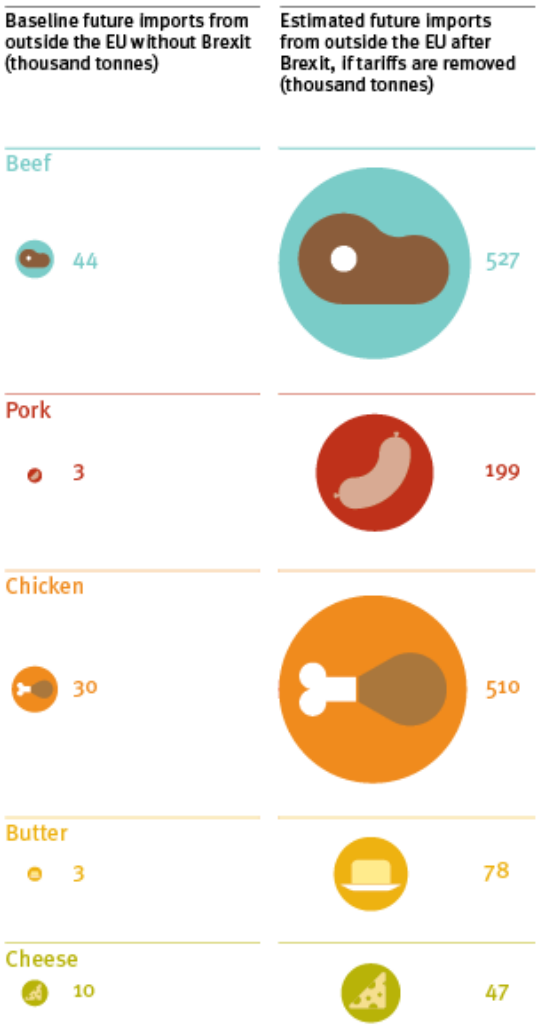
What is driving change in this scenario?

The key driver in this scenario would be the elimination of tariffs on trade in food and agricultural goods. As outlined above, EU tariffs, which the UK currently applies as a member of the EU, are high for many food and agricultural products. Dropping these would open UK food markets to products from countries with low costs of production. While these lower costs may be partly down to natural advantage, they can also be due to farm businesses having weaker social, environmental and animal welfare standards than UK farming.

"UK farmers would lose EU export markets and be subject to competition from cheaper, lower standard producers abroad."

In almost all sectors, ending tariffs would mean EU food imports cease as they would be displaced by lower cost imports from non-EU countries. UK farmers would lose EU export markets due to new tariff barriers, and UK farms would be subject to competition from cheaper, lower standard producers in non-EU countries. As a result, UK production would reduce in almost every sector and imports from non-EU countries would increase dramatically, as shown below.

How might the origins of UK food change?[71]



Affordability	Increase	
Standards, choice and control	Slight decrease	
Stability and resilience of food supply	Decrease	
Environmental sustainability of domestic production	Slight decrease	
Environmental sustainability of imports	Decrease	

Affordability

The impact on food prices in this scenario will depend to a large extent on the UK's approach to non-tariff trade barriers. Assuming that non-tariff barriers remain in place, the Resolution Foundation suggests that price reductions for consumers would be relatively modest, with the biggest reductions in the price of meat, fish, fats and oils, fruit and vegetables, ranging between 1.1 per cent and 3.2 per cent.[72] Larger price reductions would require the UK to reduce barriers to trade by weakening its regulations and lowering standards, for example accepting meat from animals treated with growth hormones which can be produced more cheaply.

Food standards, choice and control

The UK would import significantly more meat, dairy, fruit and vegetables from non-EU countries. This implies that UK consumers would lose some control over the integrity and sourcing of the food they buy.

Country of origin labelling is currently restricted to unprocessed meat and mince sold to the final consumer. Most of the food we eat in the UK is highly processed and there is little information given on the source of its ingredients. Therefore, even if EU rules are maintained after Brexit, they already do not apply to much of the food we eat. If more food was imported from outside the EU, even less would be known about how food consumed in the UK is produced.

Growth hormone use in pigs

The UK imports about 60 per cent of the pork it consumes, and imports from non-EU countries would be expected to increase in this scenario. The US, Canada and Brazil are leading global pork exporters, and one of the main non-tariff barriers limiting imports from these countries is an EU ban on the use of the growth hormone ractopamine.[73] Enforcing the ban in a situation where imports from countries that use ractopamine are increasing dramatically may be difficult in practice. In this scenario, the UK may lift the ban, facilitating trade in pork with non-EU countries.

Currently, the only non-EU countries exporting pork to the UK are the US and Australia. Altogether, non-EU imports account for just 0.1 per cent of total pork imports. While production costs and wholesale prices are lower in other exporting countries, including the US, Canada and Brazil, prohibitively high import tariffs on non-EU pork make these uncompetitive. Thus, if the tariffs were removed, imports from outside the EU would be expected to increase significantly, albeit from a low base.

Resilience of food supply

This scenario would seriously undermine UK food producers. Cheaper food imports would drive down the market price of agricultural goods, reducing the income of UK farmers. This could put many farmers out of business. For example, if tariffs are reduced by 50 per cent, poultry farms would see average reductions in income of nearly £34,300 per farm, even if direct payments were retained.[74] Sheep, beef and mixed farmers would likely also be hard hit, as these sectors are already marginal.

Food imports can have positive impacts on the resilience of food supply, as well as introducing risks. In this scenario a key risk would be that the UK would be highly exposed to world markets, with no buffer against fluctuations in prices or availability. With the capacity of UK agriculture reduced, the UK would need to consider how it could respond to global gluts and shortages of particular food products. Relying more on food from distant places could also increase the UK's vulnerability to climate change risks such as extreme weather events which can disrupt long supply chains. Overall, this is likely to reduce the resilience and stability of the UK's food supply.

Environmental sustainability of domestic production

A major restructuring of the agriculture industry is expected in this scenario. Many of the farms which remain would be likely to pursue more intensive farming to compete on the world market. The experience in New Zealand of agricultural liberalisation was increased pollution.[75] It is also likely that farmers would utilise as much of their land as possible to maximise income, increasing negative environmental impacts, with the loss of field margins, hedges, buffer strips etc.

On the other hand, expensive inputs such as fertilisers and pesticides may be used more efficiently to reduce costs and increase profit margins. Furthermore, some farmers would pursue a strategy of high quality production with low environmental impacts, selling products for a premium price. Overall, the production of beef and sheep is estimated to decrease by seven to ten per cent and seven to 11 per cent respectively.[76] Therefore, there may be a slight decrease in the extent of farmed land overall, especially on

less productive land or areas with potential for land to be developed for housing, industry or forestry. This may create isolated areas of environmentally sustainable farming, but the overall effect of liberalisation is expected to be negative for the environment, at least in the short to medium term.

Environmental sustainability of imports

In this scenario the UK will 'export' higher negative environmental impacts to other countries. Some examples of this effect have been demonstrated in the scenarios above, for example in the case of fruit and vegetables, and this effect is expected to be higher in this scenario due to the greater volume of imports shifting from the EU to the rest of the world. Beef production is an important example, since the environmental impacts of beef production are particularly high, as outlined below.

The environmental impacts of beef imports

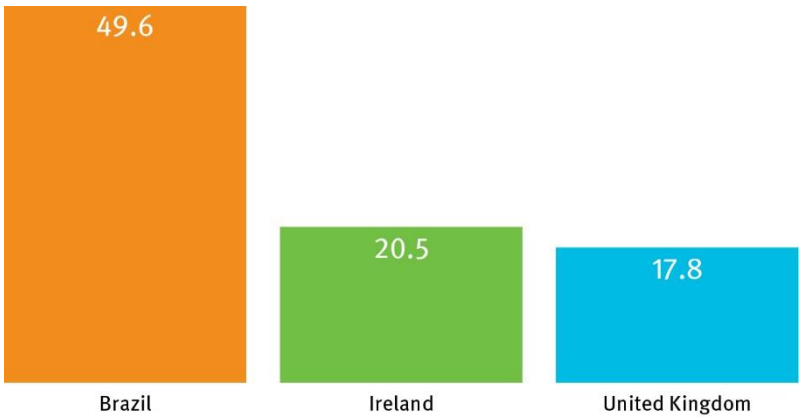
The main non-EU exporter of beef to the UK is Brazil, exporting about 22,500 tonnes in 2017.[77] Brazil may be one of the countries which benefit from the UK importing more food from outside the EU.

However, Brazil has an environmental footprint for beef production estimated to be nearly times higher than the UK, and 2.5 times higher than Ireland, where two thirds of the UK's current beef imports come from.[78,79]

These estimates are based on the monetary value of environmental impacts from agricultural production, including greenhouse gas emissions, air, water and soil pollution, and land use change. Some environmental impacts are not included, such as impacts on ecosystems and biodiversity. Brazil's high environmental impacts are mainly due to deforestation and greenhouse gas emissions.

Overall, the average environmental costs of beef imported to the UK would increase from £22 per kg currently, to £45 per kg. This is estimated to increase the environmental impact of UK beef consumption overall by around 25 per cent.[80]

Average environmental costs of beef production compared[81]



What the scenarios tell us about the future

"A trade strategy focused on cheap food would expose UK food and farming to undesirable, and potentially costly, risks."

Lowering the cost of food was one of the major promises of the Brexit campaign. This is an important consideration. While food prices have dropped since a spike between 2009 and 2014, they are still higher in real terms than 20 years ago.[82] Food remains a significant cost for UK consumers, accounting for just over ten per cent of household budgets on average. For the poorest fifth of the population, this proportion rises to 16 per cent of their incomes.

Our analysis suggests that food prices would come down only under the 'WTO, no UK tariffs' scenario, and the 'Europe and beyond' scenario, as the UK would reduce or eliminate tariffs on some or all non-EU imports. However, significant reductions in the price of food would also require weakening of the standards and regulations which protect consumers and the environment. As we outline below, a trade strategy focused on cheap food would expose UK food and farming to undesirable, and potentially costly, risks.

This analysis demonstrates the tension in the government's preferred option of high domestic standards coupled with cheap imports. It is likely that one will take precedence over the other. There are clear risks that the government's aim to pursue free trade agreements after Brexit will severely compromise its ability to achieve its stated ambitions for greener, more resilient UK food and agriculture.

Summary of risks associated with different trade scenarios

The risks

1. Lower resilience

Under every scenario, agri-food supply chains would experience disruption and new business costs from customs checks. Producers and manufacturers would need to adjust to increased competition from non-EU market actors. This increased disruption would be likely to reduce the resilience of UK food systems, at least in the short term.

However, the bigger issue is the extent to which opening up global access to the UK's markets would introduce new risks and, in particular, environmental risks to our food system. While the globalisation of our food has provided a number of benefits to UK consumers, including lower prices and access to foods that cannot be grown in the UK, integration into global supply chains has increased our vulnerability to events such as the global price shocks of 2007-08 and 2011.[83]

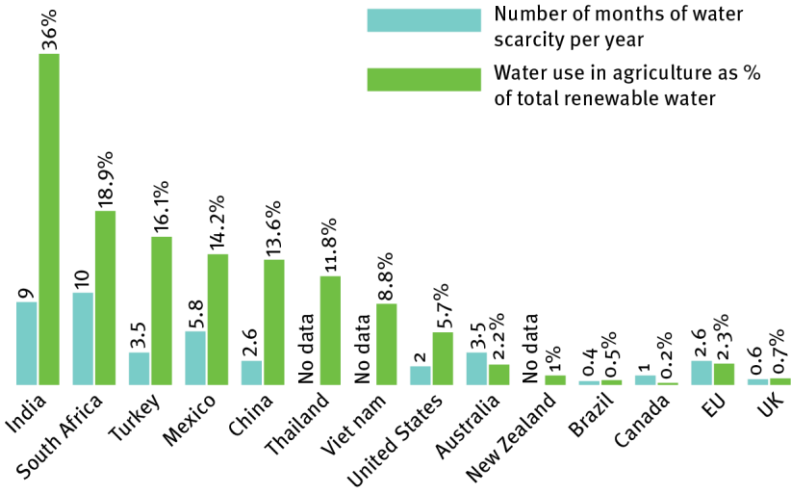
Aside from the moral issues associated with increasing the environmental footprint of our food produced abroad, concerns are being raised about the extent to which environmental degradation could become a risk to global food security. In response to growing demand for food in general, and

particular food types like meat, agriculture has intensified and the area of land used for growing food globally has increased.[84] A third of the world's arable land has been lost to erosion or pollution in the past 40 years.[85] At least 20 per cent of the world's aquifers are overexploited, there is rapid biodiversity loss linked to food production and the global food system accounts for around a quarter of greenhouse gas emissions.[86]

A strategy based around meeting a greater share of UK food demand from overseas would make the UK's food supply increasingly vulnerable to environmental shocks. The sophistication of food retail operations in the UK has created the illusion of abundance, and an expectation among consumers that fresh produce will be available all year round. Yet, this may not always be the case. For example, most of the key food exporters to the UK outside of the EU experience much higher water stress than the UK and EU average.

"A strategy based around meeting a greater share of UK food demand from overseas would make the UK's food supply increasingly vulnerable to environmental shocks."

Water stress in countries outside the EU exporting to the UK



Under the 'Only Europe' scenario, the UK could be better protected against increases in these risks, as EU rules and standards would continue to act as a buffer against environmentally damaging production.

2. Lower standards

Understandably, our future trading partners will be reluctant to agree to bespoke food standards for the UK, as we are a small country of only 66 million people. The US, one of the principal trade partners being pursued, has been clear that securing a deal would be dependent upon the UK opening up its food markets to US producers.[87] Ted McKinney, the US undersecretary of agriculture for trade and foreign agricultural affairs, has called for a reset of UK food standards after Brexit, with removal or changes to some of the current standards to increase opportunities for trade between the UK and US.[88] Even if there is no public consent in the UK for meat produced using chlorine washing or growth hormones, as long as these practices are legal in the US, British consumers will have to accept them. We identify several examples where UK standards might be weakened to secure new free trade agreements.

3. Less control

There is evidence that food from countries outside the EU is less compliant with its legal standards, designed to protect consumers and the environment. A system based on more imports from other countries is likely to be riskier overall. In 2014, 6.5 per cent of imported foods sold in the EU from other

countries exceeded legal limits for pesticide residues. This was over four times higher than the failure rates for food produced within the European Economic Area. [89]

4. Loss of information

Food labelling and information about its origins and content could be restricted due to non-discrimination rules in trade deals. It has been argued that, if consumers do not like how food is produced, they can choose not to buy it. [90] But trade agreements could result in less information being given to consumers about how and where the food they are eating has been produced. For example, the US has expressed concern about the EU's country of origin labelling, and labelling based on product quality or production methods such as genetic modification may come under fire if it is seen as prejudicial to trade. [91]

"Trade agreements could result in less information being given to consumers about how and where the food they are eating has been produced."

Assuming it were possible for consumers to tell whether the chicken they buy has been chlorine washed, this almost certainly would not be the case for processed foods or prepared foods from food outlets. Since over half the food we consume in the UK is ultra-processed and sold ready to eat, the assertion that consumer choice alone can lead to a high quality, environmentally sustainable food system becomes meaningless.[92]

What is more, if EU labelling requirements no longer apply, product manufacturers and retailers may choose not to reveal this information in the name of lowering prices. Research suggests that labelling processed foods with their country of origin, even just for the meat ingredients, would add between 15 and 50 per cent to a manufacturer's costs.[93] Therefore, guaranteeing good consumer information will require deliberate action from the government.

5. More environmental damage in the UK

Opening up trade will force UK farmers to compete against lower cost producers. Faced with these new conditions there are four broad strategies farmers could follow, as outlined in the box below: compete on quality, compete on price, diversify or leave farming all together. These strategies are not mutually exclusive: a farm could follow more than one, or switch between strategies over time.

Four choices for UK farmers

1. Go for quality

- Adopt cutting edge production and monitoring systems
- Secure relevant certification, assurance and endorsements
- Invest in marketing and product differentiation strategies
- Develop and grow new markets and opportunities

2. Compete on price

- Attempt to limit or reduce fixed costs such as labour (ie employ fewer pickers) or inputs such as fertilisers
- Attempt to increase output by adopting high yielding strategies and varieties, or increasing farmed area, for instance by reducing buffer strips around fields
- Avoid investments to maintain or upgrade equipment or facilities

3. Diversify

- Introduce, or increase revenue from, non-food activities eg B&B, renting out farm buildings as office space, woodland creation
- Revenue could come from private markets (eg tourism, timber) or public funding (eg payments for environmental public goods)

4. Quit farming

- Develop farmland for other purposes, eg housing
- Sell up to another farmer

"While many farmers will want to maintain high standards and compete on quality, most farmers are likely to follow a cost cutting strategy leading to further degradation of the farmed environment."

The government's vision is for an industry exporting high value, high quality foods, produced sustainably with minimal environmental harm. While many farmers will want to maintain high standards and compete on quality, this is a limited market, with only around nine per cent of food bought in the UK falling under 'ethical' labels such as organic, Rainforest Alliance and free range.[94] The high quality strategy would also entail significant upfront investment for many farmers. Therefore, to stay competitive, most farmers are likely to follow a cost cutting strategy leading to further degradation of the farmed environment.[95]

Thus, there is potential for a considerable increase in short term environmental harm if farmers struggling to manage financial pressures bring currently unfarmed land into production, or adopt more intensive practices to increase yield in the short term. Environmental systems can only be pushed so far before declines become irreversible. A trade and growth strategy that fails to protect the environmental assets that support food production would compromise the resilience and vitality of the UK food and farming sector in the long term.

6. Offshoring impacts

Unless UK trade policy is built around high production standards, domestic food purchases could support unsustainable or undesirable farming practices overseas, such as deforestation or excessive antibiotic use in livestock production.[96] As we showed on page 26, the environmental footprint of beef produced in Brazil is estimated to be 2.5 times higher than Ireland, where two thirds of our beef imports currently come from. [97]

Recommendations for a new UK food and farming policy

"As soil, water and biodiversity challenges start to bite globally, protecting the environmental systems that underpin food production will only improve the UK's competitiveness."

UK food and farming has nothing to gain from lowering environmental standards. It is already greener than most of the world and, as soil, water and biodiversity challenges start to bite globally, protecting the environmental systems that underpin food production will only improve the UK's competitiveness.

As our scenario analysis suggests, there is significant potential for future trade policy to compromise the resilience of the UK's agriculture, and expose consumers and the environment to risks from lower standards of production.

Since agriculture does not make a significant contribution to the UK's GDP, there is a high risk it will be used as a bargaining chip to secure preferential access to foreign markets for the UK's more lucrative finance and professional services sectors.[98] This raises the likelihood that the government will accept lower standards of production for food imported from abroad.

But these consequences are not inevitable. A well designed trade strategy, aligned and integrated with domestic agriculture and growth policies, and supported by appropriate food regulations and standards, could deliver benefits across the board. The UK government and the devolved administrations could help to achieve this. Many of the relevant policy areas are devolved including agricultural policy, chemicals regulation including pesticides and their use, food safety and standards, and food labelling. There are ongoing discussions over where there might need to be 'common frameworks' agreed across the UK in these areas.[99] Notwithstanding any common frameworks, the recommendations we set out below apply to whichever authority or authorities will have competence over this area:

1. Maintain high quality UK food and farming through markets, funding and regulation

The Environment Secretary Michael Gove has committed to a vision of a UK that produces "the best quality food in the world to the highest standards in the world."[100] For this to be deliverable and capable of withstanding the demands of prospective trade arrangements, it must be underpinned by the following:

Make it easy for consumers and businesses to judge the environmental sustainability of food

Introduce new environmental quality metrics and reporting standards to support sustainable sourcing and purchasing of food, whether produced at home or abroad. In January 2018, Michael Gove promised to bring forward a new food label representing "a new gold standard metric for food and farming quality" potentially covering "soil health, control of pollution, contribution to water quality as well as animal welfare". This new system must be Brexit-proof, ie regardless of future trade deals, UK consumers must be able to understand where their food has come from, and the conditions

under which it has been produced. The scheme should, therefore, also retain factors currently required by EU law, such as country of origin designation.

Use the new farm payments system to encourage the shift to sustainable food production

This would reward the public benefits of climate change mitigation, landscape protection, improvements in soil health and clean air and water that farmers can deliver by changing what and how they produce.

Maintain existing food regulations and continue to strengthen them over time, based on scientific advice and consumer expectations

EU regulations and directives cover almost all aspects of the food chain, including transportation, processing, retail, food service, health and safety for farm workers and consumers, communications along the food chain and information to consumers.[101] Existing EU laws will apply at the point at which the UK exits the EU, but they could be removed in future. The government should rule out this possibility or bring forward a new Food Act, as proposed by Professor Tim Lang and others, to enshrine the same or better levels of protection in UK law.[102] The government should also put into law acceptable minimum standards of environmental practice for farming, maintaining existing standards as the baseline and increasing them over time.

Give the Food Standards Agency (FSA) more resources and a wider remit to oversee environmental risks to the integrity of UK food

Significant concerns have been raised that the FSA lacks resources to police existing food standards effectively, and that this problem will become more acute as its responsibilities increase post-Brexit.[103] There is a clear risk that, outside the EU, effective oversight of environmental risks to UK food could be lost. The European Food Safety Authority's remit includes environmental risk assessment for impacts in areas such as plant and animal health. To ensure this vital function is not lost, the UK's FSA should be given appropriate powers and resources to manage environmental risks to UK food.

2. Develop trade policy which supports high quality food and environmental standards

We have shown that the government's ambitions for agriculture, food and the environment cannot be achieved without a supportive trade policy. Ministers at Defra must work with their colleagues in the Department for International Trade and the Department for Exiting the EU to ensure that a resilient and sustainable food system is at the heart of the UK's future trade relationships. To achieve this, the government should:

Guarantee that UK food and environmental standards will not be weakened in trade agreements

The government should urgently clarify a timeline for developing a UK trade policy, in consultation with all relevant stakeholders. A UK trade policy should include legally binding guarantees that the UK's food and

environmental standards will always be retained or enhanced in any future trade deals.

Require imported food and agricultural products to meet the same environmental standards as UK produced food

The government should clarify the mechanisms by which it will apply UK environmental standards to all imported food in practice, to ensure UK farmers are not undercut.

Use the Trade Bill to require comprehensive, independent and expert led Sustainability Impact Assessments of all new trade deals

The Sustainability Impact Assessment process should be open and accessible, and it should contribute meaningfully to the negotiation, ratification and implementation of any new trade deal. It should explicitly include the assessment of impacts on the natural environment in the countries party to the deal, as well as potential global impacts.

Use the Trade Bill to mandate robust meaningful and enforceable environmental sustainability chapters and clauses in all new trade agreements

There must be guarantees that environmental protections will not be reduced and that they are properly enforced in each country. They should be ambitious and legally enforceable in the same way as other commercial clauses of the agreement.

Annex one

Current UK food regulations and standards[104]

As a member of the EU, the UK has followed rules and standards on food underpinned by a General Food Law Regulation. This lays out general principles, requirements and procedures which underpin policy making in areas of food and livestock feed safety, for example the precautionary principle.

The European Food Safety Authority is responsible for providing independent scientific advice on food safety, nutrition, animal health and welfare, plant health and protection, as well as the impacts of the food chain on biodiversity. Standards for food safety and labelling apply to imports as well as food produced within the EU.

Food safety

- Hygiene rules for businesses, especially in the control and traceability of food of animal origin, and measures to control and prevent the risk of diseases and bacteria such as salmonella.
- Restrictions on the amount of certain chemicals, including pesticides, which can be present in or on food.
- Ban on the use of hormones and beta-agonists in meat produced for human consumption.
- Ban on the use of pathogen reduction treatments, such as chlorine washing, in meat production.

Labelling and consumer information

- Any product containing genetically modified organisms must be labelled clearly in writing.
- Fresh, chilled and frozen meat is required to be labelled with the country it was reared and slaughtered in. Fish and shellfish, honey, olive oil and wine are also subject to country of origin labelling, as are fruits and vegetables from outside the EU.

Environmental protection

- Directives protecting birds and habitats which can limit farming activities in some areas.
- Directives to prevent the pollution of ground and surface water with poisonous substances, nitrates and other pollutants.
- Restrictions on the use of certain pesticides which could be damaging to human and animal health or the environment, for example, the ban on the use of some neonicotinoids.
- Rules outlining Good Agricultural and Ecological Condition of land, for example maintaining habitats, preventing soil erosion and preventing pollution.

Endnotes

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