Hamburg University of Applied Sciences

Faculty Life Sciences

An analysis of the possible impacts of selected Post-Brexit trade scenarios on the UK agri-food sector and their possible consequences for trade in agricultural products between the UK and the EU

Master Thesis

Master in Food Science

by:

Anna Louisa Richau

[redacted]

Hamburg

April 8th 2021

First assessor: Prof. Dr. Martin Holle (HAW Hamburg)

Second assessor: Prof. Dr. Christoph Wegmann (HAW Hamburg)

Table of contents

List of Figures

List of Tables

List of Abbreviations

BIP	Border Inspection Post
CAP	Common Agricultural Policy
CFP	Common Fisheries Policy
CU	Customs Union
DEFRA	Department for Environment, Food and Rural Affairs
ECJ	European Court of Justice
EEA	European Economic Area
EEZ	Exclusive Economic Zone
EFSA	European Food Safety Agency
EFTA	European Free Trade Association
F&B	Food and Beverage
FSA	Food Standards Agency
FTA	Free Trade Agreement
GMO	Genetically Modified Organism
GVA	Gross Value Added
MFN	Most Favoured Nations
PFN	Protected Food Names
SI	Statutory Instruments
SME	Small and Medium Enterprise
SPS	Sanitary and phytosanitary
TFEU	Treaty on the Functioning of the European Union
TRQ	Tariff Rate Quotas
WTO	World Trade Organization

Abstract

There are various scenarios for trade with the EU after the UK's withdrawal. Five selected models were examined in this paper for their key features and then for their impacts and consequences on the UK agri-food sector and trade in agricultural products. The analysis showed that all models (Norway, Switzerland, Turkey, Canada, and WTO) restrict access to the EU single market, as raw agricultural products are excluded from the free movement of goods in all models and thus are subject to tariffs. In all models, there are also non-tariff barriers like rules of origin, customs checks and regulatory divergences, but to varying degrees. All models would also have the effect that the UK would have to leave the CAP and CFP and develop its own new agricultural and fisheries policy. Another effect is that, depending on the model, the free movement of persons no longer applies in the UK. This could be critical for the UK agri-food sector as it is highly dependent on the availability of EU migrants, especially seasonal workers. The consequences that can occur for trade in agricultural products are mainly caused by tariff barriers and non-tariff trade barriers. Exports to the EU will become more expensive due to the introduced tariffs and they would become uncompetitive on the EU market. Price for imports would also rise due to the additional costs for border controls and documentation requirements. The resulting delays and capacity utilisation would have a negative impact on the availability of food. In summary, all models represent for the factors trade-barriers and non-trade barriers a deterioration to EU membership and have far-reaching consequences. By leaving the CAP and CFP, which is the case in all scenarios, there could be an opportunity for improvement for the UK. Norway and Switzerland grant the free movement of persons. However, it is questionable whether it is politically desirable for the free movement of persons to be granted after Brexit.

1 Introduction

The UK has been a member of the EU since 1993 and, before that, the European Communities since 1973. The UK has always had a special role in the history of European integration since its accession to the European Communities. This is evident from the specific British political culture or the fact that the citizens of the UK voted to leave again in 1975, less than two years after joining the European Communities, and the numerous exceptions that the British have negotiated with the other EU member states over the years (von Ondorza, 2016). Moreover, and more importantly, the UK will be the first member state in the history of the EU to leave the union of stated because of a referendum. On June 23rd 2016, British voters were expected to answer the question “Should the United Kingdom remain a member of the European Union?". The UK voted narrowly by 51.9% to 48.1% to leave the EU (McCulloch, 2019, p. 2).

In this thesis, the term "Brexit", consisting of the words "Britain" and "exit", is used to refer to the withdrawal of the UK from the EU.

The UK's withdrawal from the EU will have wide-reaching consequences for the UK and the remaining 27 member states. There is little doubt that the UK agri-food sector is one of the sectors most seriously affected by Brexit: for almost half a century, the UK's agri-food sector has been intrinsically and intricately linked to its membership of the European Community and, subsequently, the EU. The UK's food system is shaped by EU agricultural policy (which influences what and how food is grown), UK regulatory policy (which is shaped by EU standards for food safety, quality, and the environment) and EU trade agreements and associated tariffs. It is not only dependent on trade relations with the EU and other nations around the globe, but it is also dependent on migrant labour.

1.1 Scope of research and research questions

The aim of this research is to provide a better understanding of possible consequences of the Brexit on both, the UK agri-food sector and trade. Thus, an analysis of selected post-Brexit trade scenarios is performed.

At the time of writing, it is unclear how exactly this withdrawal will take shape. In current debate, however, various scenarios have already been proposed that are based on existing country models. The scenarios are as follows:

1. The World Trade Organization (WTO) model
2. The Canadian model (Comprehensive Economic and Trade Agreement [CETA])
3. The Turkish model (Customs Union [CU])
4. The Swiss model (Negotiated Bilateral agreement)
5. The Norwegian model (European Economic Area [EEA])

The following research questions were developed:

1. What are the impacts of the selected post-Brexit trade scenarios on the UK agri-food sector?
2. What are the consequences of the selected post-Brexit trade scenarios for trade in agricultural products?
3. How are the selected scenarios assessed in terms of their impacts on the UK agri-food sector and trade in agricultural products, especially in comparison with the baseline scenario of EU membership?

To answer these questions, this study is structured as follows:

To give the context of this research, the legal basis of Brexit and the withdrawal process are first described in more detail. To highlight the importance of the close relationship between the EU and the UK the subsequent chapters provide an overview of the UK agri-food sector and agri-food trade, with a focus on trade with agricultural products. Thereafter the five post-Brexit trade scenarios in relation to selected key features are presented to provide a better understanding of the analysis of possible impacts of Brexit. Chapter three analyses the impacts on the UK agri-food sector and agri-food trade derived from the key features of the post-Brexit trade scenarios also analyses the resulting consequences for trade in agricultural products. The final chapter concludes this thesis with a summary of the findings and an outlook.

1.2 Withdrawal from the European Union

The UK will be the first member state in the history of the EU to leave. The withdrawal process, including its legal basis, will be outlined below to provide the context of this work.

1.2.1 Legal basis

Article 50 of the Treaty on European Union (TEU) allows a member state unilaterally to leave the EU in accordance with its own constitutional requirements:

> *"2. A Member State which decides to withdraw shall notify the European Council of its intention. In the light of the guidelines provided by the European Council, the Union shall negotiate and conclude an agreement with that State, setting out the arrangements for its withdrawal, taking account of the framework for its future relationship with the Union. That agreement shall be negotiated in accordance with Article 218(3) of the Treaty on the Functioning of the European Union. It shall be concluded on behalf of the Union by the Council, acting by a qualified majority, after obtaining the consent of the European Union."* (Art. 50 TEU)

A state wishing to withdraw must notify the European Council, which will consider the matter and set out negotiating guidelines. The Union conducts negotiations with the State based on the European Council Guidelines, and concludes an agreement setting out the arrangements for withdrawal and considering "the framework for its future relationship with the Union" (Art. 50 TEU). The negotiating period can be extended if all other 27 member states agree (Bowers, et al., 2016, p. 6).

The negotiations take place in accordance with Article 218(3) of the Treaty on the Functioning of the European Union (TFEU). The European Commission, considering the European Council's guidelines, submits a recommendation to the Council, which adopts a decision authorising the opening of the negotiations and nominates the Union negotiator or the head of the EU's negotiation team. During negotiation, the withdrawing member state continues to participate in other EU business activities as usual (Bowers, et al., 2016, p. 6).

Article 50(4) deprives the UK of a vote on the terms of the withdrawal agreement and of the right to take part in discussions about that agreement in the European Council. Article 50(5) regulates a possible re-entrance, should the UK want to rejoin the EU in the future. In this case the UK will have to re-apply under the procedure referred to in Article 49 TEU (Bowers, et al., 2016, p. 7).

1.2.2 Withdrawal process in the UK

The UK voted narrowly by 51.9% to 48.1% in a June 2016 referendum to leave the EU. David Cameron, who had campaigned to remain in the EU, resigned as Prime Minister of the UK immediately after the result. Theresa May replaced David Cameron as Prime Minister in July 2016. Theresa May's government announces to claim the rights to leave the EU granted by Article 50 to leave the EU in March 2017. May's government then negotiated the Withdrawal Agreement and Political Declaration with the EU. The EU signed a Withdrawal Agreement in October 2018. However, Theresa May was unable to pass her withdrawal agreement through parliament. The EU granted Theresa May's request for an extension of Article 50 until October 31st 2019. Without a withdrawal deal, the UK would crash out of the EU at the end of March 2019. Theresa May resigned as Prime Minister on May 24th 2019 based on her Government's failure to ratify a withdrawal agreement in parliament, due to poor UK local election results for the Conservative Party, and continued opposition within her parliamentary party (McCulloch, 2019, p. 2).

In July 2019, Boris Johnson was elected leader of the Conservative Party and appointed Prime Minister of the UK. Boris Johnson agreed a draft withdrawal deal with the EU on October 17th 2019. On October 19th parliament voted to withhold approval for the government's withdrawal deal. It meant that Boris Johnson was forced to write to the EU to request another extension of Article 50 until January 31st 2020, when the UK would leave the EU and enter a transition period (McCulloch, 2019, pp. 2-3). In the transition period the UK is no longer a member of the EU but remains a member of the single market and CU. During that time, it will continue to be subject to EU rules (Institute for Government, 2020).

The withdrawal agreement entered into force upon the UK's exit from the EU, on December 31st 2020. The UK is no longer an EU member state and is considered a third country.

2 Status quo of the UK agri-food sector and agri-food trade

To be able to relate the UK agri-food sector to Brexit in the further course of this work, this chapter describes the structure of the UK agri-food sector and provides an overview of agri-food trade.

2.1 Structure of the UK agri-food sector

The UK food sector consist of food manufacturing, food wholesaling, food retailing and non-residential catering. The agri-food sector combines the food sector, agriculture and fishing (DEFRA, 2020d).

In 2018, the agri-food sector contributed £120 billion to the economy, 6.3% of the national gross value added (GVA) (DEFRA, 2020a, p. 140). Figure 1 shows how each sector has contributed to GVA.

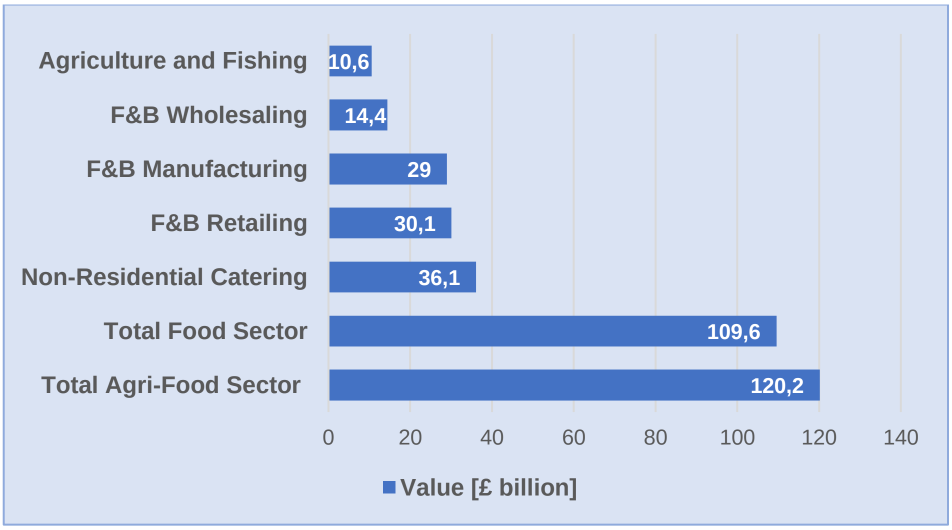

Figure 1: Contribution of the agri-food sectors to the GVA in 2018. Adapted from: DEFRA, 2020c

In the fourth quarter of 2019, the agri-food sector employed four million people, or 13% of all employees in GB (DEFRA, 2020a, p. 145). Figure 2 shows the breakdown between the individual sub-sectors:

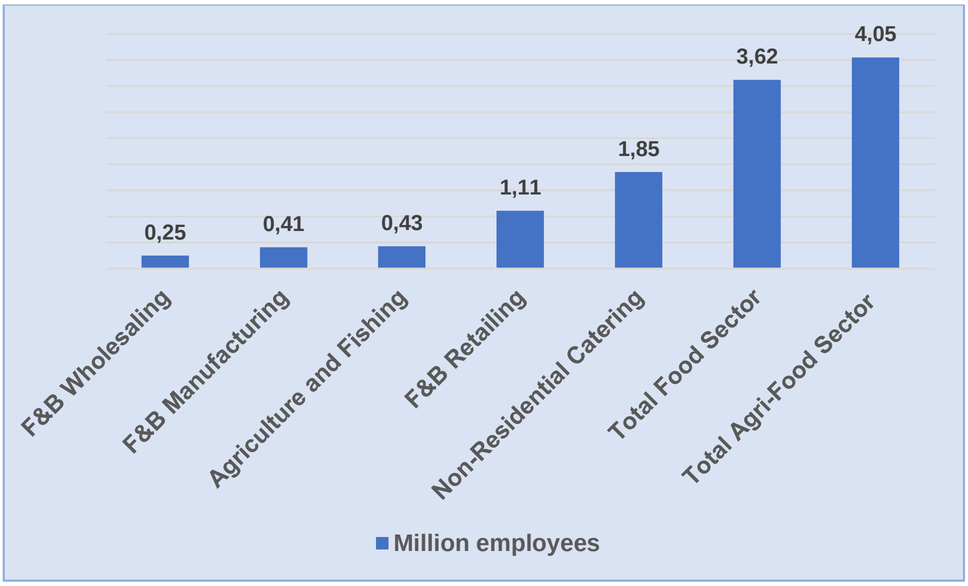

Figure 2: Agri-food sector employees (GB), Q4 2019. Adapted from: DEFRA, 2020c

2.1.1 Food and Beverage sector

As demonstrated in Figure 3 the F&B sector is dominated by small and medium enterprises (SMEs), who make up 99% of the industry.

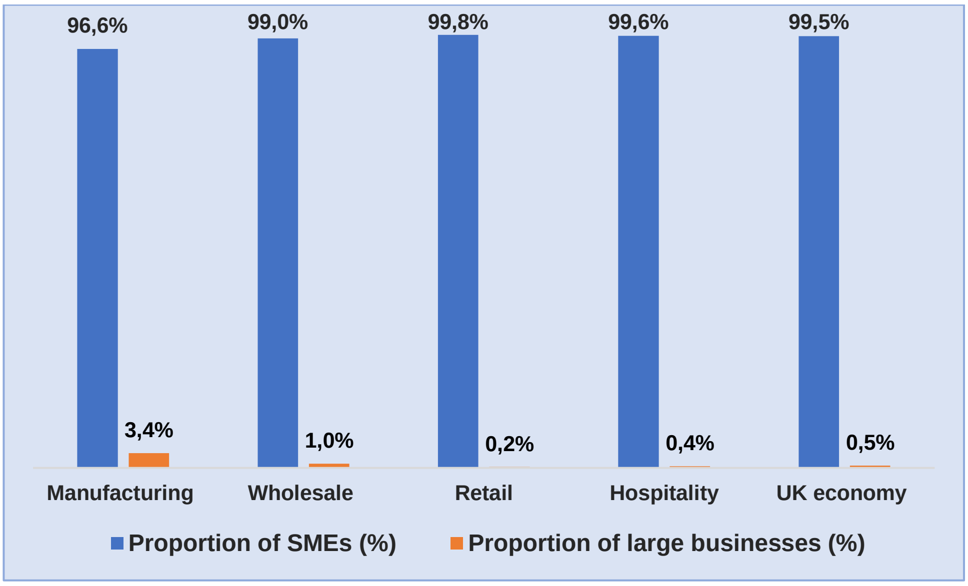

Figure 3: SMEs representation across the F&B sector in 2018. Adapted from: The Food and Drink Sector Council, 2019, p.19

SMEs also account for a large proportion of turnover in the industry. The exception to this is F&B manufacturing, where 97% of businesses are SMEs, but the majority of turnover is attributed to large businesses. On average across the supply chain, SMEs contribute over 50% of turnover, as seen in Table 1 (The Food and Drink Sector Council, 2019, p. 19).

Sub-Sector	Turnover	
	SME (%)	Large (%)
Manufacturing	25%	75%
Wholesale	59%	41%
Retail	75%	25%
Hospitality	51%	49%
UK economy	97%	3%

Table 1: SMEs vs. large enterprises in the sector in 2018. Adapted from: The Food and Drink Sector council, p. 19

The sector offers a wide variety of job roles across all levels and skills, with varying hours and contract types in over 100 different areas, ranging from production managers, directors, scientists, biochemists, programmers, fishmongers, agricultural machinery drivers and packers (The Food and Drink Sector Council, 2019, p. 19).

The provision of part-time roles can act as an indicator of the flexibility of employers. Official data highlight that the food industry has a higher availability of part-time work (53%) than the average across all UK industries, which was 27% in 2017 (Office for National Statistics, 2017, as citied in The Food and Drink Sector Council, 2019, p. 19). Figure 4 shows that the proportions vary depending on sub-sector.

Figure 4: UK employment by part-time vs. full-time in 2017. Adapted from: The Food and Drink Sector Council, p.19

EU nationals are an important part of the food industry, working across a variety of roles and skills levels, but also have different contract types.

EEA nationals represent 12% of total employment in the sector (420.000 employees in 2017). The industry employs almost one fifth of all EU27 nationals in the UK economy (The Food and Drink Sector Council, 2019, p. 20). The number of seasonal workers with EU nationality in F&B sector is estimated to be 67.000, representing 16% of all EEA nationals working in the sector, and 66% of all seasonal workers employed in the economy (Office for National Statistics, 2021).

EU nationals are required for a large variety of roles – but primarily factory-based roles, as Figure 5 demonstrates (FDF, 2017, p. 11).

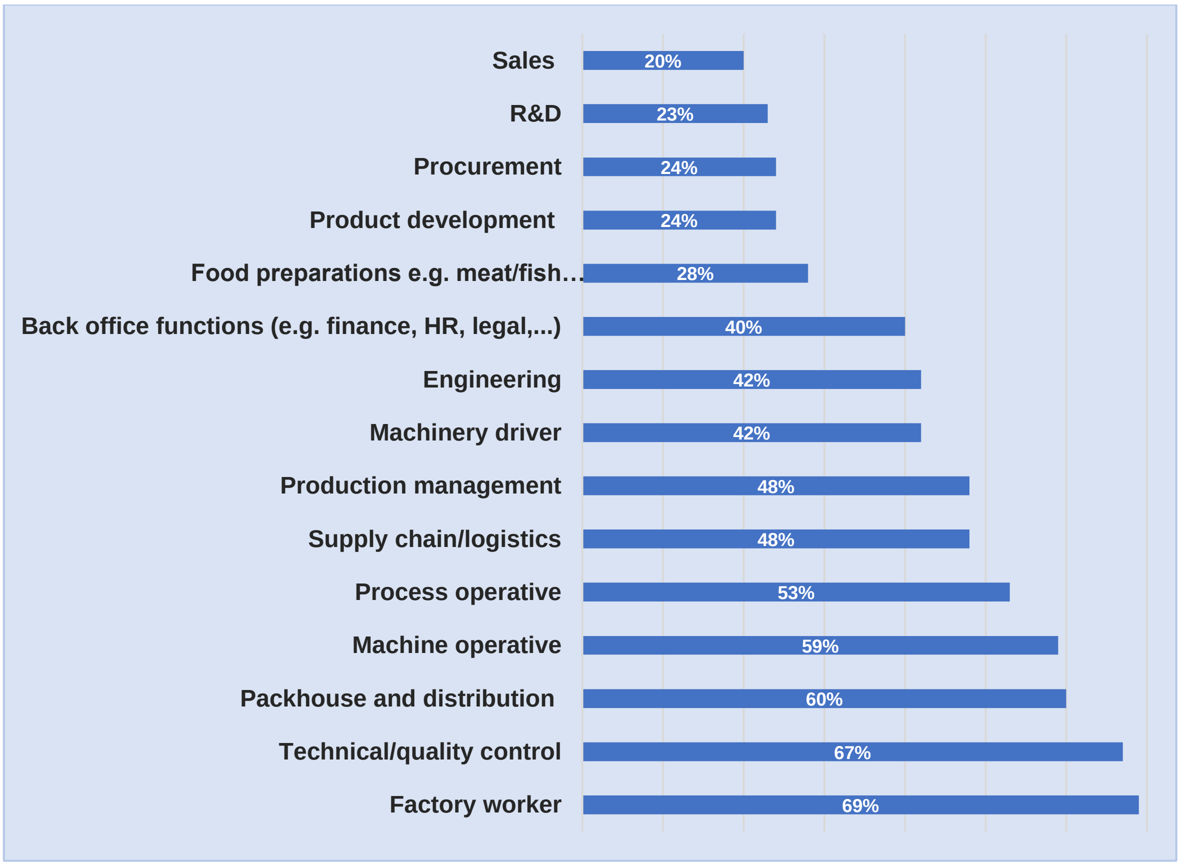

Figure 5: Job roles currently performed by non-UK EU nationals in British F&B Industry in 2017. Adapted from: The Food and Drink Sector Council, p. 21

2.1.2 Agricultural sector

In 2019, the number of agricultural holdings in the UK amounted to 219.000. The average area that each holding owns is 81 hectares with an average croppable area of 64 hectares (DEFRA, 2020a, p. 20). The majority of farms in the UK are smaller than 100 hectares, namely 80% (DEFRA, 2020a, p. 21). Since 2005, the number of smaller farms shrunk, causing the average size of a farm holding to increase from 69 to 80 hectares. In general, larger farms cultivate crops while smaller farms keep livestock (Lightfoot, et al., 2017, pp. 34-35).

In 2019, the total agricultural workforce in the UK was estimated to consist of approximately 476.000 employees, with around 30% being full-time farmers, business partners, directors or their spouses, and about 32% working part-time. On top of the farmers themselves, there are also around 177.000 regular employees, salaried managers and casual workers (DEFRA, 2019, p. 17).

Freedom of movement has enabled EU nationals from other member states to take up seasonal as well as permanent jobs throughout the agri-food supply chain across the UK (European Union Committee, 2017a). The agriculture sector is further depending on a large seasonal workforce to supplement regular, full-time staff. According to DEFRA, there were 64.200 seasonal workers in 2017 (DEFRA, 2017). Approximately 98% of this number are recruited from elsewhere in the EU (McGuiness & Garton Grimwood, 2017, p. 3).

EU nationals make up a substantial proportion of the workforce across all agriculture sectors in the UK:

- On average, non-UK born labour accounts for around 11% of the processing workforce in the UK dairy sector.
- Approximately 40% of staff on egg farms and nearly 50% of staff in egg packing centres were EU nationals.
- Of the 35.900 direct employees in the British poultry meat industry, around 60% are migrant workers.
- Around 63% of the workforce of the British red and white meat processing sector industry are from other EU member states (McGuiness & Garton Grimwood, 2017, p. 6).

Overall, it is difficult to find accurate or reliable figures for EU migrant workers. The figures mentioned above probably underestimate the true extent of EU migrant workers. Turning to seasonal labour, the United Nations definition of an immigrant is someone who resides in another country for at least twelve months (United Nations, 1998, p. 10). The ONS, the recognised national statistical institute of the UK, uses this definition and so immigration statistics exclude seasonal workers who stay only for a few months (Office for National Statistics, 2019).

2.1.3 Fishing sector

Industrial classification divides the UK fishing sector into three sectors:

- The fish processing industry, which is a food manufacturing industry that prepares and preserves fish for food consumption and animal feed. In 2018 there were 353 seafood processing sites in the UK which derived over 50% of their turnover from fish processing. Fish processing sites accounted for 19.179 full-time equivalent jobs; 17.065 of them in majority sea fish processing sites and the remainder in salmon and trout only processing sites (Cowie & Witteveen, 2019, p. 6). The UK fishing processing industry is, together with Spain (€6.1 billion) and France (€4.5 billion), a major contributor to the total turnover of the EU fish processing industry of €31 billion. In 2017, turnover of the seafood processing sector in the UK was €4.0 billion (European Commission, 2020, p. 28).

- The fishing industry encompasses the collection for human consumption of all wild aquatic life, including fish, crustaceans, and molluscs. In 2019, there were 5.911 registered fishing vessels (Marine Management Organisation, 2020, p. 4), compared to 2018, where the UK fishing fleet had 6.036 fishing vessels, the seven highest number in the EU (Greece had the highest with 14.934). In terms of capacity, in 2018 the UK fleet had a gross tonnage of 191.000 gross tonnes, the second largest capacity in the EU (Spain had by far the largest in the EU: 332.000 gross tonnes) (Marine Management Organisation, 2019, p. 9). The total number of fishers on UK registered vessels has hovered around 12.000 for the past decade (Marine Management Organisation, 2020, p. 13).
- The aquaculture or aquafarming sector is the farming of aquatic life, including fish, molluscs, crustaceans, and aquatics plants such as seaweed (Uberoi, et al., 2020, p. 4). The aquaculture industry in the UK produced 185 Mt of fish in 2018 (Eurostat, 2021), compared to 483 Mt of fish landed in UK ports (Marine Management Organisation, 2019, p. 46), so approximately 38% of all fish produced in the UK stems from aquaculture. The UK's aquaculture industry was the second largest in the EU in 2018 by tonnage – just behind France which produced 187 Mt. No data was available for 2018 for Spain, which topped the list in 2017 with 315 Mt (Eurostat, 2021).

The fishing sector is characterised by a higher than average proportion of SMEs, as shown in Table 2.

	Number	**% with 0-9 employees**
Fishing	3.765	98%
Aquaculture	580	87%
Fish processing	360	49%
Total fishing sector	*4.705*	*93%*
All UK businesses	3.2 million	84%

Table 2: Businesses in the UK fishing sector, 2019. Source: Office for National Statistics, UK Business Counts – local units by industry and employment size band, 2019, via NOMIS database

In the whole fishing sector 93% of businesses have a maximum of 9 employees, compared to 84% in the UK economy. In the fishing industry specifically, this proportion is even higher: 98% of businesses have fewer than 9 employees (Office for National Statistics, 2019). This is explained by the large number of vessels that are registered as businesses with their crew as the only employees. The fish processing industry has a smaller than average proportion of businesses with less than five employees: 49% (Office for National Statistics, 2019). The processing industry is labour intensive and typically involves businesses with lots of employees (Ares, 2019b, p. 8).

The non-departmental public body “Seafish” conducts annual surveys to collect information on the composition of the seafood processing sector’s and the fishing fleet’s workforce.

Their surveys showed that EU workers represented 51% of the total surveyed workforce employed in the seafood processing sector in 2018. 8% were from the UK and 1% were from non-EU countries. The survey covered nearly 11.000 employees in the seafood processing sector (Cowie & Witteveen, 2019, p. 3).

The 2018 Seafood survey gathered employment data on 291 UK fishing vessels and 730 jobs. The survey collected data on the nationality of workers in 707 jobs in the sample. Nearly 85% of the jobs in the sample were filled by UK citizens. A further 8% of jobs were filled by citizens of other EU/EEA countries and 7% were filled by citizens of non-EU countries. The survey sampled approximately 7% of the UK fishing fleet (Seafish, 2019, pp. 9-13).

2.2 Overview of current UK agri-food trade

The future trade relationship with the EU will have a strong impact on trade with agricultural products. To understand further implications, this section examines trade in food, in particular trade with agricultural products. The import and export data for the respective product categories can be found in Appendix I.

2.2.1 Imports

The UK imported £47.5 billion worth of F&B products in 2019 (UK Trade Info, 2020). It also has been running a trade deficit for every year since record began in 1996 (The Manufacturer's Organsiation, 2017, p. 6).

The UK runs a trade deficit in every food category. The largest deficit is found in processed and preserved fruit and vegetables at - £10.2 billion in 2019, while the smallest is in sugar products at - £0.8 million. Conversely, the UK ran a modest trade surplus in beverage products of £1.3 billion in 2019 (UK Trade Info, 2020).

The UK’s top trading partners in import in 2019 are shown in Figure 6 below.

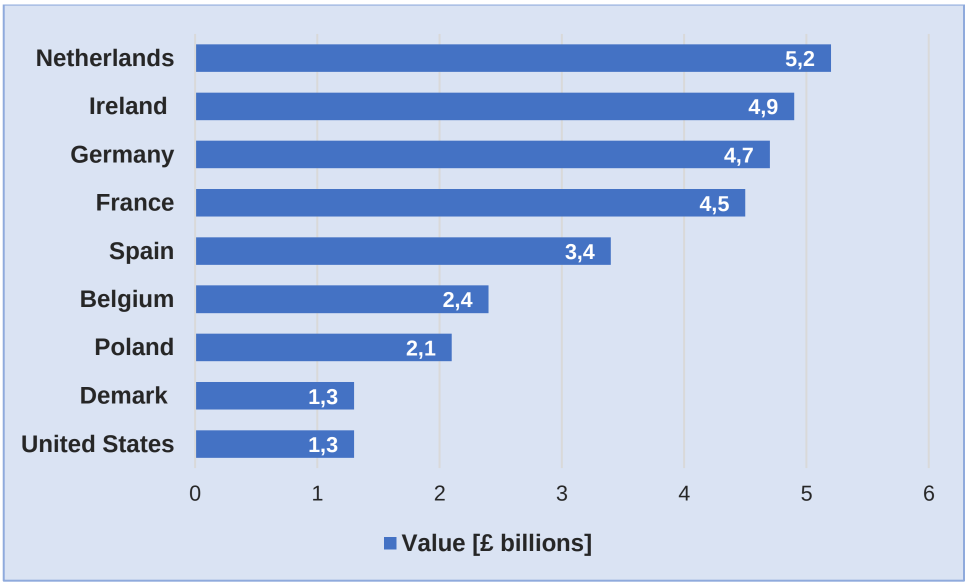

Figure 6: The UK's top import trading partners in 2019. Adapted from: UK Trade Info, 2020

From the Netherlands mainly vegetables, fruits and meat are imported, from Ireland also meat. Imports from Germany are predominantly meat, coffee, tea and cocoa, from France cereals and dairy products are imported. Imports from Spain are by a large margin mainly vegetables and fruit (UK Trade Info, 2020). The top nine are all EU members states; the United States, from which mainly fruits and vegetables are imported, is the only non-EU country in the top ten.

Dairy

In the last decade, imports of dairy products remained relatively steady, averaging at just under 1.3 Mt a year. The EU is the key trading partner, with nearly all (99%) dairy imports sourced from the bloc (IHS Maritime & Trade, as citied in: AHDB, 2021a).

Cheese and curd are the most imported dairy products. Around a third of imported dairy products comes from Ireland. Between 2015 and 2019, the UK imported on average 72 kt per year of dairy products from Ireland (IHS Maritime & Trade, as citied in: AHDB, 2021a).

Beef

The UK imported an average of 286 kt of beef between 2015 and 2019. Imports from the EU accounted for an average of around 94% of the UK's total beef import (2015-2019). Ireland is the dominant supplier. Some of these imports from Ireland are beef that is produced there but exported for further processing (IHS Maritime & Trade, as citied in: AHDB, 2021b).

Fresh beef and veal made up the majority of imports (an average of 67%) between 2015 and 2019 (IHS Maritime & Trade, as citied in: AHDB, 2021b).

Sheep meat

UK sheep meat imports are dominated by shipments from Oceania. In recent years, imports from New Zealand have accounted for an average of 70% of all sheep meat imports. Imports from the EU only averaged out at 16% from 2015 to 2019, with Ireland being the main European supplier. Sheep meat legs comprise a considerable portion of sheep meat imports, reflecting that domestic production is insufficient to satisfy UK consumption levels. Most sheep meat imports are frozen products. On average (2015-2019), 54% of sheep meat imports were frozen goods (IHS Maritime & Trade, as citied in: AHDB, 2021c).

Pork

The UK is a net importer of pork and processed products. Between 2015 and 2019, the UK on average imported 874 kt of pig meat, with over 99% sourced from the EU (IHS Maritime & Trade, as citied in: AHDB, 2021d).

Processed products have accounted for just over half of total pork imports, with bacon, sausages and hams cumulatively accounting for over 90% in the category of processed products. This reflects the British pork industry, as it does not have the processing capacity or the herd size to satisfy domestic demand for these products. On average, fresh and frozen pork accounted for 46% of total imports between 2015 and 2019 (IHS Maritime & Trade, as citied in: AHDB, 2021d).

Poultry meat

For poultry meat, no current data is available at this time of this study, therefore, older data is analysed.

Between 2013 and 2017, the UK imported an average of 419 000 tonnes of poultry meat and offal. The EU was the main origin, accounting for 95% of all imports (AHDB, 2019a, p. 40).

The UK is even more reliant on processed poultry meat imports. Between 2013 and 2017, an average of 328 kt of processed poultry meat was imported, while an average of just 44 kt was exported. More than half of processed poultry meat imports were sourced from non-EU origins, particularly Thailand and Brazil (AHDB, 2019a, p. 40).

Cereals, oilseeds and oilseed products

UK wheat imports have averaged around 767 kt (2015-2019), with 69% of these imports originating from the EU. However, the share of non-EU imports has grown in recent years, reaching 64% in 2019, compared with 40% in 2013. Virtually all UK barley imports are sourced from the EU (IHS Maritime & Trade, as citied in: AHDB, 2021e).

The UK is, typically, a net importer of milling wheat, while any surplus in feed wheat is exported. Feed wheat faces competition from maize imports, mainly for animal feed demand. Between 2015 and 2019, the UK imported around 996 kt of maize per annum, with almost 58% of this sourced from the EU (IHS Maritime & Trade, as citied in: AHDB, 2021e).

In the following, only import products that are relevant in terms of quantity are presented: Rapeseed, soya cake, sunflower oil and palm oil. The UK also imports other oilseeds and oilseeds products, but only in very small quantities (e.g. 16 kt of linseeds or 38 kt sunflower seeds in 2019) (IHS Maritime & Trade, as citied in: AHDB, 2021f).

Rapeseed imports are mainly imported from the EU, although in some seasons, imports from Australia outweighed total imports form the EU due to the Australian prices being more competitive than European prices (AHDB, 2019b, p. 8).

The UK has imported an average of 2 Mt of soya cake between 2015 and 2020, primarily for use as protein animal feed. Typically, 77% of UK soya cake imports are from non-EU origins (IHS Maritime & Trade, as citied in: AHDB, 2021f).

Between 2015 and 2019, 245 kt of sunflower oil was imported into the UK on average, with 78% of this sourced from the EU. Over the same time period, an average of 408 kt of palm oil was imported, with 414 kt imported in 2019. The majority (73% on average) of palm oil imports were sourced from non-EU countries, predominantly Indonesia and Malaysia (IHS Maritime & Trade, as citied in: AHDB, 2021f).

Potatoes

Frozen potato products are the main category of UK potato imports. Virtually all (99%) frozen potato product imports in recent years have originated from the EU (AHDB, 2019c, p. 7).

The UK is typically a net importer of fresh/chilled potatoes. The EU is the main source for its imports (68% average from 2015-2019), while Israel is the main non-EU source (IHS Maritime & Trade, as citied in: AHDB, 2021g).

Fruits and vegetables

UK fruit imports have experienced steady growth in recent years, reaching 3.6 Mt in 2019. Between 2015 and 2019, UK fruit imports were worth an average of £3.6 billion as Figure 7 shows. The three key imported fruits in 2019 were bananas (Colombia and Costa Rica) with 1.07 Mt, apples with 336 kt (France and South Africa) and grapes (South Africa and Spain) with 282 kt (DEFRA, 2020e, pp. 7-8).

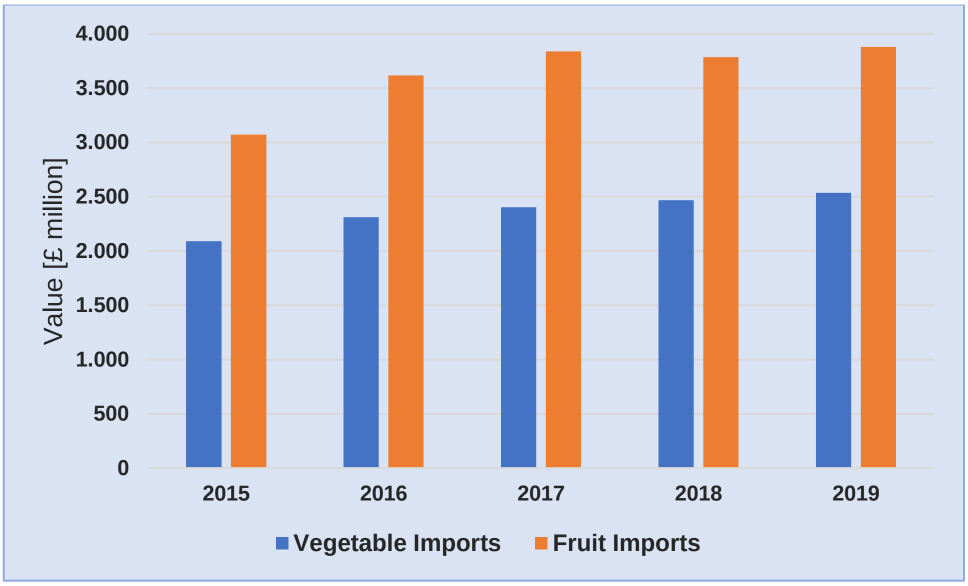

Figure 7: UK imports of vegetables and fruit. Adapted from: DEFRA, 2020, p.7

UK vegetables imports (excluding potatoes) were worth £2.5 billion in 2019. Around 80% of vegetable imports are from the EU, particularly Spain and the Netherlands (DEFRA, 2020e, p. 8). The three key imported vegetables in 2019 were onions (457 kt), tomatoes (406 kt) and lettuce (215 kt) (DEFRA, 2020f).

2.2.2 Exports

In 2019 the UK exported £23.6 billion of food, feed and beverages, up 4.5% on the previous year (FDF, 2020, p. 1). Figure 8 shows the top ten UK export markets in 2019 for food, feed and beverages – seven of them are EU members.

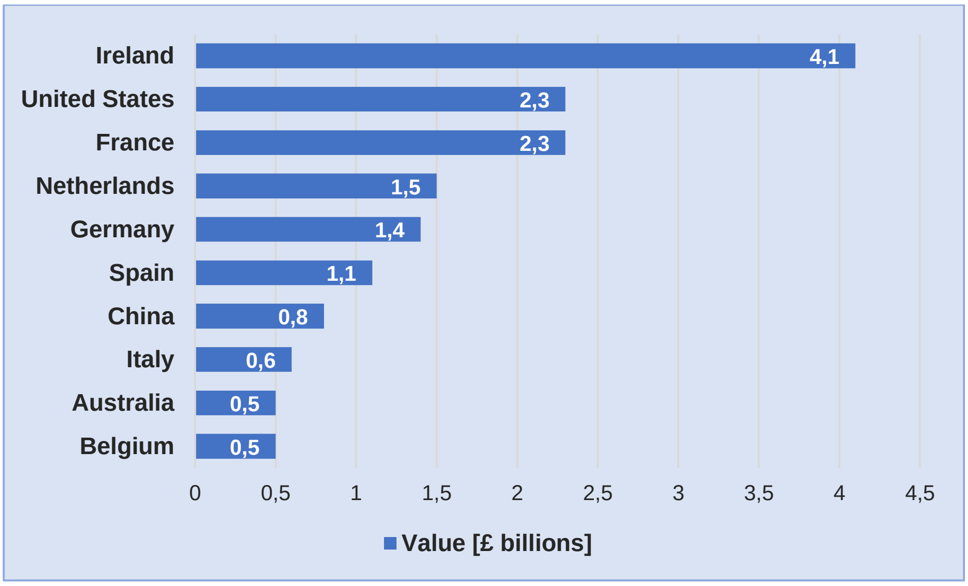

Figure 8: The UK's top trading export partners in 2019. Adapted from: UK Trade Info, 2020

In terms of products, F&B is the only category where the UK is running a trade surplus with the rest of the world. Moreover, the UK is the 2nd largest exporter of beverages in the world. This is mainly down to its specialisation in alcoholic beverages and particularly exports of whisky (The Manufacturer's Organsiation, 2017, p. 8), where the UK is the leading exporter globally, generating over £4.91 billion in export sales in 2019 (Scotch Whisky Association, 2020). The UK also exports a large amount of food products, as shown in Table 3.

Food Product	Value
Whisky	£5.0 bn
Salmon	£832.6 m
Chocolate	£775.7 m
Cheese	£707.7 m
Gin	£674.9 m
Wine	£661.0 m
Beef	£584.7 m
Pork	£583.1 m
Beer	£500.1 m
Breakfast cereals	£ 483.5 m

Table 3: Top ten of exported food product categories in 2019. Adapted from: FDF, 2020, p. 1

Dairy

Between 2015 and 2019, the UK on average exported 1.2 Mt of dairy products per year. During this period, more than 90% of exports were shipped to the EU, highlighting the significance of the EU market to the UK dairy industry. While the UK is generally a net importer of dairy products overall, it is a net exporter of fresh milk, cream, and milk powder (IHS Maritime & Trade, as citied in: AHDB, 2021a).

In volume terms, fresh milk and cream are the most significant export products for the UK dairy sector. Between 2015 and 2019, the UK exported on average 781 kt of liquid milk and cream per year, however, most of this (737 kt i.e. 94%) comprises movement across the Irish border (IHS Maritime & Trade, as citied in: AHDB, 2021a).

In value terms, cheese is the most significant export product for the UK dairy sector. The UK on average (2015-2019) exported 177 kt per year, with a value of £590 million (IHS Maritime & Trade, as citied in: AHDB, 2021a). This trade is also dominated by the EU, with Ireland and the Netherlands the main export destinations.

Beef

The UK exported an average of over 156 kt of beef and beef products per year between 2015 and 2019, equating to an average value of £463 million. Over this period, exports to the EU accounted for an average of 79% of all beef exports, highlighting the significance of the EU market to the UK beef industry. Ireland and the Netherlands are the key export destinations for UK beef, accounting for just over 49% of total exports (2015-2019 average). Hong Kong has been growing as a key export outlet in recent years, with exports having increased from 4 kt in 2013 to 15 kt in 2019 (IHS Maritime & Trade, as citied in: AHDB, 2021b).

Sheep meat

For UK sheep meat exports, the EU is the main destination, accounting for an average of 93% of total exports between 2015 and 2019. In this regard France and Germany are the UK's main EU trading partners. The main non-EU export market for UK sheep meat is Hong-Kong, accounting for an average of 62% of all non-EU export (2015-2019) (IHS Maritime & Trade, as citied in: AHDB, 2021c).

Pork

Between 2015 and 2019, exports of pork increased by 35% to stand at 350 kt in 2019. During this period, the value of exports grew by 90%, increasing from £291 million in 2015 to £553 million in 2019. Exports of fresh and frozen pork have accounted for the majority (62% in volume terms) of overall pig meat exports between 2015 and 2019 (IHS Maritime & Trade, as citied in: AHDB, 2021d).

The volume wise proportion of exports shipped to the EU has been in decline in recent years. While in 2013, 71% of pig meat exports were to EU member states. Exports to the EU plummeted to 50% by 2019. Thus, there seems to be a growing importance of exports to non-EU destinations (IHS Maritime & Trade, as citied in: AHDB, 2021d).

Within the EU, Ireland, Germany and the Netherlands are the main destinations for UK pork. Exports to China accounted for over a quarter of all exports in 2019, of which 57% were frozen products. In 2013, China accounted for 13% of UK pig meat exports, highlighting its importance as an emerging market. Also exports to the Philippines and the USA have grown sharply over the past few years. In 2019, the UK exported nearly 14 kt of pork and offal to the Philippines, making it the ninth largest export outlet (IHS Maritime & Trade, as citied in: AHDB, 2021d).

Poultry meat

For poultry meat, no current data is available at this time of this study, therefore, older data is analysed.

The UK exported 327 kt of poultry meat (including offal) on average between 2013 and 2017, meaning that the UK is a net importer of poultry meat. As with imports, the EU is the UK's major trading partner, accounting for an average of 73% of all UK poultry meat exports (2013-2017). The main non-EU destination is Hong Kong.

Cereals, oilseeds and oilseed products

Between 2015 and 2019, the UK exported an average of 596 kt of wheat. On average, in this period, 89% of UK wheat exports were sent to the EU. The other important non-EU markets for wheat exports, with a high export volume in 2015, 2016 and 2019, include Algeria and Morocco (IHS Maritime & Trade, as citied in: AHDB, 2021e).

UK barley exports to the EU from 2015 to 2019 averaged 91%. In recent years the UK has consistently been a net exporter of barley. Key non-EU importers of UK barley were Algeria, Saudi Arabia and Tunisia (IHS Maritime & Trade, as citied in: AHDB, 2021e).

UK flour is traded almost entirely within the EU, with exports to the Republic of Ireland particularly important. The UK is a net exporter of malt, most of which is shipped to non-EU destinations (AHDB, 2019a, p. 46).

On average, 97% of UK rapeseed exports were destined for the EU, mainly for use in biodiesel production (AHDB, 2019b, p. 8).

The UK is usually a net exporter of rapeseed oil (net exports between 2015 and 2020 have averaged 172 kt, with 83% shipped to the EU) (IHS Maritime & Trade, as citied in: AHDB, 2021f).

The UK also exports other oilseeds and oilseeds products, but only in very small quantities, e.g. 9 kt of sunflower seeds and 14 kt of linseeds in 2019 (IHS Maritime & Trade, as citied in: AHDB, 2021f).

Potatoes

The UK's main activity in potato exports is for seed potatoes. Average UK seed potato exports (2015-2019) were 99 kt (IHS Maritime & Trade, as citied in: AHDB, 2021g).

Seed potato exports are primarily destined for non-EU countries. Over the last years, Egypt has accounted for almost half of all UK seed potato exports. From 2015 to 2019, the share of non-EU exports increased by 29% (IHS Maritime & Trade, as citied in: AHDB, 2021g).

Processed potato products, such as crisps, are another key export area in the potato sector. Compared with seed potatoes, UK crisp exports increased between 2015 and 2019. The UK crisp market is saturated and so crisp manufactures have increasingly turned their attention to overseas markets (AHDB, 2019c, p. 4). The EU is the main destination for UK crisp exports, accounting for an average of 87% of all exports between 2015 and 2019. Ireland is the main customer of UK crisps, with shipments averaging out at 55% of total exports (IHS Maritime & Trade, as citied in: AHDB, 2021g).

Fruits and vegetables

In 2019, the fruits and vegetables exports amounted to 303 kt. Vegetable exports were worth £128 million in 2019, fruit exports £155 million (DEFRA, 2020e, p. 8). On average, 153 kt of fruit and 145 kt of vegetables were exported per year between 2015 and 2019. Among fruits, oranges (30 kt), bananas (40 kt) and apples (20 kt) were reported for the largest share of exports in terms of volume. Bananas and oranges were re-exports. In the case of vegetables, it was carrots and turnips with 28 kt on average between the years 2015 and 2019 (DEFRA, 2020f).

2.3 Summarising overview

In summary, the agri-food sector contributes only a small share to the UK economy with a GVA of 6.3% and employs four million people, out of a UK workforce of more than 32 million (Office for National Statistics, 2020). Nevertheless, the agricultural and fisheries sector may be significantly affected by Brexit, firstly if the availability of EU workers is restricted, and secondly because these two sectors are heavily regulated by EU policy. The outlook for these sectors will depend on what policy the government puts in place to replace the EU policies.

The high number of SMEs present in the sector may also become a critical factor. After Brexit, there will be a period of uncertainty as businesses in the agri-food sector figure out how the new rules (related to new regulations on labelling, import and export conditions, new distribution of official responsibilities, etc.) will be implemented. This could be a challenge for SMEs, as the implementation involves a certain financial effort that enterprises cannot afford. It is also questionable whether where is enough staff and thus know-how available in such enterprises to drive the implementation forward.

A closer look at the import situation shows that the largest trading partners are all from the EU. Especially in the product categories where the UK is a net importer, restrictions in trade with the EU can have a far-reaching impact. The critical product categories are those in which trade deficits are high (trade deficits in selected product categories are shown in Figure 9) and where self-sufficiency or domestic production is low.

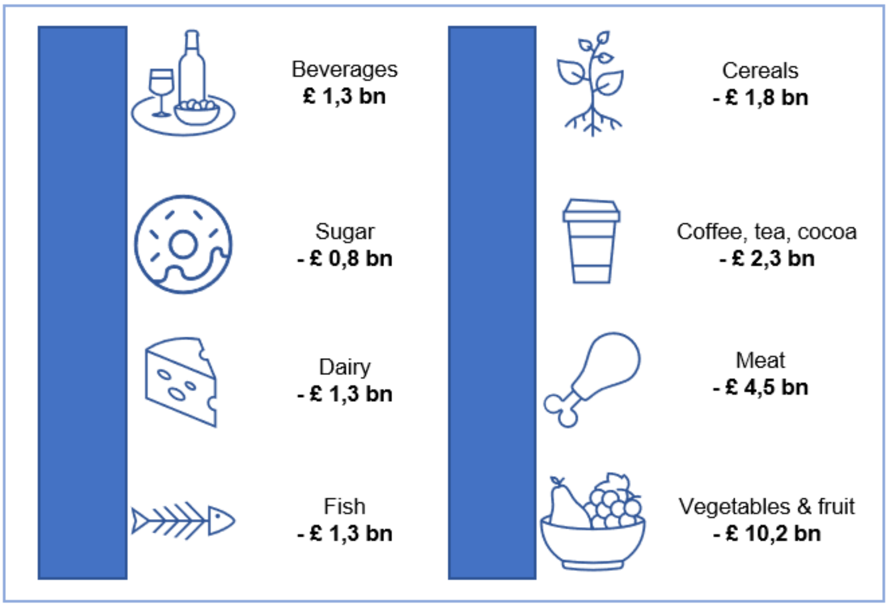

Figure 9: UK trade deficit (2019) in selected product categories. Source: UK Trade Info, 2020

This is particularly true for the horticulture sector, especially for fruits, for which domestic production is very low due to climatic conditions (for example bananas and oranges) (DEFRA, 2020f). Due to Brexit or the UK's status as a third country, significantly higher tariffs on the import of vegetables and fruits may occur (see section 3.3.3). A resulting problem can be an increase in prices (more details in section 3.3.1). Also critical is the meat sector, especially pork products. Since the UK does not have the capacity to meet domestic demand, it relies on imports. If tariffs are imposed on imports due to Brexit, this would again mean an increase in prices for consumer. However, it could also be an incentive for British industry to increase domestic production to avoid the higher import prices. Another critical meat product is sheep meat, especially legs. However, if domestic demand for individual animal parts like sheep meat legs is high, production of these should not necessarily be increased, as this would also produce other parts of the animal for which there is only little demand. In this case, imports should be increased.

Not all imports are used to meet domestic demand. For example, beef products are imported from Ireland to be exported again for further processing. The critical aspect here is how trade relations with Ireland will be post-Brexit. Restrictions and additional trade costs may also lead to increased domestic production, but it is questionable whether domestic and foreign demand can be met as a result.

When analysing the export situation, several critical factors are identified. If tariffs are imposed on exports to the EU in the wake of Brexit, this will primarily have an impact on the product categories in which the UK is a net exporter. The UK is a net exporter of barley, malt and rapeseed oil. If export tariffs are in place on these products after Brexit, this would lower the domestic prices by the amount of the tariff, which could have a negative impact on the profit margins for processing these products.

As Ireland is the one of the top trading partners of the UK, any restrictions at the border and tariffs on exports have a negative impact on trade. Large volumes of raw milk in the UK are exported for processing in the Irish Republic and proportion of the processed product is then exported back to the UK (AHDB, 2019a, p. 10). Tariffs on UK exports to the EU and/or UK imports from the EU would likely make this trade with Ireland uneconomical. More details on this can be found in section 3.3.2.

A critical issue, not only for the trade with Ireland, will be the future requirements for trade in products of animal origin. Although the UK is a net exporter of only a few animal products (fresh milk, cream, and milk powder), the quantities of animal products traded are not small. The Export of products of animal origin to the EU could be slowed down of the necessary export health certification process is slow or cumbersome. This plus additional tariffs and trade costs would limit trade in products of animal origin and make British products unattractive on the international market due to their reduced price competitiveness.

A deeper analysis of the consequences for trade in agricultural products can be found in section 3.3.

3 Analysis of Brexit impacts on the UK agri-food sector and trade

There are several models of how the EU can relate to non-member states. In the following section, five of these models will be analysed in more detail to determine their advantages and disadvantages in comparison with EU membership.

3.1 Presentation of the post-Brexit trade scenarios

The possible terms of a future relationship between the UK and the EU can be characterised as five "harder" or "softer" variants, as Figure 10 shows. These variants and the baseline scenario, the EU membership, are briefly presented and then analysed in the following section according to their key features.

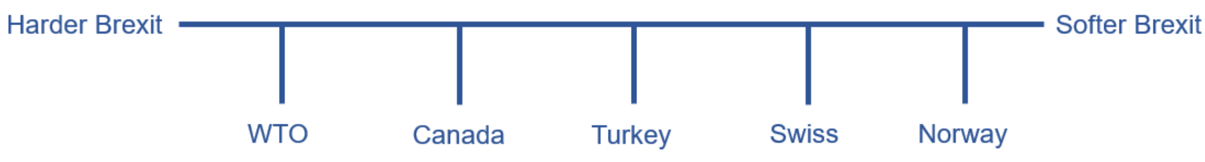

Figure 10: Brexit variants. Adapted from: Hix, 2018, p. 2

The decisive key feature in this assessment is access to the EU single market. The more restricted the market access, the "harder" the respective scenario is assessed. Other important key features are also analysed. An overview of all key features and their meanings is shown in Table 4.

Key feature	Meanings
Access to the EU single market	➢ Free movement of goods: Full preferential access (all goods traded between the country in question and EU member states are free from tariffs) or partial access (some goods, normally agricultural products, are subject to tariffs). ➢ Free movement of persons: The rights for EU nationals to enter, live and work in another EU member state
Non-EU markets	The trade with countries outside the EU and the possibility to negotiate and conclude (free) trade agreements with these countries.
	Requirements
Financial contribution	Contribution to the EU budget.
EU rules and legal system	Implementation of EU rules concerning the single market and compliance with EU rules and legislation when exporting to the single market.
Influence over EU rules and legislation	The ability and/or obligation to be consulted on EU rules and legislation and the possibility to influence EU laws or legislation.

Table 4: Key features of the post-Brexit trade scenarios

3.1.1 Baseline scenario: EU-Membership

The EU is an international organisation formed by 28 countries, with a combined population of 508 million people. The UK joined in 1973 alongside Ireland and Denmark (HM Government, 2016c, p. 7). Until December 31st 2020, the terms of the UK's trade are predicated on its membership of the EU. The analysis of the EU-Membership is presented in Table 5.

EU-Membership	
Access to the EU single market	➢ Free movement of goods: • No customs barriers, tariffs, quotas, or duties between the EU countries • Common set of rules ➢ Free movement of persons: All EU citizens can live and work anywhere within the EU area
Non-EU markets	➢ No permission to negotiate other bilateral trade deals

	➢ Part of the EU's existing Free Trade Agreements (FTAs) covering 53 markets
Requirements	
Financial contribution	➢ "Membership fee" to the EU, which supports several EU policies and programmes, including the CAP ➢ The UK receives funding from these programmes and a rebate on its net contribution
EU rules and legal system	EU directives are legally binding, but member states must pass their own laws to put them into practice
Influence over EU rules and legislation	The UK is represented in all the EU institutions which take decisions and approve laws that apply to the UK

Table 5: Analysis of the key features of EU membership. Adapted from: HM Government, 2016c, p. 7-29

3.1.2 Scenario 1: WTO model

The UK was an original contracting partner to the General Agreement on Tariffs and Trade in 1947 and a founding member of the WTO. As a result, the UK is and will remain a WTO member, regardless of its relationship with the EU or other countries. The WTO agreements will continue to apply to the UK's trade relations worldwide (Molinuevo, 2018, p. 601).

The WTO provides a global framework for trade relations between its 162 members. In the absence of any other arrangements between the UK and the remaining EU countries, the UK would fall back on its WTO membership as the basis of its trading relationship with the EU in the same way as, for example, Brazil or Russia. The WTO rules represent a minimum threshold for trade to take place (HM Government, 2016b, p. 92). Were the UK to default to WTO rules, tariffs on UK exports to the EU would be based on the EU's standard most favoured nation (MFN) tariffs, which the EU currently applies to third countries. This would contrast with a 0% tariff on trade with the EU at present (HM Government, 2016b, p. 95). The analysis of the WTO model is presented in Table 6.

The WTO model	
Access to the EU single market	➢ Free movement of goods: • Each member must apply the same tariffs to all • No automatic provision for preferential access to the Single Market: The EU must impose a common external tariff on exports from non-EU member states • EU MFN tariffs to UK agri-food exports ➢ Free movement of persons: no provision for free movement of persons

Non-EU markets	This key feature does not apply in this scenario, as the UK would become a non-EU or third country.
Requirements	
Financial contribution	None
EU rules and legal system	➢ Exporters must comply with EU rules and regulations when exporting to the single market ➢ WTO members are not subject to the European Court of Justice (ECJ) rulings
Influence over EU rules and legislation	WTO members have no formal ability to influence over EU laws or regulations

Table 6: Analysis of the WTO model. Adapted from: Dhingra & Sampson, 2016, pp.7-9; HM Government, 2016a, p. 37; HM Government, 2016b, p.93; PwC UK, 2016, pp. 16-17

3.1.3 Scenario 2: Canadian model

An FTA is an agreement between two or more countries that aims to liberalise the trade of goods and/or services. Rather than providing completely free trade, FTAs provide preferential market access relative to a situation in which no such agreement exists. The main benefit of FTAs is lower tariffs than those prescribed by the WTO: FTAs reduce or eliminate tariffs and remove quotas on imported and exported goods (HM Government, 2016b, p. 36).

The agreement between the EU and Canada goes further than any existing EU trade deal. Negotiations between the EU and Canada took seven years and were concluded in 2014. CETA has been provisionally applied since September 2017. This, however, applied only to those chapters for which the EU undisputedly has sole responsibility. The agreement now needs to be ratified by the parliaments of all 28 EU member states before it can fully enter into force (Federal Ministry for Economic Affairs and Energy, n.d.). The analysis of the Canadian model is presented in Table 7.

The Canadian model	
Access to the EU single market	➢ Free movement of goods: 98% of EU goods enter Canada free of tariffs and duties ➢ Agricultural tariffs are eliminated in most areas, but trade in beef, pork, poultry and fruit and vegetables are subject to tariff rate quotas (TRQs), beyond which they will be subject to the EU's MFN tariffs ➢ Free movement of persons: no obligation to accept free movement of persons

Non-EU markets	➢ Not part of the EU's existing FTAs ➢ Canada is free to negotiate and agree free trade deals with other countries
Requirements	
Financial contribution	None
EU rules and legal system	➢ Exporters must comply with EU rules and regulations when exporting to the single market ➢ No subject to ECJ rulings
Influence over EU rules and legislation	Canada has no formal ability to influence EU laws or regulations

Table 7: Analysis of the Canadian model. Adapted from: European Commission, 2016. pp. 2-7; HM Government, 2016a, p. 30-34; Matthes & Busch, 2016, pp. 12-14; PwC UK, 2016, p.16

3.1.4 Scenario 3: Turkish model

The CU with Turkey has been in force since 1995 and is based on the 1963 Ankara Agreement and its Additional Protocol (1970). It provides, inter alia, for free circulation between the two parts of the CU for goods which are either wholly manufactured or released for free circulation after importation from third countries into Turkey or the EC and for the alignment of Turkey with the Community's Common Custom Tariff including preferential arrangements and harmonisation of commercial policy measures (European Commission, n.d.b). The analysis of the Turkish model is presented in Table 8,

The Turkish model	
Access to the EU single market	➢ Free movement of goods: • Access to the EU market in industrial and processed agricultural products: no tariffs, quotas or duties are placed • The CU does not apply to raw agricultural products on which third-country tariffs and TRQs are levied ➢ Free movement of persons: no obligation to accept free movement of persons
Non-EU markets	➢ Not part of the EU's existing FTAs ➢ Turkey can negotiate and agree trade agreements with other non-EU countries, but its external tariffs must be aligned with the EU's external tariff
Requirements	

Financial contribution	None
EU rules and legal system	In areas where Turkey has access to the EU market, it is required to enforce rules that are equivalent to those in the EU, like competition, product and environmental rules
Influence over EU rules and legislation	Turkey has no formal ability to influence EU laws or regulations

Table 8: Analysis of the Turkish model. Adapted from: HM Government, 2016a, pp.29-30; HM Government 2016b, p.91; Piris, 2016, p.9; Matthes & Busch, 2016, p. 15

3.1.5 Scenario 4: Swiss model

Switzerland has a closer economic relationship with the EU than any other country outside the European Economic Area (EEA). This relationship is based upon a series of bilateral treaties governing Switzerland-EU relations (Dhingra, et al., 2017, p. 6). Overall, more than 100 bilateral agreements currently exist between the EU and Switzerland. Bilaterals I signed in 1999 included an agreement on agriculture and Bilaterals II signed in 2004 included an agreement on processed agricultural products (Farmer Scientist Network, 2016, p. 34). Being a member of the European Free Trade Association (EFTA), Swiss trade agreements are usually concluded in the EFTA framework. The EFTA is the intergovernmental organisation of Iceland, Liechtenstein, Norway and Switzerland (European Commission, 2021b). The analysis of the Swiss model is presented in Table 9.

The Swiss model	
Access to the EU single market	➢ Free movement of goods: • Access to the Single Market in all non-agricultural products, agricultural products are subject to customs duties and TRQs • The agreement on trade in agricultural products regulate the dismantling of tariff and non-tariff barriers. Currently there are tariff concessions in the following areas in particular: fruit, vegetables and meat and wine specialities • Not a member of the EU CU, so there are customs checks between Switzerland and EU member states ➢ Free movement of persons: • Switzerland has a Free Movement of Persons Treaty with the EU
Non-EU markets	➢ Not part of the EU's existing FTAs ➢ Switzerland has the right to conclude its own bilateral agreements with non-EU member states. ➢ It can also negotiate free trade agreements as part of the EFTA

Requirements	
Financial contribution	Pay a fee to participate in EU programmes.
EU rules and legal system	➢ Switzerland must adapt domestic regulations to reflect EU laws and regulation relating to those parts of the single market in which it participates ➢ It is not formally bound by rulings of the ECJ, although in some areas ECJ rulings apply
Influence over EU rules and legislation	➢ Switzerland has no formal right to be consulted on EU legislation and very limited informal influence over them ➢ It is not represented as a member within EU institutions

Table 9: Analysis of the Swiss model. Adapted from: Bowers, et al., 2016, p.30; HM Government, 2016a, p.26; HM Government, 2016b, p.90; Matthes & Busch, 2016, pp. 11-12; Schweizerische Eidgenossenschaft, 2019a, p.1; Schweizerische Eidgenossenschaft, 2019b

3.1.6 Scenario 5: Norwegian model

Staying in the EEA but exiting the EU CU is often referred to as the Norwegian model. The EEA was established in 1994 to give countries that are not part of the EU a way to join the single market. The EEA comprises all members of the EU together with three non-EU countries: Iceland, Liechtenstein, and Norway. There is free movement of goods, services, persons and capital within the EEA and, since EEA members belong to the single market, they must abide by the EU's economic rules including legislation regarding employment, consumer protection, product standards, environmental and competition policy (Dhingra, et al., 2017, p. 5). The EEA agreement provides for a high degree of trade liberalisation in most sectors. However, agriculture and fisheries are not covered by the EEA agreement. Nevertheless, Article 19 of the EEA Agreement underlines the obligation of the contracting parties to progressively liberalise agricultural trade by concluding separate agreements on this basis. As a result, the EU and Norway came in 2017 to an agreement which will facilitate bilateral trade in agricultural products (European Commission, 2017). The analysis of the Norway model is presented in Table 10.

The Norway model	
Access to the EU single market	➢ Free movement of goods: • Considerable but not unlimited access to the Single Market in industrial goods – with some restrictions on agricultural products: meat, dairy, grains, vegetables and cereals are subject to TRQs

	• No member of the EU CU so there are customs checks between Norway and EU member states ➢ Free movement of persons: • free movement of persons within the EU and EEA areas
Non-EU markets	➢ Not part of the EU's existing FTAs ➢ It has the right to conclude its own bilateral free trade agreements with non-EU member states ➢ Norway can also negotiate free trade agreements as part of the European Free Trade Association
Requirements	
Financial contribution	➢ Norway makes a significant contribution to the EU budget including research programmes and education ➢ Does not contribute to the CAP funding
EU rules and legal system	➢ All EEA members must automatically implement all EU rules concerning the Single Market ➢ All must comply with ruling of the EFTA court – in most cases these rulings follow ECJ principles
Influence over EU rules and legislation	➢ EEA members have the right to be consulted on laws and regulations but there are limited channels for formal influence ➢ Norway is not represented as a member within EU institutions

Table 10: Analysis of the Norwegian model. Adapted from: HM Government, 2016a, pp. 18-19; HM Government, 2016b, p.89; Matthes & Busch, 2016, pp. 7-8; PwC UK, 2016, p. 17

3.1.7 Summarising overview

In the following, the key features of the five post-Brexit trade scenarios are briefly summarised and then analysed in terms of their advantages and disadvantages compared to EU membership. Table 11 breaks down the key features of each scenario.

Key features	**Scenarios**				
	Norway	***Swiss***	***Turkey***	***Canada***	***WTO***
Access to the EU single market					
Free movement of goods	Largely	Largely	Largely	Largely	No
Free movement of persons	Yes	Yes	No	No	No
Renegotiation of FTAS	Yes	Yes	Yes	Yes	Yes
Loss of co-decision rights in the EU	Very largely	Yes	Yes	Yes	Yes

Obligation to adopt EU regulations	Very largely	Largely	Partly	Partly	No
Financial contribution to the EU	Very largely	Largely	No	No	No
Independent negotiation of trade deals	Yes	Yes	Limited	Yes	Yes

Table 11: Analysis of the five post-Brexit trade scenarios

Based upon a comparison of key features, as presented in Table 11, an agreement based on the Norwegian model would come closest to EU membership (especially free access to the Single Market). Norway is part of the EU single market (although there are exceptions for some agricultural products) but not a member of the CU. This means that trade in industrial goods is not subject to customs duties but is subject to costly customs clearance regulations and rules of origin (Matthes & Busch, 2016, p. 7). There is also free movement of goods, services, people and capital within the EEA. Due to the free movement of people migrant workers from EU can work in agriculture. This aspect would be of particular interest to the Eurosceptics, as the lack of control over migration has been one of their main objections to British membership of the EU.

The EEA agreement means that EU laws in areas such as employment, environmental policy and competition policy continue to apply, although the CAP is not included in the EEA. Norway has its own domestic farm policy instruments and provides a higher level of support for producers that within the CAP (Farmer Scientist Network, 2016). Leaving the CAP leads to the UK having to develop a new agricultural policy.

Norway is also to conclude trade agreements independently of the EU. However, FTAs with third countries negotiated by the EU would no longer apply to the UK, so they would all have to be renegotiated. This could be problematic as it is a time-consuming process, and the UK might not be able to conclude FTAs with the same terms as negotiated by the EU.

One criticism of the Norway model is “integration without representation”. As a member of the EEA the UK must implement EU single market policies, but without representation in EU decision making. Norway’s influence on the further development of the legislation is very limited. The country has only a non-binding right of consultation in the further development of the EU’s single market legislation and can at best attempt to exert influence at a very early stage (Matthes & Busch, 2016, p. 8). Moreover, Norway also pays a member fee to be part of the single market. They do this by contributing to the EU’s regional development funds and contributing to the costs of the EU programmes in which they participate (Dhingra, et al., 2017, p. 5).

Switzerland is not a member of the EU or the EEA. Instead, it has negotiated a series of bilateral treaties governing its relations with the EU. Usually, each treaty provides for Switzerland to participate in a particular EU policy or programme. Switzerland is also a member of EFTA, which provides for free trade with the EU in all non-agricultural goods and allows Switzerland to negotiate FTAs independently of the EU. The bilateral treaty approach allows Switzerland the ability to choose the EU initiatives in which it wishes to participate. Through EFTA membership and an agreement covering technical barriers to trade, Switzerland has achieved a similar level of goods market integration with the EU as EEA countries (Dhingra & Sampson, 2016, pp. 5-6). Rules of origin apply to trade, but there are cost savings through simplified and harmonised rules (e.g. cumulation in the (Pan-European) Mediterranean region) (Matthes & Busch, 2016, p. 10).

Bilateral I also include the agreement on the free movement of persons, which entered into force in 2002 and which Switzerland largely grants to EU citizens (Schweizerische Eidgenossenschaft, 2019b). The bilateral agreements require Switzerland to adopt EU rules, but it, like the EEA states, has no say in the EU's decision-making process on new regulations and can only try to exert influence in the early decision-making stage. Switzerland also makes payments to the EU: it participates financially in the EU's cohesion policy (Matthes & Busch, 2016, p. 11).

Switzerland is not a member of the CAP either, so it had to develop its own agricultural policy. Switzerland provides a higher level of domestic agricultural support than the EU. Together with Norway, South Korea and Japan, Switzerland is one of the countries where more than half of agricultural revenues are attributable to policy measures (OECD, 2015, p. 14).

Unlike Norway and Switzerland, the EU and Turkey form a CU. This has the advantage that the free movement of goods, except for certain agricultural products, is not hindered by rules of origin, as both comply a common external tariff for imports from third countries. However, access to the EU's free movement of goods is limited in one important respect. Turkish companies wishing to export to the EU must comply with EU rules and product regulations, and thus may have to produce different product variants than for the Turkish market, at great cost (Matthes & Busch, 2016, p. 14). The Agreement with Turkey provides some limited migration rights for Turkish nationals to reside in the EU (HM Government, 2016a, p. 29), Turkey itself does not grant EU citizens free movement of persons (Matthes & Busch, 2016, p. 15).

While Turkey can agree trade agreements with countries outside the EU, as part of the CU, Turkey's external tariffs must be aligned with EU tariffs. When the EU signs a trade agreement with a third country, such as South Korea, Turkey must give that country access to its own market on the same terms. But this obligation is not reciprocal. The third country is not required to open its market on the same terms to Turkish exports. Instead, Turkey must negotiate separate trade deals with these countries (HM Government, 2016a, p. 30).

Turkey has no role in EU-decision making and does not contribute to the EU budget but receives payments from the EU (HM Government, 2016a, p. 30).

In the Canadian model 98% of EU goods enter Canada free of tariffs and duties (except for certain agricultural products). Canadian exports to the EU are subject to rules of origin and costly customs clearance procedures but these are to be reduced through improved cooperation between the authorities (Matthes & Busch, 2016, p. 13). They also must comply with EU rules such as technical regulations, health, food or phytosanitary rules (European Commission, 2016, p. 8). Trade between the EU and Canada is bound by rules of origin. Canadian companies have to prove that a sufficient proportion of the product was originally made in Canada in order to qualify for preferential tariff rates (HM Government, 2016a, p. 31). In favour of the model is the fact that no financial contribution must be paid to the EU and that Canada predominantly retains national sovereignty in setting regulations (Matthes & Busch, 2016, p. 14). Regarding the free movement of persons, Canada must (like the EU) in future allow the right of temporary entry for EU workers (European Commission, 2016, p. 11).

The “hardest” variant, the WTO model, would mean the loss of both the free movement of goods and persons. The UK would also lose preferential market access to more than 50 countries with which the EU has trade agreements. They could seek to negotiate new agreements, but this would be very time consuming, and they might not be able to replicate the conditions that applied before Brexit. The WTO model involves the fewest direct obligations to the EU. WTO countries which do not have preferential trade agreements with the EU are not required to implement EU legislation and to contribute to EU budget. However, UK businesses would still have to comply with EU rules to trade with the single market (HM Government, 2016a, p. 37).

In summary, none of the five models provided access to the EU single market to the extent that EU membership does. Especially on agricultural products, all models impose specific tariffs at different levels, while in the EU there is duty-free trade. In addition, there are non-tariff trade barriers such as SPS-checks, rules of origin, etc. None of the models offer the benefits of EU-negotiated trade agreements (an overview of the EU’s current trade agreements is provided in Appendix II). All trade agreements would have to be renegotiated, which is likely to be very time-consuming, and it is also unclear whether the UK is likely to be able to negotiate the agreements on EU terms due its reduced bargaining power.

All scenarios have in common that the agreements with the EU do not cover CAP and CFP, which means that the UK will withdraw from them. However, this could be advantage for the UK. These two policies are considered bureaucratic and outdated (more details in sections 3.2.1 and 3.2.2). The UK could therefore use this opportunity to adapt these policies to the UK's needs. However, this process is fraught with uncertainty for farmers and fishermen, as they depend on the financial support of the CAP and the CFP and the amount of this subsidies must first be renegotiated.

As far as the free movement of persons is concerned, this element is not present in every scenario. On this point, it is questionable to what extent the UK is willing to make concessions as immigration and the free movement of persons within the EU have been key aspects of the Brexit debate (NFU, 2017, p. 5). The analysis of the five scenarios showed that the models with free movement of persons also had the largest access to the EU single market. It can therefore be concluded that the UK will have to compromise on the extent of access to the EU single market in the negotiations with the EU if it wants to forego the free movement of persons.

A tabular overview of the pros and cons of the respective post-Brexit trade scenarios can be found in Appendix III.

Through the analysis of the five post-Brexit trade scenarios, five factors can be identified that could impact the UK agri-food sector and trade in agricultural products:

- Withdrawal from the CAP
- Withdrawal from the CFP
- Availability of EU labour
- Tariff barriers
- Non-tariff trade barriers

How exactly the impacts of these factors will play out is analysed in more detail in the next two sections.

3.2 Analysis of the impacts on the UK agri-food sector and agri-food trade

The impacts of the factors identified in the previous section are now analysed in more detail. The UK must withdraw from the CAP and CFP, as the agreements with the UK do not cover this policy area. The availability of EU labour is affected by the free movement of persons, a key feature not included in every scenario. Tariff and non-tariff trade barriers come from limited or non-existent access to the single market.

3.2.1 Withdrawal from the CAP

The CAP is one of the EU’s oldest policies. Launched in 1962, the original purpose of the CAP was to encourage better productivity in the food supply chain in the years following World War II, thereby providing a fair standard of living for the agricultural community, stabilising the market, and ensuring the availability of food to European consumers at reasonable prices (European Union Committee, 2017a, p. 10).

The EU’s powers to legislate in respect of agriculture are set out in Articles 38 to 44 of the TFEU. These provide that the EU must implement a CAP which extends the single market to agriculture and trade in agricultural products, subject to special rules which do not apply to other products traded in the single market. Article 40(2) of the TFEU provides that these special rules may include “[…] *regulation of prices, aids for the production and marketing of the various products, storage and carryover arrangements and common machinery for stabilising imports and exports.”* (Art.40(2) TFEU). In Appendix IV the main components of the CAP are shown in detail.

CAP has undergone significant changes through a series of reforms since 1992, but its basic two-pillar architecture remains unchanged:

- Pillar one payments are direct income support payments to farmers (through the Basic Payment Scheme). To remove any incentive to overproduce, payment is based on the amount of land a farmer owns, not how much they produce. To qualify for payment, farmers must meet certain standards on environmental management, animal welfare standards and traceability (Lightfoot, et al., 2017, pp. 19-20). Member states can also apply market support measures in certain conditions. These measures are part of the Common Market Organisation regulation (CMO). This is the set of rules used to organise the single market for agricultural products. The rules cover a wide range of provisions from market safety nets such as public intervention, exceptional measures in the case of market disturbances such as animal disease outbreaks, marketing standards, trade provisions and various operational programmes for particular sectors, e.g. fruits and vegetables, wine and hops (Coe S. D., 2018, p. 17). The principal EU legislation which governs direct payments under pillar one is regulation (EU) 1307/2013 of the European parliament and of the council.
- Pillar two subsidies are for specific rural development and environmental programmes and require co-financing from member states. The EU describes the purposes of this as: fostering the competitiveness of agriculture ensuring the sustainable management

efraof natural resources, combating climate change, and creating employment in rural communities (Lightfoot, et al., 2017, pp. 19-20). The principal EU legislation which governs the rural developments regime is regulation (EU) 1305/2013 of the European parliament and of the council.

CAP spending has shrunk over the last decades, but it still represents 37.8% of total EU expenditure. Most of it is allocated to direct payments, which make up approximately 70% of the CAP budget and more than a quarter of the EU budget. Pillar two spending accounts for 8.8% of total EU spending (Policy Department for Structural and Cohesion Policies , 2017, p. 25).

In the 2019 CAP financial year (the CAP financial year begins on the preceding 16th of October and ends 15th of October), total expenditure on CAP schemes in the UK came to €4.2 billion as shown in Table 12. Most of this was on direct aids under pillar one of the CAP and was funded entirely from the EU budget. Expenditure on pillar two was shared between the EU budget (€776k) and the UK HM Treasury (€267k) under the co-financing rules.

	UK	***England***	***Wales***	***Scotland***	***NI***
Pillar one	3.228	2.100	324	539	324
Direct Aids	3.186	2.058	324	539	324
Market price support	42	42	-	-	-
Pillar two	1.001	572	132	245	52
EU funded	776	502	93	159	22
UK funded	225	70	39	86	30
Total	**4.229**	**2.672**	**397**	**784**	**376**

Table 12: All CAP payments by funding stream, 2019, € million. Source: DEFRA, 2020a, p.106

After Brexit (and the transition period) UK agriculture will be operating outside of the EU's CAP, regardless of the Brexit scenario. This is because the CAP is not open to association with third countries (Cabinet Office, 2018, p. 10). The fact that the UK will no longer be a contributor to the above-mentioned funds means uncertainty as to the size of these budgets after 2020. In 2019/20, the basic payment accounted for a substantial proportion of average farm business income for all farm types (DEFRA, 2020b, p. 11). Any reduction in payments made to farmers under either scheme may impact the agriculture sector, especially if combined with less competitive agri-food exports. Particularly reduced payments would put pressure on smaller farmers, so that they could no longer be viable. Negative effects could also impact the UK economy, due to the reduced spending power in rural communities (Hederman & Durkin, 2018, p. 3).

Departure from the CAP after Brexit requires the formulation of a new British agriculture policy. Currently, EU CAP funding is allocated by the UK government to the devolved administrations and the basis for this is set out at the beginning of each seven-year CAP "round". The UK government has guaranteed current levels of funding until 2022 across the UK which will continue to be ring-fenced for agriculture and the rural economy (Downing & Coe, 2018, p. 16). The need of a new domestic agriculture policy gives the UK Government and devolved legislation the opportunity to revise farm subsidies and incentives and the general operating environment for farm businesses. What support for agriculture looks like in other non-EU countries is shown in Appendix V.

In 2018, the Agriculture Bill has already been passed, which contains 25 delegated powers, five of which allow ministers to amend primary legislation. This 2018 Bill aims to help most parts of the UK to develop their approaches to supporting farm businesses whilst meeting international trading obligations (Coe S. D., 2018, p. 4).

3.2.2 Withdrawal from the CFP

Following Brexit, the UK will no longer be part of the CFP. This will have several implications for fisheries as will be shown in this section. An overview of the main components of the CFP is presented in Appendix VI.

Being no longer a part of the CFP, the UK will become an independent coastal state and be fully responsible for managing fisheries in the UK's exclusive economic area (EEZ) as can be seen in Figure 11. This will include setting total allowable catches, distributing quotas and determining who has access to fisheries, following Art. 61 (1) of the UN Convention on the Law of the Sea: *"The coastal State shall determine the allowable catch of the living resources in its exclusive economic zone"* (Art. 61(1) UNCLOS).

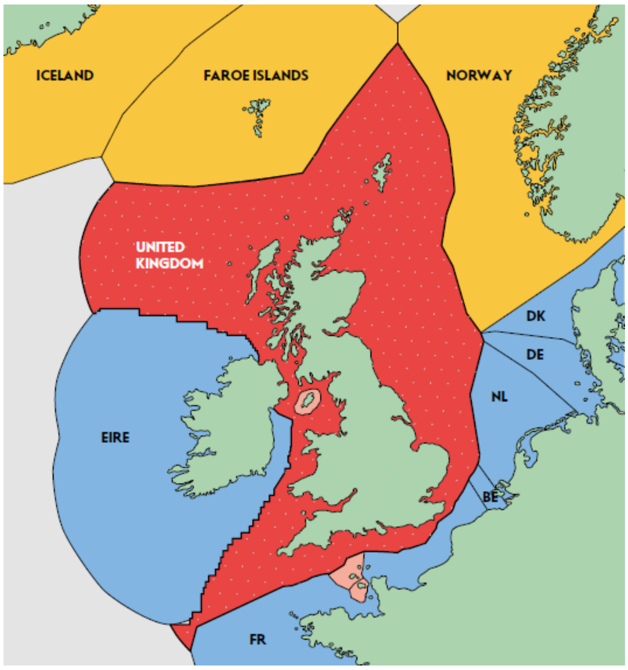

Figure 11: The UK 200 nautical miles EEZ. Source: Carpenter, 2017, p.11

Declaring an EEZ would most directly impact on which fishing vessels can access these waters, as described in Table 13:

	6-12 Nautical Miles	12-200 Nautical Miles
Before Brexit	Fishing by non-UK vessels is restricted to those with historic rights, subject to quota, under CFP exemptions (Art. 5 (2) Reg. (EU) No 1380/2013).	EU vessels and vessels from countries with which the EU has agreements, have access subject to quota (Art. 5 (1) Reg. (EU) No 1380/2013).
After Brexit	These historic rights may remain under the London Convention 1964.	The UK will assume control of its EEZ and be able to control access. UK vessels' access to EU waters will depend on negotiations.

Table 13: Access to UK waters before and after Brexit. Adapted from: Kenyon, 2017, p.11

The key question is to what extent the UK will grant the EU access to UK EEZ and vice versa. Enabling the UK to exclude EU fishers from the UK's EEZ could result in the amount of fish available to UK fishers. The NAFC Marine Centre examines how much fish and shellfish is caught within the UK's EEZ by EU fishing boats, and by UK boats in other areas of the EU EEZ. The results indicate that over the five-year period from 2011 to 2015:

- Less than half of the fish and shellfish landed from the UK EEZ by EU fishing boats (43% by weight) was caught by UK boats.

- If landings by non-EU (Faroese and Norwegian) fishing boats are included, UK boats' share of the total landings from the UK EEZ falls to less than one-third of the total (32% by weight).
- Non-UK EU fishing boats landed about 700,000 tonnes of fish and shellfish, worth almost £530 million, from the UK EEZ each year on average.
- UK fishing boats landed 92,000 tonnes of fish and shellfish, worth about £110 million, from other areas of the EU EEZ each year on average.
- Non-UK EU fishing boats therefore landed almost eight times more fish and shellfish (by weight) from the UK EEZ than UK boats did from other areas of the EU EEZ, or almost five times more by value (Napier, 2017, p. 7).

Further issues could also include possible exclusion of UK vessels from EU waters, the implications of damaging fish trading relationships with Europe and the capacity of marine enforcement services to monitor, patrol and exclude EU fishing boats from the entirety of the UK's EEZ (Hirst, 2017, p. 12).

As a future independent coastal state the UK will be responsible for co-operating with other coastal states to manage shared fish stocks. The sharing of quota is a potential impact with significant implications for economic performance. Cooperation on sharing stocks is required as many fish stocks are migratory and therefore cross EEZ boundaries. Fish populations could be damaged if countries failed to coordinate on fishing effort. Most of the fish stocks found in the waters of the UK are shared with the EU, Norway, the Faroe Islands or, in some cases, all three (European Union Committee, 2017c, p. 14). The current relative stability mechanism favoured by the EU is perceived as unfair by the UK fishing sector, as the fishing opportunities it regulates are based on historic rights under the 1964 London Convention. The UK fishing sector is advocating reclaiming UK waters for UK vessels, termed "zonal attachment". Zonal attachment is a principle in which shared fish stocks should be divided between the parties based on the proportion of fish stock present in each EEZ. As there are certain fish stocks that are found within the UK EEZ that the UK fleet does not target, zonal attachment might be a possible outcome, but on the basis that quota shares are renegotiated based on the priority stocks for each side. This concept is already used in the EU-Norway agreement for the sharing of total allowable catches for joint stocks (Walmsley, 2016, p. 3).

Withdrawal from the Common Fisheries Policy (CFP) will mean that existing fisheries management practices need to be reviewed and adapted to the UK. For example, fisheries management measures could be fishing with sustainable limits through a quota system. Nevertheless, Brexit management will need to be well-coordinated with the EU given the extent to which stocks are shared. It could be that the UK will have less influence over the management measures of some stocks, as it may have less ability to participate in discussions with EU member states (Hirst, 2017, pp. 16-17).

As outlined in section 2.1.3, the UK fishing industry employs a significant number of non-UK nationals. Leaving the EU thus creates potential problems both in terms of the existing migrants working in the EU fishing industry as well as attracting EU migrants in the future.

In terms of economic impacts for the UK fishing fleet, the ending of free movement of EU labour would be expected to increase crew wages to attract local workers and as a result, decrease profibility.

After the Fisheries Bill, which contained powers for the government to set and distribute fishing opportunities and provided powers for the government to set and distribute fishing opportunities and exclude foreign vessels from UK waters, failed to get past the committee stage in the House of Commons, the government set out its intention to bring forward a new Fisheries Bill (Ares, 2019a, p. 3).

Just as with the CAP, withdrawal from the CFP will occur under each of the five post-Brexit trade scenarios.

3.2.3 Availability of EU labour

As already made clear in section 2.1, the agri-food sector and especially the agricultural sector is heavily dependent on EU labour. This dependency has increased in recent years due to the seasonal nature of demand and falling unemployment in the UK.

Control of immigration was one of the key objectives of the "Vote Leave" campaign, so it would seem unlikely that free movement of persons between the EU and UK will remain in place beyond Brexit. The existing models of EU association without full membership illustrate that accepting the principle of free movement of labour may be the price the UK has to pay to gain free access to EU markets. Without an agreement on this matter, it may be that the UK is unable to access the free market on the same terms as for example, Norway or Switzerland. Restricting free movement would mean that the UK economy could react differently to growth opportunities. If unilateral trade agreements opened new potential market for agricultural produce, a shortage of appropriate labour could mean that higher wages and the resulting increased cost of production would have negative impact on the UK's productivity and competitiveness. If this happened at the same time the UK opened to free trade and new low-cost competition from emerging markets, some UK-based businesses may find it even harder to complete (AHDB, 2016b, p. 3).

There are several options for ensuring that the agricultural sector has the workforce it needs post-Brexit. One option is schemes to maintain the current availability of migrant labour (AHDB, 2016b, p. 10). The first Seasonal Agricultural Workers Scheme was introduced in 1945 in response to labour shortages after World War 2. Initially an exchange programme encouraging students to work in UK agriculture during harvest times, it evolved as a flexible tool to meet changing labour demands in the agricultural sector. In its last phase the scheme allowed fruit and vegetable growers to employ migrant workers from Bulgaria and Romania to do short-term, low-skilled agricultural work for a maximum of six months. The Seasonal Agricultural Workers Scheme was closed at the end of 2013 upon the lifting of restrictions on the free movement rights of Bulgarian and Romanian citizens (McGuiness & Garton Grimwood, 2017, p. 3).

The UK already runs a five tier points-based style system for immigration for non-EU nationals:

- Tier 1 – Entrepreneurs, investors, exceptional talent
- Tier 2 – Highly skilled workers
- Tier 3 – Low-skilled workers filling specific temporary labour shortages
- Tier 4 – All student visas
- Tier 5 – Temporary workers and youth mobility

Tier 3 is currently suspended by the Government. A strong supply of labour from the EEA, members of which do not require visas to work in the UK, has meant is has not been required since the points-based system was implemented in 2008 (AHDB, 2016b, p. 11).

Currently, 96% of migrants employed on UK farms would fail entry under the UK system. This is because the vacancies being filled would not meet the requirements for Tier 1 or 2. A new developed scheme, specific to agriculture, could be used to maintain labour supply (AHDB, 2016b, p. 11).

The National Farmers Union (NFU) has developed a new framework for a new SAWS scheme, with the following key features:

- An international scheme which is open to workers from any countries with returns arrangements in place with the UK.
- The permission to work and remain in the UK could be restricted to a defined period, but not restricted to a specified window to accommodate all crop harvest patterns.
- Retaining special elements of free movement, so EU citizens can enter, settle in the UK and work without a work permit. Some restrictions could apply, for instance requiring

them to have a definite job offer before coming to the UK or establishing numerical limits on the people allowed in for work purposes.

- Under the existing UK points-based system, the UK could adopt the same system for all people wishing to come to the UK without differentiating EEA and non-EEA migrant (NFU, 2017, p. 11).

So, due to unattractiveness of agricultural jobs, low wages and other factors, UK farmers already face labour shortages and rely heavily on EU migration. Therefore, expected changes to immigration control, ending the free movement of EU workers to the UK, will exacerbate the problems and will make labour shortages even more acute. For these reasons it is important for the UK to establish a system which will provide the easy and sufficient inflow of EU workers to fill demand on farms even after Brexit. Without any solutions, it can be expected that many agricultural businesses will collapse, and the prices of fruits and vegetables will significantly rise (Barathova, 2018, p. 11).

The impact of the five post-Brexit trade scenarios on the availability of EU labour can be summarised as follows: In the Norway and Switzerland models, the free movement of persons is guaranteed, whereas this is not the case in the Turkey, Canada and WTO models.

3.2.4 Tariff barriers

Tariffs (or customs duties) are a state levy imposed on goods crossing from one customs territory to another. Tariffs can be imposed on exports and imports. There are no tariffs on products traded between the EU member states, and its Common Customs Tariff (*erga omnes* tariff) applies to all goods imported from third countries (with some exceptions e.g. TRQs). As soon as the UK leaves the EU CU, both UK exports to the EU, and EU exports to the UK will be potentially subject to tariff barriers. In the absence of a free trade agreement with the EU or CU agreement, the UK and the EU will trade under the default framework governed by the WTO (Environment, Food and Rural Affairs Committee, 2018, p. 7).

The existence of tariffs post-Brexit, and the level they are set, will depend on any agreement on future relations, including trade, that the UK reaches with the EU. In the Norway, Switzerland, Turkey and Canada scenarios, there are tariff barriers on agricultural products, but the respective countries have agreed in corresponding agreements with the EU to dismantle these over times and to liberalise trade. The UK Government is seeking such an FTA with the EU, which could result in a continuation of the no-tariffs status quo at the end of the transition period. If an FTA is not in place by ending of the transition period, then UK-EU trade would take place under the default framework governed by the WTO. This would oblige the UK to treat imports from the EU in the same way as imports from any other country, including imposing the same tariffs on food imported from the EU as from outside the EU (European Union Committee, 2018, pp. 6-7).

3.2.4.1 Tariffs on UK imports and exports

As part of the CU, the UK imposes a common level of tariffs on products imported from outside the EU, under WTO schedules adopted for the EU. Outside of the EU CU the UK would be free to set its own tariffs, subject to WTO requirements. The terms of any FTA with a particular country/block would set tariffs for products imported from there, but under other circumstances tariffs would be applied using the UK schedules lodged with the WTO. The UK can set its tariffs up to the maximum level it has proposed in these schedules, provided the MFN non-discrimination rule is applied (the same tariffs must be applied to all countries) (Coe & Ward, 2019, pp. 25-26).

If no trade deal with the EU is struck, any food or agricultural product that they need to import from the EU will be subject to UK tariffs. The UK would need to set out its own schedule of tariffs and TRQs at the WTO. The two scenarios focus on applying WTO tariffs on imports or trade liberalisation with low/no tariff on imports. The first scenario would lead to increased costs for importers, leading to higher costs for consumers. On the other side high tariffs on imports offered an opportunity for import substitution. Price rises on imported products could give an opportunity to British products, making them more to domestic consumers with the potential to displace imports. This was particularly significant for certain sectors with high levels of imports (see section 2.2.1) (Environment, Food and Rural Affairs Committee, 2018, pp. 9-10) An example for this scenario gives Norway which shields the Norwegian agri-food market with high import tariffs. The agricultural raw products meat, milk, cheese and grain are subject to the highest tariffs. In these product categories, the Norwegian government wants to support and protect its domestic farmers in particular (Ministry of Agriculture and Food, 2016). In second scenario the UK government could decide to remove all tariffs on imports into the UK. This would lower the cost of imported goods, leading to reduced prices for UK consumer. But it would also mean that he removal of tariffs would result in the UK market being flooded with imports produced to different and by inference, lower welfare, environmental and health standards (see section 3.2.5). It would also reduce the competitiveness of British products, which could be more expensive compared to imported products (Environment, Food and Rural Affairs Committee, 2018, pp. 12-14).

WTO negotiations produce general rules that apply to all members, and specific commitments made by individual member governments which are listed in “schedules of concessions” (WTO, n.d.b). Schedules include the maximum tariff levels that will be imposed on a particular product, as well as tariff rate quotas (which allow for a product to be imported at a lower tariff, up to a set quota), limits on export subsidies and some kinds of domestic support. The EU has a single schedule for all its member states. The UK does not currently have its own tariff schedule, and the government's wishes, the easiest way would be to adopt the WTO-agreed EU tariff schedule for tariffs on non-EU imports (known as the EU MFN tariff) (European Union Committee, 2018, pp. 6-7).

The EU's WTO tariffs vary considerable by product but tend to be considerably higher for agri-food products that for other goods. The average EU MFN tariff on agricultural products was 11.4% in 2019 compared with 4.2% for non-agricultural products (WTO, ITC, UNCTAD, 2020, p. 90), with a significant variation depending on the type of food. The weighted average EU MFN tariff on whole milk is equal to 70 %, but 36% on low fat milk; beef is subject to a 56% average tariff, but the tariff on poultry is 14%. Sugar is subject to high EU tariffs (75%), but salt, spices and culinary herbs face lower tariffs (3%) (Serwicka, 2018).

3.2.4.2 Tariff Rate Quotas

TRQs are a means by which non-EU suppliers of agri-food products can be given preferential access to EU markets within a regulated framework of quotas at tariff rated below the MFN rates bound in the General Agreement on Tariffs and Trade. TRQs are common in governing trade in the meat and dairy sectors of the EU, although they apply to a wide range of other agricultural commodity and processed agri-food products (Revell, 2017, p. 17). The EU-28 has around 87 TRQ schemes for agricultural, F&B products which, depending on how they are counted, comprise over 120 individual tariff quotas. This compares with 54 TRQs in the USA and 21 in Canada (Revell, 2017, p. 10).

Brexit poses a complex set of problems regarding TRQs in terms of how the respective parties should divide up jointly undertaken commitments within the WTO, since TRQs have been negotiated by the European Commission on behalf of all EU member states, so there will be the need to separate the current EU-28 TRQ commitments into UK and EU-27 components. This will require agreement not only between the EU-27 and the UK, but also with third country exporters, both current and potential, regarding market access. The process of establishing an independent UK schedule of tariff commitments and TRQs within the WTO is primarily a legal matter. As there is no directly comparable precedent (only one for new WTO members, whereas the UK is already a WTO member), potential solutions remain the subject of legal opinion and debate (Revell, 2017, p. 11).

The analysis of the different post-Brexit trade scenarios showed that all models exclude raw agricultural products from the preferential trade and thus all under the EU's third-country tariffs and TRQs. Only Canada has been able to negotiate tariff preferences in its agreement with the EU. This is quite crucial for trade in agricultural products, as it means that should the UK negotiate a trade agreement along the lines of one of the models presented, it will no longer be able to trade duty-free as it did as an EU member. What exactly third-country tariffs and TRQs mean for the individual product categories is discussed in section 3.3.3.

3.2.5 Non-tariff trade barriers

Non-tariff trade barriers include requirements for goods to be inspected, for them to be labelled in a certain way and for them to meet certain standards, as well as documentation requirements. UK membership of the EU single market and CU means that food imported from the EU to the UK is not currently subject to non-tariff barriers (European Union Committee, 2018, p. 12).

The UN Conference on Trade and Development classifies 16 types of non-tariff barriers (United Nations Conference on Trade and Development, 2019). An overview of the 16 types is shown in Appendix VII.

The EU Commission's draft withdrawal agreement allows for the current customs arrangements for food imported from the EU to remain in place until the end of the transition period. After this time non-tariff barriers will be determined by any agreement reached between the UK and the EU. If no agreement is reached, the UK government will need to decide what customs and border arrangements to put in place on food imported from the EU. These would need to comply with WTO requirements (European Union Committee, 2018, p. 12).

However, non-tariff barriers can also arise from standards and regulations if they are not consistent or equivalent between the trading partners. This creates an increased regulatory divergence that makes trade more difficult.

3.2.5.1 Customs checks

UK membership of the EU means that there are no custom duties inside the union and there is no need for UK traders to prove the origin of their goods at internal borders. Trade in food products of animal origin for human consumption between member states takes place without certification or controls at borders between the different member states. There are no charges or any specific hygiene inspections on these consignments (Environment, Food and Rural Affairs Committee, 2018, p. 18).

Leaving the single market will have great implications for trade because it will require sanitary and phytosanitary (SPS) checks on cross border trade as well as checks for compliance with technical regulations, such as nutrition labelling and organic certification, at the EU border for products entering the EU or UK, respectively. The requirements that UK exports to the EU will have to meet will be the standard requirements which will apply to imports from any non-EU country, unless these requirements are modified in a future FTA (Matthews, 2017, p. 29). An overview of the requirements for trade with third countries is given in Appendix VIII. For example, exporters of products of animal origin will need to go through the following steps:

1. Register with the EU as a third country company that is authorised to export animal products in the EU
2. Apply for relevant import licences along with documentary proof of the product's country of origin
3. Apply and pay for veterinary certificates to show that the product meets EU public health standards
4. Notify the relevant border inspection post in advance of the arrival of the goods
5. Arrive at the first point of entry into the EU only at an approved EU border inspection post
6. Submit the goods for veterinary inspection before the consignment is permitted to freely move on its destination within the EU (Environment, Food and Rural Affairs Committee, 2018, p. 19).

At the border inspection post there are 100% documentation and identity checks as well as risk-based physical checks of a proportion of all consignments. All these checks would add significant additional costs for UK exporters (Matthews, 2017, p. 30).

3.2.5.2 Farm animal welfare

The impact of Brexit on total animal welfare will be determined by its impact on farm animals. This is due to the large number of farm animals. In the UK, every year approximately 2.6 million cattle, 10 million pigs, 14.5 million sheep and lambs, 80 million fish and 950 million birds are slaughtered for human consumption (Humane Slaughter Association, n.d.). For comparison, in 2019, for research 3.4 million procedures were carried out involving living animals (Home Office, 2020, p. 1). In the UK there are around 12.5 million pet dogs, 12.2 million pet cats and 1.3 million indoor birds (Pet Food Manufactures Association, n.d.). To put these figures in context, the human population is around 67 million (ONS, 2021).

Most UK legislation on the welfare of farm animals is based on EU law. Eighteen of the suites of 44 EU animal welfare laws, by far the largest part of the acquis on animal welfare, relate to the welfare of farmed animals. EU directives lay down minimum standards for the protection of animals bred or kept for farming purposes (Wildlife and Countryside Link, and UK Centre for Animal Law, 2018, p. 23).

In some instances the UK has implemented higher regulatory standards than the baseline set by the EU. For example, UK law prohibits the use of sow stalls throughout the sow's pregnancy (Welfare of Farmed Animals (England) Regulations, Schedule 8, paragraphs 5 & 6), whereas the EU permits the use of stalls during the first four weeks of pregnancy (Council Directive 2008/120/EC, Articles 3.3 & 3.4). UK law also requires all calves to be given bedding (Welfare of Farmed Animals (England) Regulations, Schedule 6, paragraph 8), while EU law only requires the provision of bedding the for the first two weeks of life (Council Directive 2008/119/EEC, Annex 1, paragraph 10). Additionally, slightly higher stocking densities for broilers are permitted by the EU law (Council Directive 98/58/EC, Article 3) than in most UK law (Welfare of Farmed Animals (England) Regulations, Schedule 5A, paragraph 3). In some case there are differences in welfare provisions between the four devolved areas (e.g. Northern Ireland has a maximum permitted broiler stocking density of 42 kg/m2, compared to 29 kg/m2 in the rest of the UK (Welfare of Farmed Animals Regulations (Northern Ireland), Schedule 5, paragraph 14)).

A major threat of Brexit is the importation of lower animal welfare products, for instance from the US. If, after Brexit, the UK is unable to prevent the import of lower welfare products, UK farmers are likely to oppose any strengthening of domestic farm animal welfare. When negotiating a new trade agreement with the EU, the US, or others, it is vital that the government insists on an inclusion of a clause permitting it to require that imports meet UK animal welfare and health standards. An alternative would be for the UK to press for the ability to place differential tariff on imports. For example, imports that do not conform to UK welfare standards would be subject to tariffs that are sufficiently high to safeguard farmers; imports that meet UK welfare standards would benefit from a low or zero tariff (Wildlife and Countryside Link, and UK Centre for Animal Law, 2018, p. 24). However, it is questionable whether such a procedure would be practical to implement, as the threat of customs checks is already very extensive (see previous section). Traders wishing to import such goods into the UK would have to be able to prove that their goods meet the standards. This procedure could also ensure that additional non-European markets are not opened, as many markets have lower standards (such as the US). The UK market would thus lose further attractiveness.

Where the UK does not conclude trade agreements (with either the EU or other countries), trade will be governed by the rules of the WTO. It is questionable whether animal welfare can be used as a rationale to restrict imports from other countries under WTO rules (European Union Committee, 2017b, p. 18). However, recent developments in WTO case law suggest that such restrictions are allowed: A number of WTO Panel and Appellate Body rulings suggest that a WTO member country may be able to require imports to meet welfare standards equivalent to its own provided that there is no element of discrimination that favours domestic producers and no discrimination between different would-be exporting countries (European Union Committee, 2017a, p. 41).

Another factor which is decisive in determining the post-Brexit level of animal welfare is the arrangements for farm support payments that replace the CAP. This factor has already been explained in more detail in section 3.2.1.

3.2.5.3 Food safety legislation

The Food Standards Agency (FSA) is the central authority in the field of food safety in England, Wales and Northern Ireland. Food Standards Scotland (FSS) was established by the Food (Scotland) Act 2015. The Department for Environment, Food and Rural Affairs (DEFRA) is the government department responsible for environmental protection, food production and standards, agriculture, fisheries, and rural communities (BfR, 2017, pp. 104-105).

The EU Withdrawal Act repeals the European Communities Act 1972 on the day the UK leaves the EU, which means that this will happen regardless of the post-Brexit trade scenario. The act ends the supremacy of EU law in UK law, and convert European law as it was in force immediately before the withdrawal date into UK law. UK ministers are granted wide powers to enact secondary legislation – in the form of statutory instruments (SI) – to correct so-called “defects” in this retained EU law, e.g., where a provision no longer has practical application by reference to an EU institution (Department for Exiting the European Union, 2018, pp. 28-30).

DEFRA has produced 25% of all SIs, or about 100 in total. Detaching UK food safety regulation from EU bodies, while maintaining agricultural and food systems that are no less harmful to the environment and public health than those provided by the EU’s regime, is a challenging task, even if the SIs merely transfer all the provisions of the status quo. This is because the UK must develop capacities, competencies and procedures that have not been required or available domestically for many years (Lydgate, Anthony, & Milstone, 2019, p. 3).

In the following, core food safety SIs are compared with the original EU legislation.

Pesticide approvals and maximum residue levels in food and feed

EU law regulates the use of pesticides, the approval of active ingredients in pesticide products and maximum residue levels of pesticide in food and feed (European Commission, n.d.f). The EC is responsible for the approval of active ingredients and for setting maximum residue levels. This is subject to a scrutiny procedure involving the European Food Safety

Authority (EFSA), and the Standing Committee for Food Chain and Animal Health composed of representatives from member states. The UK's Health and Safety Executive, and its Chemical Regulatory Division, currently assesses pesticide products, but not their active ingredients. The Expert Committee on Pesticides advises the Health and Safety Executive and the Expert Committee Pesticides Residue on Food monitors pesticide residues (Lydgate, Anthony, & Milstone, 2019, p. 4).

The UK government's approach is to replace the roles of the EFSA, the Standing Committee and the EC with discretionary powers for UK ministers to amend, revoke or make pesticide regulations and issue guidance on how approval processes for new pesticides and maximum residue levels are to be carried out (PPP SI, reg 12(6); MRL SI, regs 4(3) and 7(10)). These SI create a new legal framework for pesticides by consolidating powers to a single entity in each UK nation and removing requirements for oversight and scrutiny of changes to pesticide regulation (Lydgate, Anthony, & Milstone, 2019, p. 4). Provision in EU law for the integration of independent scientific assessments is replaced with discretion for ministers to decide whether to obtain independent scientific advice (PPP SI reg 4(29)(e); MRL SI regs 4(9), 7(6), 7(8) and 9(2)). New powers are given to UK ministers allowing them to issue or amend guidance on approvals and assessments of pesticide products and maximum residue levels, including the coordination of compliance checks, by statutory instrument rather than primary legislation (PPP SI reg 12(6); MRL SI reg 9(4)).

Genetically modified organism authorisations and labelling

The EU has established a legal framework for the risk assessment and authorisation of genetically modified organisms (GMO), as well as their labelling to ensure consumer choice and traceability (European Commission, n.d.e). The Brexit SI pertaining to GMO transfers powers to UK ministers to amend GMO law by secondary legislation, albeit after consultation with the FSA, replacing the legislative functions of the European commission, the Standing Committee and EU reference laboratories (The Environment, Food and Rural Affairs (Amendment) (EU Exit) Regulations 2019 SI 2019/778).

With respect to GMO authorisations, the SI replaces:

- EFSA with food safety authorities in each nation
- The European commission and the Standing Committee roles for authorisations and amending non-essential elements of the legislation with UK ministers
- The European commission's role in administration of the regime with the FSA for submission of monitoring reports

- The European Union Reference Laboratories with a reference laboratory or "public analyst" at the ministers discretion (The Genetically Modified Food and Feed (Amendment etc) (EU Exit) Regulations 2019 2019/705).

Food additive authorisations and monitoring

The EU operates a system of authorisation of food additives with conditions of use based on safety assessments, the technological need for the additive, and standards on the provision of consumer information (European Commission, n.d.d). Brexit SI concerned with food additives transfer many of the provisions of the EU's regime into UK law, but they make several key changes: They revoke EU provisions requiring re-evaluations, monitoring and reporting the scale and patterns of the consumption of additives, as well as substantive changes to the requirements for certain types of additives. The Brexit SI dealing with amendments to the food additives enforcement regime evokes the EU regulation on re-evaluation of approved food additives (The Food Additives, Flavourings, Enzymes and Extraction (EU Exit) Regulations 2019/860, reg 170).

This Brexit SI also omits key provisions of the EU regime which provide for a harmonised system of monitoring consumption and use of food additives using a risk-based approach. Further changes to EU law are the omitting of references to enzymes wine-making practices and the amending of EU regulations on smoke flavourings in food, omitting the stipulation that applications for authorisation and opinions from authorities should be accessible to the public (The Food Additives, Flavourings, Enzymes and Extraction (EU Exit) Regulations 2019/860, reg 170).

Micro-biological food safety

EU legislation stipulates that only water can be used to wash animal carcasses, except for lactic acid solution that can be used on beef carcasses, providing the infamous prohibition on "chlorinated chicken" (Regulation (EC) No. 853/2004). If an EU member state wishes to use another substance, they must seek approval by the European commission which is assisted by a regulatory committee composed of member states. Article 12(2) of the legislation specifies that the substance must be approved in accordance with Articles 5 and 7 of Council Decision 1999/468/EC. In the Brexit SI, businesses can use any substance authorised by the UK FSA. The SI then specifies that "*those measures, designed to amend […] elements of this Regulation by, among other things, supplementing it, shall be prescribed by the appropriate authority"* (The Specific Food Hygiene (Amendment etc.) (EU Exit) Regulations 2019, SI 2019/640 part 2 reg 6.). This suggests that ministers can prescribe changes in the substances to wash animal carcasses without the checks and balances provided in the EU legislation (Lydgate, Anthony, & Milstone, 2019, p. 7).

Brexit SI also revoke UK participation in the EU-wide Rapid Alert System for Food and Feed (General Food Law (Amendment etc.) (EU Exit) Regulations 2019 SI 2019/614.). The Rapid Alert System for Food and Feed system permits participant member states to receive rapid notification of unsafe and rejected consignments of food and feed products (European Commission, n.d.f). The loss of the RASFF would create an increased risk unsafe foods and drinks coming into the UK, and EU member states will not hear of UK rejections and may become less enthusiastic about buying UK food products (Lydgate, Anthony, & Milstone, 2019, p. 7).

The above-described SIs confer powers to amend and make future laws to UK Government and they permit a regulatory divergence. Empowering devolved nations to change food safety legislation could complicate trade in agricultural and food products within the UK. This could also lead to the introduction of internal UK regulatory controls and border checks to ensure that products comply with divergent jurisdictional requirements what could complicate the flows of agricultural and food products within the UK (Lydgate, Anthony, & Milstone, 2019, pp. 7-8).

A list of selected food-related EU institutions and agri-food policies affected by Brexit is provided in Appendices IX and X.

3.2.5.4 Protected Food Names

Since the creation of EU protected food name (PFN) schemes in 1992, the three EU “quality” certifications or “marks” legally recognise and protect agri-food products from imitation. This protection is awarded in recognition of a product’s quality attributes, links to a specific region or place, and/or traditional, artisanal production methods. PFNs are often referred to as geographical indications, which was the more common terminology when they were originally incepted (Owen, et al., 2018, pp. 7-8).

There are three EU PFN schemes, each requiring different production, processing, and geographical criteria to be adhered to. The three schemes and the UK registered products are presented in Appendix XI. Under the EU quality system, a named food or beverage originating either from the EU or from outside the EU, once registered at European level, will be given legal protection against imitation throughout the EU. Any individual food producer or group of food producers can apply for EU PFN (AHDB, 2016a, p. 5).

Protection of EU registered PFNs is also offered outside the EU by bilateral agreements. For example, EU protected geographical indications are protected through agreements with countries such as South Korea, Ukraine, Moldovia, and Georgia (AHDB, 2016a, p. 10). Table 14 shows the options for PFN after the Brexit.

	Existing PFN	Future food names to be protected
Protection in the EU	Remains protected, provided there is a reciprocal agreement on existing geographical indications.	Could still benefit from EU protection, provided they are already protected under protected food name status in the UK, which would need to be established. Once protected at national level, EU protection would have to be applied for.
Protection in the UK	Protection currently results from EU law regulation. Need for a new regime for protected food names.	It is unlikely that there will be many applications until there is protected food name status in the UK.

Table 14: Post-Brexit options for PFN. Adapted from: AHDB, 2016, p. 10

If the UK wishes to register PFN post-Brexit with the EU, it will first need to set up its own national approval scheme. Only when products have been approved by a non-EU country's own national scheme they can be considered for approval under the EU protected food scheme. These products would also be protected by countries which have an FTA or bilateral agreement with the EU (AHDB, 2016a, p. 13).

3.2.5.5 Rules of Origin

Rules of origin are the criteria needed to determine the national source of a product. Their importance is derived from the fact that duties and restrictions in several cases depend upon the source of duties (WTO, 2017).

Origin requirements can be met in two basic ways:

- by showing that a product "wholly originates" in a particular market; or
- by showing that the components of a product on that market have been sufficiently transformed to produce the product, they constitute a local or "originating" product (FDF, 2018, p. 6).

Countries can, as with tariffs, adopt different rules where trade preference agreements, such as a CU, are in place. When the UK leaves the CU, producers will need to meet whatever origin regime is put in place. This will apply even if a trade agreement is reached, as producers will need to demonstrate their product is eligible for preferential trade terms (European Union Committee, 2018, p. 13).

Rules of origin can be problematic for products that have inputs from different countries; depending on the approach taken to origin requirement products could be excluded from the benefits of any free trade agreement negotiated. The Food and Drink Federation gave the example of a frozen pizza made in the Republic of Ireland, but with flour milled in the UK from grains bought from Canadian, US and UK growers. Failing to meet origin requirements would mean the flour would be subject to EU MFN tariffs when imported from the UK; the pizza would then also be subject to tariffs if exported for sale to the UK (FDF, 2018, pp. 17-18).

As shown in section 2.2, the UK's trade is highly globalised, often bringing basic commodities or produce from around the world to process and manufacture in the UK into finished products. UK manufacturing businesses use global commodities such as cereals, sugar, coffee, or chocolate in producing a wide range of manufactured products for both the local market and export. The rules of origin could pose a big challenge facing businesses, large and small, when they find themselves shut out of preferential trade between the EU and the UK (FDF, 2018, p. 3).

Rules of origin apply in all models, but in different levels. For example, the handling of rules of origin in the Canadian and Swiss models is to be facilitated by harmonised rules and improved cooperation between the authorities (Matthes & Busch, 2016, p. 13).

3.3 Consequences for trade in agricultural products

Agricultural products are traded extensively. EU membership currently provides the framework for the UK's trade in agricultural products not just within the EU, but with third countries with which the EU has negotiated preferential trade agreements. Once outside the EU the UK must develop its own external tariff and may find itself subject to the high external tariffs applied by the EU to agricultural products unless a preferential trade agreement is agreed.

The introduction of customs checks and increased tariffs has consequences for the availability of food and pricing, which is described in this section. Brexit also has especially far-reaching consequences for Ireland, which are described in this chapter, too.

Furthermore, this section analyses the impact of the introduction of third-country tariffs. These tariffs apply to all models and will also apply to the UK, as it is already clear that they will leave the EU single market and customs union.

3.3.1 Effects on food availability and prices

Upon entry of the WTO model, the UK is obliged to impose the same tariffs on their mutual trade as they impose on imports from the third countries (those not covered by preferential trade agreements). If the UK imposes the EU's current MFN tariffs on UK imports from the EU, tariff-induced price rises were likely to be more pronounced for food than for other products, ranging from an 8.1% increase for dairy products, to a 1.5% for fish as shown in Table 15. Overall, the EU shares of UK imports are high in many food sectors – partly reflecting the high tariffs and other barriers levied by the EU against imports from the rest of the world (Clarke, 2017, pp. 13-14).

	Change in tariff and trade costs (%)	**EU share of imports (%)**	**Price change (%)**
Bread & cereals	18.0	92.7	**1.8**
Meat	37.0	78.4	**5.8**
Fish	13.3	28.3	**1.5**
Dairy products	44.6	98.1	**8.1**
Oils and fats	18.1	56.7	**7.8**
Fruit	10.6	44.1	**3.1**
Vegetables	14.8	71.6	**4.0**
Sugar, jam and confectionery	10.6	89.9	**2.3**
Other food products	9.5	83.6	**5.5**

Table 15: Price effects of the WTO model. Adapted from: Clarke, 2017, pp. 14-15

To counteract all this the government could cut tariffs on all food imports, EU and non-EU, but this would pose a serious risk of undermining UK food producers who could not compete on price (European Union Committee, 2018, p. 3).

Calculations showed that UK imports via these agreements made up more than 11% of all UK food and beverage imports in 2017. It will be important for the UK to secure FTAs with each third country, as loss of preferential access to these markets threatens the ability to import ingredients and raw materials (European Union Committee, 2018, p. 9).

UK membership of the EU CU means that there are no customs duties inside the union and there is no need for UK traders to prove the origin of their goods at internal borders. Trade in agricultural products of animal origin for human consumption between member states takes place without certification or controls at borders between the different member states. There are no charges or any specific hygiene inspections on these consignments (Brooks, 2017, p. 1).

If no agreement is reached, either post-Brexit trade scenario will result in some additional border checks and documentation requirements for food imported from the EU because of the status of the UK as a third country. This will have an impact on the price and availability of food:

- Delays: Delays due to border controls will reduce the shelf life of perishable products. This can lead to increased food waste, or, in the worst cases meaning it is unproductive to put it into store. Also the UK retailers apply strict delivery time slots. If a delivery arrives late at the retailer, it cannot be unloaded on the same day and unloading will be delayed by a day or more (KPMG, 2018, p. 45).
- Costs: Non-tariff barriers not only cause delays and shorten the shelf life of products, but also represent additional costs for businesses. Because of the delays the businesses will have to make more frequent use of "last minute "carriers charging premium rates, which would mean an additional 20-25% of transport costs. Another example is the additional inspection of containers and associated inspection fees (KPMG, 2018, p. 45).
- Capacity: UK ports and borders are not designed for the increased number of checks and vehicles. The lack of adequate infrastructure as well as a possible lack of staff and capacity in existing inspection facilities could lead to significant disruptions. Another problem is the fact that no existing IT system can cope with the expected increase in the number of customs declarations (European Union Committee, 2018, pp. 13-16).

European businesses will also face additional non-tariff barriers when exporting food to the UK. Depending on the product, this could include completing export declarations, and obtaining veterinary health and phytosanitary certificates. It seems likely that the associated costs will affect the price of food in the UK (European Union Committee, 2018, p. 18).

If a combination of tariff and non-tariff barriers results in food imported from the EU becoming more expensive post-Brexit, or in less food being imported, this could stimulate the UK to produce more of its own food. The UK's self-sufficiency in food has been decreasing over the past 30 years as Figure 12 demonstrates. Domestic production will expand under all Brexit scenarios, with this growth in domestic production ranging from 0.9% under the Norway model to 9.2% under the WTO model (Serwicka, 2018). The impact on the price of food depends on the type. An increasing domestic production of fruit and vegetables could lead in cheaper products for the consumer in the long run, a potentially more stable supply and, given the perishable nature of fresh produce, could also lead to fewer food miles and better product quality (Food Foundation, 2018). Other foodstuffs, on the other hand, could become more expensive, as a lack of access to EU workers could result in an increase in recruitment and overtime costs, or alternatively food producers could seek to attract additional domestic workers by paying higher wages. Such cost increases may need to be passed on to consumers, otherwise some businesses will no longer be viable, limiting the UK's ability to produce its own food, which in turn may affect availability to consumers (European Union Committee, 2018, p. 33).

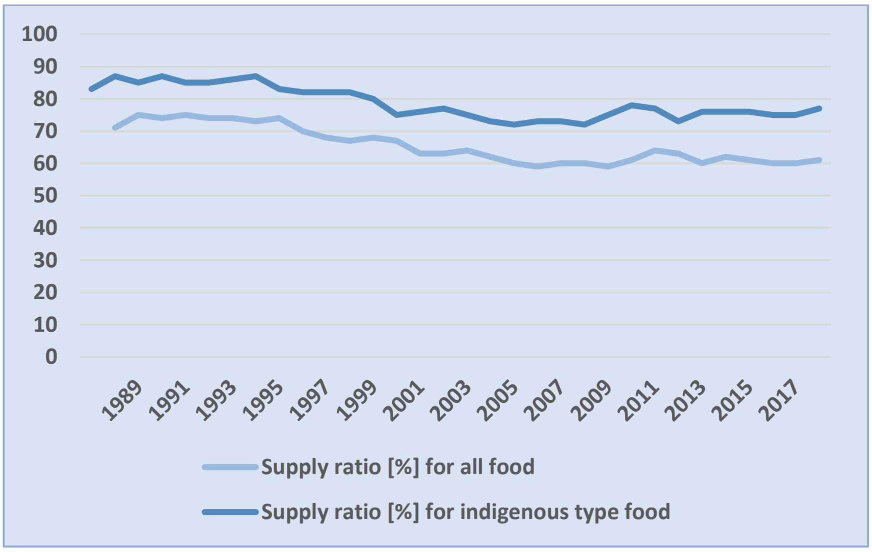

Figure 12: Food production to supply ratio. Adapted from: DEFRA, 2020a, p. 146

The consequences for the British population can also be far-reaching. There is already research that has found that nutrient-rich foods such as fruits and vegetables will become more expensive and harder to find in low-income areas compared to processed foods. This leads to a decline in the consumption of fruit and vegetables, which has been linked to increased mortality from cardiovascular disease (Barons & Aspinall, 2020, p. 6).

3.3.2 Effects on the Irish trade with agricultural products

The prospect of the UK leaving both the single market and the EU CU and the nature of any future trade agreement between the two partners could profound consequences for the Irish agri-food exports. Agriculture is Ireland's largest indigenous sector, F&B accounting for 9.5% of exports (worth €14.5 billion in 2019), 7.1% of total employment and 4.3% of economy wide GVA (DAFM, 2020).

The UK remains the key destination for Irish F&B exports. However, in 2019, the UK was the destination for 34% of F&B exports, the rest of the EU account for 35%, with international markets accounting for 31% as illustrated in Figure 13. This is also the first year that a larger proportion of Irish F&B export went to continental EU than those that went to the UK (Bord Bia, 2020, p. 10).

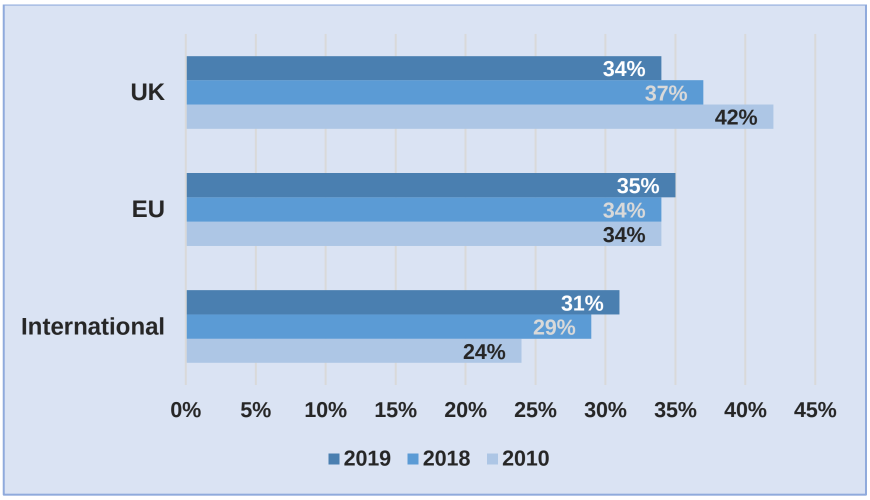

Figure 13: Market distribution of Irish F&B exports. Adapted from: Bord Bia, 2020, p.11

For specific sub-sectors the UK market accounts for an even greater share of exports, including prepared consumer foods at 67%, poultry at 71% and mushrooms at 99%.

Any potential trade barriers, including tariffs and customs posts at the Northern Ireland-Great Britain border, would have major implications for this trade like disruption of supply chains and delays. Not revealed by these figures is the close integration of supply chains for milk, lamb, live pigs, pig meat and other products across the Ireland – Northern Ireland border on the island of Ireland. Also not revealed is the dependence of the transport of Irish exports to other EU markets over the UK land-bridge. The land-bridge refers to the route that connects the Republic of Ireland to the rest of the EU via Britain's mainland road and ports network (Jones, 2020). The route through Dublin and Calais takes approximately 20 hours, when time in port is included, comparable to the 40-hour roll-on roll-off sear route and the 60-hour load-on load-off sea route (Breen, 2018, p. 13).

Another impact is the further depreciation of sterling in the future. The value of GBP against the EUR has already affected the Irish agri-food sector. In the immediate aftermath of the Brexit referendum, the value of the GBP against the EUR immediately dropped and has yet to fully recover. The direct impact of this is that Irish exports are now less competitive to UK importers and Irish exporters' sales have declined meaning that Irish exporters are taking home less money. This has already had the effect of reducing the profit margins of many Irish agri-food producers (Hederman & Durkin, 2018, p. 27).

Higher trade costs when either exporting to or importing from the UK because of required SPS checks on cross-border trade as well as checks for compliance with technical regulations are a further factor that is likely to affect Irish agri-food trade (Matthews, 2017, p. 29).

Another impact of the withdrawal from the EU CU is the loss of the protected price premiums that Irish exporters currently enjoy on their sales on the UK market. As joint members of the EU CU, Irish agri-food exporters to the UK currently benefit from a preferential trade rent. This is the difference between the prices that now prevail on the UK market behind this tariff protection and the prices that Irish exporters will receive once the Ireland accesses the UK market as a third country. Reducing the current UK tariff protection would lead to lower prices with a simultaneous increase in trading costs (Matthews, 2017, p. 27).

Thus, the Brexit will have significant structural implications for Irish agri-food exports. Regardless of what the future trade deal between the UK and the EU looks like, the UK market will lose value for Irish agri-food exporters.

3.3.3 Trade with agricultural products after Brexit

The following section describes the expected EU import tariff rates on agricultural products as well as the allocation of TRQs between the EU and the UK. Appendix XII shows the EU and Canada import tariff rates and TRQs of selected main raw and processed agricultural products exported by the UK to the EU. For the Norway, Switzerland and Turkey models, the EU MFN tariffs apply. Canada has identified certain tariff preferences in its trade agreement, which are also listed in Appendix XII.

Dairy

Most dairy products imported into the EU are subject to tariffs, which are usually fixed based on the product weight or weight of lactic matter in the product. The tariffs effectively mean that most non-EU exports are uncompetitive on the EU market. Under the WTO model, the UK would also be subject to these tariffs, which is likely to reduce the competitiveness of British products on the European market. With more than 90% of dairy-products exports destined for the EU, this would significantly impact the UK industry (AHDB, 2019a, p. 16).

Appendix XII shows the EU and UK import tariffs rates for selected dairy products. How much the tariffs would impact prices is influenced by several factors, including the unit price and exchange rates (AHDB, 2019a, p. 16).

The EU does have several TRQs, mainly covering butter and cheese, which allow limited volumes of product to enter from non-EU countries at significantly reduced tariff levels. When the UK leaves the EU, existing TRQs will be split between the two. Most dairy-product TRQ would be split in favour of the EU, except for the New Zealand cheese for processing TRQ (4 kt) and Canadian Cheddar TRQ (4 kt). Comparing the typical level of UK cheese imports with the TRQ that may be available, it is possible that most UK cheese and butter imports would be subjected to the full tariff rates (Reg. (EU) 2019/216, Annex, Part A).

Beef

Most beef imports into the EU are subject to ad valorem tariffs[1] of 12.8%, plus an additional fixed amount that can range from €1.414 to €3.041 per tonne, depending on the product (see Appendix XII). Under the third-country tariffs, UK exports could be subject to these tariffs, which would limit access to the EU market (AHDB, 2019a, p. 23).

There is also a range of non-tariff barriers that may limit market access into the EU – SPS measures being the main non-tariff trade barrier. For example, there is a ban in Europe on beef from animals that have been treated with hormones, which is a common practice in some exporting nations (AHDB, 2019a, p. 23).

When the UK leaves the EU, existing TRQs will be split between the two. The EU will have access to the largest proportion of most beef TRQs. However, the Australian TRQ (7.15 kt) is split 65% in favour of the UK and the *erga omnes* TRQ (63.7 kt bone in weight) is spilt 69% in favour of the UK (Reg. (EU) 2019/216, Annex, Part A). Given that the UK typically imports around 400 kt of beef carcasses weight equivalent, it is likely that a considerable portion of imports would be subject to full tariff levels out of quota (AHDB, 2019a, p. 23).

Sheep meat

Tariffs impose on sheep meat (out of quota) consist of an ad valorem tariff of 12.8%, plus a fixed amount which varies according to the product (AHDB, 2019a, p. 30).

For sheep meat imported from New Zealand, the TRQ will be split evenly between the UK and the EU, while the UK will be allocated 80% of the TRQ for sheep meat import from Australia (Reg. (EU) 2019/216, Annex, Part A).

Outside TRQs, and if there is no trade deal in place, sheep meat exports will be subject to tariffs under third-country basis, which would make it uneconomical for the UK to supply sheep meat to the EU. As a result, higher supplies of sheep meat on the domestic market will put downward pressure on UK prices. Market access to non-EU countries is likely to be difficult, based on the competition from top exporters, Australia and New Zealand.

[1] an ad valorem tariff means that the customs duty is calculated as a percentage of the value of the product (WTO, n.d.a)

Moreover, UK sheep meat exports could face prohibitive tariffs. Additionally, there is also the issue of having recognised export health certification in place post-Brexit (AHDB, 2019a, p. 30).

Pork

The trade of pork between the UK and EU member states is largely unrestricted under the single market. Imports from pork and processed pork products from third countries are subject to sizeable tariffs. Some major export nations outside of the EU have considerably lower average costs of production, but the high tariffs effectively mean that the imported pork is uncompetitive (AHDB, 2019a, p. 37). Nevertheless, there are TRQs available which allow imports into the EU at reduced or zero tariffs. The EU will have access to the largest proportion of all pork TRQs, except for boneless loins, hams and sausages. Although the UK will be entitled to 94.5% of the 3 kt *erga omnes* TRQ for sausages, this only represents a small proportion of the volume of UK sausage import (Reg. (EU) 2019/216, Annex, Part A).

If the UK were to leave the EU without a trade deal, the UK could be subject to full tariff rates, making UK exports uncompetitive on the European market at least until a deal is struck. As a result, domestic prices would have to fall to be competitive. As over half of UK pig meat exports are shipped to the EU, this would have a significant impact on the UK pork industry (AHDB, 2019a, p. 38).

Appendix XII demonstrates the effect that tariffs could have if the UK adopted similar tariff levels to those currently set by the EU. For example, one of the UK's most significant exported pork products, fresh/chilled boneless pork, could be subject to a tariff of €869 per tonne tariff (European Commission, n.d.a).

Without a deal that ensures free trade, export of sow carcasses would be a particular area of concern. With little domestic value, most sow carcasses are exported to Germany. However, under the WTO model, carcases could be subject to a tariff of €536 per tonne, which again could erode producer margins. In this instance, exports of the sow carcasses would be uneconomical, and with no demand or value domestically, it may be challenging to find an outlet (AHDB, 2019a, p. 38).

Poultry meat

EU WTO tariffs on poultry meat range from €187 to €1.283 per tonne. In the event of tariffs, it is likely that the UK could incur additional costs for exporting to the EU market. If the UK decides to impose tariffs on imports from the EU, this could raise prices for consumers by a considerable amount. Free trade deals with other countries such as Brazil and the USA could be an option, but non-tariff issues are likely to be a major point of contention, particularly animal welfare standards and chlorinated chicken. This could push further demand for red meat such as pork and beef, at the expense of poultry (AHDB, 2019a, p. 42).

The use of TRQs would allow poultry imports into the UK at lower tariffs. The division of all poultry meat TRQs is in the favour of the EU, mostly ranging from 85% to 100%, except for chicken carcasses, where the split is 65% in favour of the EU. For processed poultry meat products, there is generally a more even split of TRQs between the UK and EU (Reg. (EU) 2019/216, Annex, Part A).

Cereals & Oilseeds

Tariffs on cereals depend on the commodity, grade, and origin. Existing TRQs could play an important role if tariffs are placed on UK exports/imports to and from the EU. For example, in-quota imports of common wheat are subject to a tariff of €12 per tonne (*erga omnes*), whereas out-of-quota the tariff is prohibitive €95 per tonne (AHDB, 2019a, p. 50).

Appendix XII shows that Rapeseed and other oilseeds, such as soya beans, are tariff-free under the WTO MFN tariffs adopted by the EU. Oilseed cakes are generally also tariff-free. EU MFN tariffs on vegetable oils have variable rates (generally under 10%). The tariff for importing crude rapeseed oil for use on food is 6.4%, while the tariff for refined rapeseed oil for use in food applications is 9.6% (European Commission, n.d.a).

If export tariffs are in place on rapeseed oil after Brexit, this would lower the domestic price of rapeseed oil by the amount of the tariff. An import tariff would serve to increase the domestic price, but as the UK is typically a net exporter of the oil, the export tariff would be expected to have a larger influence. While other factors, such as currency movements, may to some extent mitigate the effect of tariffs, a lower domestic price of rapeseed oil could negatively impact UK rapeseed crush margins and so, indirectly, rapeseed prices (AHDB, 2019a, p. 50).

Additionally, the UK imports other vegetable oils, which would become more expensive for processors if import tariffs were in place. Sunflower oils imports could potentially see a bigger difference in terms of importing costs. Ukraine is the world's top sunflower oil producer and the EU has an agreement with Ukraine, allowing tariff-free access for sunflower oil imports (AHDB, 2019a, p. 50).

Potatoes

Egypt and Morocco impose WTO third-country tariffs at 2% and 2.5% respectively on seed potatoes imports. However, neither imposes tariffs on imports from the EU, so, post-Brexit, the UK would have to incur extra costs on seed potato exports to these key destinations if there is no trade agreement in place. Imports of fresh/chilled potatoes into the EU are subject to a WTO third-country tariff of 11.5%. However, under a preferential agreement, EU imports of fresh/chilled potatoes from Israel are tariff-free. Given that most non-EU fresh potato imports into the UK are from Israel, the UK may need to negotiate its own agreement with Israel (AHDB, 2019a, p. 57).

For crisp imports, the EU imposes a third-country tariff of 14.1% (European Commission, n.d.a). This could have a considerable impact on UK crisp exports, given that the majority are shipped to the EU market. To remain price-competitive on the export market, domestic crisp prices may have to fall (AHDB, 2019a, p. 57).

EU tariffs on frozen potato product imports range from 14.4-17.7% (European Commission, n.d.a), which could increase the cost of shipments into the UK and raise prices if the UK decided to impose tariffs at a similar level (AHDB, 2019a, p. 57).

The *erga omnes* TRQ for fresh potato imports into the EU is approximately 4.3 kt, which is around 2% of the quantity of fresh potatoes the UK imports on average (European Commission, n.d.a). Post-Brexit, the EU will have access to 99.9% of the *erga omnes* quota, although from a UK point of view, this is insignificant given the small quantity of the TRQ (Reg. (EU) 2019/216, Annex, Part A). This means that most UK fresh potato imports could be subject to a tariff of 11.5% (European Commission, n.d.a).

Horticulture

The EU imposes a third-country duty of €114 per tonne on fresh banana imports. There are instances where there is a lower tariff for certain countries due to trade agreements (e.g. banana imports from Colombia are subject to a tariff of €89 per tonne) (European Commission, n.d.a). If the UK adopts the EU's third-country tariff rate on banana imports, then this could lead to higher prices for consumers, at least other trade deals or arrangements are made (AHDB, 2019a, p. 62).

Although apples are produced domestically, they are imported in high numbers as already mentioned in section 2.2.1. However, if tariffs are imposed, this may influence import substitution by producing more domestically (AHDB, 2019a, p. 62).

Tomatoes and onions, which comprise around a quarter of all vegetable imports, may be subjected to variable tariffs and a tariff of 9.6% respectively if the UK dets similar import tariffs as the EU (European Commission, n.d.a).

3.3.4 Summarising overview

The five impacts selected all have the potential to bring about profound changes in the UK's agri-food sector and trade with agricultural products. When asked which impacts could bring the most critical changes, the answer is clearly tariff-barriers and non-tariff barriers. Tariffs on agricultural products will be imposed in any model, just at different levels, which will above all be a big difference to the hitherto tariff-free trade as a member of the EU. This could increase trade costs for UK exporters, which could lead them to reflect this cost increase in selling prices. This reduces the competitiveness of British products – both on the European and on the global market. The supply of certain foods to the UK population could also be affected, particularly exotic fruits. Increased prices for bananas could lead to the low-income part of the population no longer being able to afford them. The introduction of non-tariff barriers can also lead to a restriction of the availability of food as the additional border checks and documentation requirements lead to delays and capacity problems. This can lead to difficulties, especially with perishable products as a longer delivery time shortens the shelf life. The elaborate and time-consuming SPS checks that must be carried at the border, especially for products of animal origin, also shorten the shelf life of the products. The rules on origin ensure that trade with third countries is made more difficult by the fact that they must prove the origin of their products in an elaborate way.

The next critical factor is the availability of EU-migrants after Brexit. As already shown in chapter 2, the agri-food sector is highly dependent on the labour of EU-migrant, especially seasonal workers are needed. Restrictions or even the elimination of these workers could lead to supply shortages. In the longer term, food prices could rise again if entrepreneurs had to pay higher wages because low-skilled workers were no longer available or because they tried to compensate for the lack of workers by using technology.

The withdrawal from the CAP and the CFP are considered the least critical factors, it may even be an opportunity to develop improved policies tailored to the UK. Nevertheless, there will be a period of uncertainty about the level of financial support, especially for farmers and fishermen. Although the UK government has pledged to continue the current payments for a certain time, these payments will be renegotiated and it is still unclear at what level they will be compared to the payments from the EU.

4 Conclusion

To answer the first the first research question, five factors that could impact the UK agri-food sector and trade in agricultural products were identified.

In the case of the withdrawal from the CAP and CFP, the individual post-Brexit trade scenario is irrelevant; all that matters here is the fact that the UK is leaving the EU and thus withdraws from the CAP and CFP. At the same time, in all scenarios, the UK will have the opportunity to adopt a new agricultural and fisheries policy. UK governments have always been strong critics of the CAP, especially of its income support policy. According to them the CAP imposes substantial costs on consumers and taxpayers but is inefficient in delivering support to farmers (HM Treasury & DEFRA, 2005, p. 9). Similarly, much of the CAP, especially the high market price support, has encouraged farmers to intensify agricultural production which has exacerbated agriculture's contribution to diffuse water pollution and the negative impacts on biodiversity and wildlife (HM Treasury & DEFRA, 2005, p. 15). In this case, leaving the EU creates the opportunity to improve a heavily criticised policy and to adapt it to the UK in the best possible way.

The CFP was also criticised for the mismanagement of stocks, incentivising overfishing, fleet overcapacity and much more (HM Government, 2014, p. 24). To many in the fishing industry Brexit is therefore a "sea of opportunities" (Scottish Fishermen's Federation, 2016). The UK government can adopt a new fisheries management regime, tailored to UK conditions.

Should a post-Brexit agreement be agreed that resembles the key features of the Norway and Switzerland models, the free movement of persons will continue to be granted, thus ensuring the availability of EU labour. This is not the case with the other models. Ending the free movement of persons will mean that the agricultural sector will face labour shortages. As labour availability is an important factor influencing the competitiveness of the agricultural sector, solutions need to be found for post-Brexit (such as making the sector more attractive for UK workers or new technologies) to remain competitive, especially as new markets could be opened by Brexit.

It will be decisive for the tariff barriers what kind of trade agreement is negotiated between the EU and the UK. Tariff barriers in agricultural products exist in all scenarios, but the parties have agreed through (preferential) agreements to phase them out to achieve trade liberalisation in agricultural products. This does not apply to the WTO model, where preferential agreements do not exist.

Non-tariff barriers like customs checks, regulations and standards and rules of origin are part of every scenario. For some of them, like the regulations and standards on farm animal welfare, food safety legislation and PFN, new systems and schemes must be developed to convert them into UK law. This happens independently of the occurring post-Brexit trade scenario. Customs checks are part of every scenario except for the Turkey model, since here the checks are not applicable due to membership in the CU. In the CU, the rules of origin also omitted; in the other scenarios, they do exist, but they are regulated individually for each scenario.

The second research question dealt with the consequences for trade in agricultural products. The consequences are that exports to the EU will become more expensive due to new introduced tariffs. The product categories most affected here are those where EU third-country tariffs are very high (dairy and meat) and where the share of exports to the EU is very high. These include certain dairy products, wheat, barley, sheep meat and beef. These exports would become uncompetitive on the EU market and the producer prices could also decrease, so that many companies would face financial constraints.

Prices for imports will also rise due to additional costs for border controls and documentation requirements. The resulting delays and capacity utilisation have serious consequences for food availability. Critical are especially perishable products, as longer delivery times lead to a shortening of the shelf life. Food prices will also increase due to the additional costs mentioned above and an increased domestic production due to the potential lack of EU workers.

The third research question addresses the assessment of the five post-Brexit trade scenarios in terms of their impacts on the UK agri-food sector and trade in agricultural products in comparison with EU membership.

In answering the question, several factors need to be considered. Probably the most important factor is the fact that no model includes duty-free trade in agricultural products, as is the case in the EU. So, in the case of trade barriers, therefore, no scenario is preferable.

The non-tariff trade barriers occur in all models: Exporters must comply with EU rules and regulations in all scenarios when exporting to the EU. Compared to EU-Membership, either model would imply a deterioration of trade conditions.

On the factor of the availability of EU migrants, there are models that grant free movement of persons, as in the EU, namely Norway and Switzerland. From an economic point of view, the availability of EU migrants is very important for the UK agri-food sector as it is highly dependent on them. However, it is questionable whether it is politically desirable that the free movement of persons will still be granted after Brexit.

By leaving the CAP and CFP, which is the case in all scenarios, there could be an opportunity for improvement for the UK after Brexit. It is questionable whether the UK government will manage to develop a policy that offers an improvement on the European version.

Compared to EU membership, all scenarios imply a deterioration of the terms of trade with the EU. Otherwise, the assessment of the scenarios depends on how the UK wants to weight certain factors. If it places a lot of emphasis on not contributing to the EU budget, the Norway and Switzerland models are not suitable. If the UK wants to continue to be a voice in the EU decision-making process, all models are a downgrade. If the UK values independent negotiation of trade agreements, all models except Turkey are actually an improvement. With regard to the most critical impact, name trade barriers, the Canadian model would fit best, as the vast majority of tariffs on agricultural products have been abolished here. But otherwise, it cannot be clearly said that one model is best for the UK. It is still questionable whether a model that comes closest to EU membership would even be the best choice for the UK. The numerous exceptions that the British have negotiated with the other EU member states over the years and other factors suggest that the UK, through its Eurosceptic nature, is not aiming to negotiate an agreement that comes as close as possible to EU membership.

So which model will occur at the end of the transition period cannot be predicted. In the best case, the UK will be able to negotiate an agreement that will avert the described deterioration of trading conditions. However, the UK would also have to be prepared to make some compromises. However, there are limits to the validity of the statements made here. More explicit statements could be made by applying mathematical models. Furthermore, not all impacts that Brexit could have on the UK agri-food sector and trade in agricultural products could be considered. A selection of influences was analysed that only represent a fraction of what could occur because of Brexit. Nor the UK will adopt any of the models here presented here on a one-to-one basis. All models were negotiated country-specially and with regard to the respective situation at the time (for example, Turkey was still a candidate for EU membership when it joined the CU). Rather, the UK will want to put together a combination of certain elements from the models. To what extent the EU or both sides are prepared to compromise remains to be seen.

References

AHDB. (2016a). The impact of Brexit on protected food names. n.p. Retrieved November 30, 2020, from https://www.agindustries.org.uk/static/80d9ced9-2029-4d38-a9d71d334bb56929/AHDB-Horizon-Report-6-Dec-2016-The-impact-of-Brexit-on-protected-food-names.pdf

AHDB. (2016b). The impact of Brexit on the UK agricultural workforce. Warwickshire. Retrieved January 1, 2021, from https://ahdb.org.uk/knowledge-library/the-impact-of-brexit-on-the-uk-agricultural-workforce

AHDB. (2019a, February). Brexit prospects for UK agri-food trade. Warwickshire. Retrieved from https://ahdb.org.uk/knowledge-library/brexit-prospects-for-uk-agri-food-trade

AHDB. (2019b, February). Brexit prospects for UK cereals and oilseeds trade. Warwickshire. Retrieved from https://ahdb.org.uk/knowledge-library/brexit-prospects-for-uk-cereals-and-oilseeds-trade

AHDB. (2019c, February). Brexit prospects for UK potatoes trade. Warwickshire. Retrieved from https://ahdb.org.uk/knowledge-library/brexit-prospects-for-uk-potatoes-trade

AHDB. (2021a, January 21). *UK dairy trade dashboard*. Retrieved January 24, 2021, from AHDB: https://ahdb.org.uk/dairy/trade-dashboard

AHDB. (2021b, January 21). *Beef trade*. Retrieved January 27, 2021, from AHDB: https://ahdb.org.uk/beef/beef-trade

AHDB. (2021c, January 22). *Sheep meat trade*. Retrieved January 27, 2021, from AHDB: https://ahdb.org.uk/lamb/sheep-meat-trade

AHDB. (2021d, January 22). *Pig meat trade*. Retrieved January 27, 2021, from AHDB: https://ahdb.org.uk/pork/pig-meat-trade

AHDB. (2021e, January 21). *Cereals and Oilseeds trade dashboard*. Retrieved January 27, 2021, from AHDB: https://ahdb.org.uk/cereals-and-oilseeds/trade-dashboard

AHDB. (2021f, January 15). *UK trade data.* Retrieved January 27, 2021, from AHDB: https://ahdb.org.uk/cereals-oilseeds/trade-data

AHDB. (2021g, January 22). *Potato trade*. Retrieved January 27, 2021, from AHDB: https://ahdb.org.uk/potato/potato-trade

Ares, E. (2019a). Fisheries and Brexit. *Briefing Paper Number 8396*. London. Retrieved from https://commonslibrary.parliament.uk/research-briefings/cbp-8396/

Ares, E. (2019b). The Fisheries Bill 2017-19. *Briefing Paper 8442*. London: House of Commons Library. Retrieved December 8, 2020, from https://commonslibrary.parliament.uk/research-briefings/cbp-8442/

Barathova, K. (2018). EU labour in agricultural sector of the United Kingdom. Kiel, Hamburg: Leibniz Information Centre for Economics . Retrieved November 3, 2020, from http://hdl.handle.net/10419/181025

Barons, M., & Aspinall, W. (2020). Anticipated impact of Brexit scenarios on UK food prices and implications for policies on poverty and health: a structured expert judgement approach. *BMJ Open*(10).

BfR. (2017). EU-Almanach Lebensmittelsicherheit. Berlin. Retrieved from http://www.bfr.bund.de/de/publikation/eu_almanach-192686.html

Bord Bia. (2020). Export Performance & Prospects Irish Food, Drink & Horticulture 2019-2020. Retrieved January 6, 2021, from https://www.bordbiaperformanceandprospects.com/annual-reports

Bowers, P., Lang, A., Miller, V., Smith, B., & Webb, D. (2016, July 28). Brexit: some legal and constitutional issues and alternatives to EU membership. *Briefing Paper Number 07214*. London: House of Commons Library. Retrieved from https://commonslibrary.parliament.uk/research-briefings/cbp-7214/

Breen, B. B. (2018). The Implications of Brexit on the Use of the Landbridge. Dublin: Irish Maritime Development Office .

Brooks, N. (2017). *Written evidence (BRT0005).* Retrieved February 9, 2021, from data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/environment-food-and-rural-affairs-committee/brexit-trade-in-food/written/71319.pdf

Cabinet Office. (2018). Explanatory Memorandum for European Legislation. Retrieved December 31, 2020, from http://europeanmemoranda.cabinetoffice.gov.uk/files/2018/06/EM_9645-18,9646-18,9556-1-18_REV_1,9634-18.pdf

Carpenter, G. (2017). Not in the same boat: The economic impact of Brexit across UK fishing fleets. New Economics Foundation. Retrieved December 15, 2020, from https://www.researchgate.net/publication/328342869_Not_in_the_same_boat_The_economic_impact_of_Brexit_across_UK_fishing_fleets

Clarke, S. S. (2017). Will brexit raise the cost of living? *National Institute Economic Review, 242*(1), pp. 37-50.

Coe, S. D. (2018). The Agriculture Bill (2017-19). *Briefing Paper Number CBP 8405*. London: House of Commons Library. Retrieved January 1, 2021, from https://commonslibrary.parliament.uk/research-briefings/cbp-8702/

Coe, S., & Ward, M. (2019). Brexit: Trade issues for food and agriculture. *Briefing Paper Number 7974*. London. Retrieved from https://commonslibrary.parliament.uk/research-briefings/cbp-7974/

Cowie, L., & Witteveen, A. (2019). UK seafood processing sector labour report 2019. *Seafish Report No.: SR735*. Edinburgh: Seafish Economics. Retrieved December 9, 2020, from https://www.seafish.org/document/?id=16687D65-6E8C-488D-AC3F-F592F9FE9253

DAFM. (2020). Fact Sheet on Irish Agriculture. Retrieved January 4, 2021, from https://assets.gov.ie/88632/eff46189-8124-4072-9526-c49f995833b9.pdf

DEFRA. (2017). *Structure of the agricultural industry in England and the UK at June, 2016.* Retrieved November 1, 2020, from Department for Environment, Food and

Rural Affairs: https://www.gov.uk/government/statistical-data-sets/structure-of-the-agricultural-industry-in-england-and-the-uk-at-june

DEFRA. (2019, December 19). Final crop areas, yields, livestock populations and agricultural workforce at June 2019 - United Kingdom. *Farming Statistics* . n.p. Retrieved October 28, 2020, from https://www.gov.uk/government/statistics/farming-statistics-final-crop-areas-yields-livestock-populations-and-agricultural-workforce-at-1-june-2019-uk

DEFRA. (2020a). Agriculture in the UK. n.p. Retrieved from https://www.gov.uk/government/collections/agriculture-in-the-united-kingdom

DEFRA. (2020b). Farm Business Income by type of farm, England, 2019/20. London. Retrieved from https://www.gov.uk/government/statistics/farm-business-income

DEFRA. (2020c). *Food Statistics in your pocket: Food chain*. Retrieved April 2, 2021, from gov.uk: https://www.gov.uk/government/statistics/food-statistics-pocketbook/food-statistics-in-your-pocket-food-chain

DEFRA. (2020d, October 26). *Food statistics in your pocket: Glossary*. Retrieved October 27, 2020, from gov.uk: https://www.gov.uk/government/publications/food-statistics-pocketbook/food-statistics-in-your-pocket-glossary

DEFRA. (2020e, July 16). Horticulture Statistics 2019. Retrieved from https://www.gov.uk/government/collections/horticultural-statistics

DEFRA. (2020f). *Latest Horticulture Statistics.* Retrieved April 1, 2021, from gov.uk: https://www.gov.uk/government/statistics/latest-horticulture-statistics

DEFRA. (n.d.). *Protected geographical food and drink names*. Retrieved March 29, 2021, from gov.uk: https://www.gov.uk/protected-food-drink-names?register%5B%5D=foods-designated-origin-and-geographical-indication&register%5B%5D=foods-traditional-speciality-guaranteed&status%5B%5D=registered&country_of_origin%5B%5D=united-kingdom

Department for Exiting the European Union. (2018). *European Union (Withdrawal) Act 2018 - Explanatory Notes.* Retrieved April 1, 2021, from Legislation.gov.uk: https://www.legislation.gov.uk/ukpga/2018/16/notes

Dhingra, S., & Sampson, T. (2016). Life after Brexit: What are the UK's options outside the European Union? London: Centre for Economic Performance. Retrieved from https://personal.lse.ac.uk/sampsont/LifeAfter.pdf

Dhingra, S., Huang, H., Ottaviano, G., Pessoa, J., Sampson, T., & Van Reenen, J. (2017). The Costs and Benefits of Leaving the EU: Trade Effects. (C. f. Perfomance, Ed.) London. Retrieved September 29, 2020, from https://academic.oup.com/economicpolicy/article-abstract/32/92/651/4459728?redirectedFrom=fulltext

Dhingra, S., Ottaviano, G., Rappoport, V., Sampson, T., & Thomas, C. (2018). Uk trade and FDI: A post-Brexit perspective. *Papers in Regional Science*(97), pp. 9-24.

Dingra, S., Ottaviano, G., Rappaport, V., Sampson, T., & Thomas, C. (2018). UK trade and FDI: A post-Brexit perspective. *Papers in Regional Science*(97), pp. 9-24.

Downing, E., & Coe, S. (2018). Brexit: Future UK Agriculture Policy. *Briefing Paper Number CBP 8218*. London. Retrieved from https://commonslibrary.parliament.uk/research-briefings/cbp-8218/

Environment, Food and Rural Affairs Committee. (2018). Brexit: Trade in food. London: House of Commons. Retrieved from https://euagenda.eu/upload/publications/untitled-132569-ea.pdf

EUR-Lex. (n.d.). *Glossary of summaries - Common Agricultural Policy (CAP)*. Retrieved March 29, 2021, from EU law - EUR-Lex: https://eur-lex.europa.eu/summary/glossary/agricultural_policy.html?locale=en

European Commission . (2019). *Customs duties mean revenue* . Retrieved from European Commission - official website: https://ec.europa.eu/taxation_customs/facts-figures/customs-duties-mean-revenue_en

European Commission. (2016). CETA - Summary of the final negotiating results. Retrieved October 11, 2020, from https://trade.ec.europa.eu/doclib/docs/2014/december/tradoc_152982.pdf

European Commission. (2017). *EU and Norway conclude negotiations to enhance trade of agricultural products*. Retrieved March 6, 2021, from European Commission: http://trade.ec.europa.eu/doclib/press/index.cfm?id=1650

European Commission. (2020). Facts and Figures on the Common Fisheries Policy. Luxembourg. Retrieved December 9, 2020, from https://ec.europa.eu/fisheries/sites/fisheries/files/docs/body/pcp_en.pdf

European Commission. (2021a). *Negotiations and agreements*. Retrieved March 29, 2021, from European Commission: https://ec.europa.eu/trade/policy/countries-and-regions/negotiations-and-agreements/

European Commission. (2021b). *Switzerland - Trade - European Commission*. Retrieved March 6, 2021, from European Commission: https://ec.europa.eu/trade/policy/countries-and-regions/countries/switzerland/

European Commission. (n.d.a). *Access2Markets*. Retrieved March 29, 2021, from European Commission: https://trade.ec.europa.eu/access-to-markets/de/home

European Commission. (n.d.b). *Access2Markets Zollunion EU-Türkei*. Retrieved March 6, 2021, from Access2Markets: https://trade.ec.europa.eu/access-to-markets/de/content/zollunion-eu-tuerkei

European Commission. (n.d.c). *Common agricultural policy funds*. Retrieved March 29, 2021, from European Commission: https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/financing-cap/cap-funds_de#eafrd

European Commission. (n.d.d). *EU Rules - Food Safety*. Retrieved December 23, 2020, from European Commission: https://ec.europa.eu/food/safety/food_improvement_agents/additives/eu_rules_en

European Commission. (n.d.e). *GMO legislation - Food Safety*. Retrieved December 23, 2020, from European Commission: https://ec.europa.eu/food/plant/gmo/legislation_en

European Commission. (n.d.f). *Pesticides - Food Safety*. Retrieved December 23, 2020, from European Commission: https://ec.europa.eu/food/plant/pesticides_en

European Commission. (n.d.f). *RASFF - Food and Feed Safety Alerts*. Retrieved December 23, 2020, from European Commission: https://ec.europa.eu/food/safety/rasff_en

European Commission. (n.d.g). *Quality schemes explained*. Retrieved March 29, 2021, from European Commission: https://ec.europa.eu/info/food-farming-fisheries/food-safety-and-quality/certification/quality-labels/quality-schemes-explained_en

European Union Committee. (2017a). Brexit: agriculture. *20th Report of Session 2016-17*. London: House of Lords. Retrieved December 29, 2020, from https://publications.parliament.uk/pa/ld201617/ldselect/ldeucom/169/16902.htm

European Union Committee. (2017b). Brexit: farm animal welfare. London. Retrieved from https://publications.parliament.uk/pa/ld201719/ldselect/ldeucom/15/15.pdf

European Union Committee. (2017c). Brexit: fisheries. *8th Report of Session 2016-17*. London: House of Lords. Retrieved December 15, 2020, from https://publications.parliament.uk/pa/ld201617/ldselect/ldeucom/78/78.pdf

European Union Committee. (2018). Brexit: food prices and availability. *14th Report of Session 2017-19*. London. Retrieved December 20, 2020, from https://euagenda.eu/publications/brexit-food-prices-and-availability

Eurostat. (2021). *Production from aqualculture excluding hatcheries and nurseries*. Retrieved December 9, 2020, from Eurostat: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=fish_aq2a&lang=en

Farmer Scientist Network. (2016). The Implications of "Brexit" for UK Agriculture. (Y. A. Society, Ed.) n.p. Retrieved September 29, 2020, from https://yas.co.uk/wp-content/uploads/2019/03/yas-fsn-brexit-full-report.pdf

FDF. (2017). Breaking the chain - Key workforce considerations for the UK food and drink supply chain as we leave the EU. n.p. Retrieved November 3, 2020, from https://www.fdf.org.uk/publicgeneral/Breaking-the-Chain.pdf

FDF. (2018). Rules of origin in an EU-UK FTA - A "hidden hard Brexit" for and drink exporters? London. Retrieved December 7, 2020, from https://www.fdf.org.uk/corporate_pubs/FDF-Rules-of-origin-report.pdf

FDF. (2020). Exports Snapshots 2019. Retrieved November 16, 2020, from https://www.fdf.org.uk/exports-2019-q4.aspx

Federal Ministry for Economic Affairs and Energy. (n.d.). *CETA - The European-Canadian Economic and Trade Agreement*. Retrieved October 7, 2020, from BMWi - Federal Ministry for Economic Affairs and Energy: https://www.bmwi.de/Redaktion/EN/Dossier/ceta.html

Food Foundation. (2018). *Written evidence - Food Foundation (BFS0004).* London. Retrieved April 2, 2021, from http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/eu-energy-and-environment-subcommittee/brexit-food-security/written/79641.html

gov.uk. (2016). *UK Trade Tariff: Common Agricultural Policy (charges and refunds)*. Retrieved March 29, 2021, from gov.uk: https://www.gov.uk/government/publications/uk-trade-tariff-common-agricultural-policy-charges-and-refunds/uk-trade-tariff-common-agricultural-policy-charges-and-refunds

Hederman, W., & Durkin, A. (2018). The impact of Brexit on the Agricultural and Fishing industries. Retrieved from https://www.cpaireland.ie/getattachment/Resources/CPA-Publications/Accountancy-Plus/accountingcpd-net-courses-(2)/PCA-Profiles-Personal-Development-(3)/13-The-Impact-of-Brexit-on-the-Agricultural-and-Fishing-Industries-(1).pdf?lang=en-IE

Hirst, D. (2017). Brexit: What next for UK fisheries? *Briefing Paper Number CBP7669*. London: House of Comons Library. Retrieved from https://researchbriefings.files.parliament.uk/documents/CBP-7669/CBP-7669.pdf

Hix, S. (2018). Brexit: Where is the EU-UK Relationship Heading? *Journal of Common Market Studies*, pp. 1-17.

HM Government. (2014). Review of the Balance of Competences between the United Kingdom and the European Union: Fisheries Report. London: HM Government. Retrieved from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/335033/fisheries-final-report.pdf

HM Government. (2016a). Alternatives to membership: possible models for the United Kingdom outside the European Union. London. Retrieved September 18, 2020, from https://www.gov.uk/government/publications/alternatives-to-membership-possible-models-for-the-united-kingdom-outside-the-european-union

HM Government. (2016b). HM Treasury analysis: the long term economic impact of EU membership and the alternatives. London. Retrieved September 25, 2020, from https://www.gov.uk/government/publications/hm-treasury-analysis-the-long-term-economic-impact-of-eu-membership-and-the-alternatives

HM Government. (2016c). Rights and obligations of European Union membership. London. Retrieved from https://www.gov.uk/government/publications/rights-and-obligations-of-european-union-membership

HM Treasury & DEFRA. (2005). A Vision for the Common Agricultural Policy. London: HM Treasury, Defra. Retrieved from http://projects.mcrit.com/foresightlibrary/attachments/article/1102/HM%20Treasury_Defra%20(2005)%20A%20vision%20for%20the%20Common%20AP.pdf

Home Office. (2020). Annual Statistics of Scientific Procedures on Living Animals Great Britain 2019. London: Home Office. Retrieved from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/901224/annual-statistics-scientific-procedures-living-animals-2019.pdf

HRMC. (2017). *Administrative elements of importing and exporting goods (written evidence FTG0010).* London: House of Lords. Retrieved from http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/eu-external-affairs-subcommittee/brexit-future-trade-between-the-uk-and-the-eu-in-goods/written/42702.html

Humane Slaughter Association. (n.d.). *General*. Retrieved February 10, 2021, from Humane Slaughter Association: https://www.hsa.org.uk/faqs/general#n1

Institute for Government. (2020). *Brexit transition period*. Retrieved March 5, 2021, from The Institute for Government: https://www.instituteforgovernment.org.uk/explainers/brexit-transition-period

Jones, N. (2020, November 12). *Trade: the UK landbridge*. Retrieved February 12, 2021, from The Institute for Government: https://www.instituteforgovernment.org.uk/explainers/trade-uk-landbridge

Kenyon, W. (2017). Implications of Leaving the EU - Fisheries. Edinburgh: Scottish Parliament Inforamtion Centre. Retrieved December 14, 2020, from https://www.cablemagazine.scot/ResearchBriefingsAndFactsheets/S5/SB_17-21_Implications_of_Leaving_the_EU-_Fisheries.pdf

KPMG. (2018). Impact of non-tariff barriers as a result of Brexit. Retrieved from https://www.government.nl/binaries/government/documents/publications/2018/01/18/impact-of-non-tariff-barriers-as-a-result-of-brexit/Impact+of+non-tariff+barriers+as+a+result+of+Brexit.pdf

Lang, T., Milstone, E., & Marsden, T. (2017). A Food Brexit: time to get real. Brighton: University of Sussex Science Policy Research Unit. Retrieved from http://www.sussex.ac.uk/spru/newsandevents/2017/publications/food-brexit

Lightfoot, W., Burke, J., Craig-Harvey, N., Dupont, J., Howard, R., Lowe, R., . . . Taylor, M. (2017). Farming Tomorrow - British agriculture after Brexit. London: Policy Exchange. Retrieved December 31, 2020, from https://policyexchange.org.uk/wp-content/uploads/2017/07/Farming_Tomorrow.pdf

Lydgate, E., Anthony, C., & Milstone, E. (2019). Brexit Food Safety Legislation And Potential Implications For UK Trade: The Devil In The Details. Sussex: UK Trade Policy Observatory. Retrieved December 23, 2020, from http://sro.sussex.ac.uk/id/eprint/87859/

Marine Management Organisation. (2019). UK Sea Fisheries Statistics 2018. London. Retrieved December 9, 2020, from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/920110/UK_sea_fisheries_statistics_2018_002.pdf

Marine Management Organisation. (2020). UK Sea Fisheries Statistics 2019. *National Statistics* . n.p. Retrieved January 21, 2021, from https://commonslibrary.parliament.uk/research-briefings/sn02788/

Matthes, J., & Busch, B. (2016, Dezember 12). Was kommt nach dem Brexit? Erwägungen zum zukünftigen Verhältnis zwischen der Europäischen Union und dem Vereinigten Königreich. (I. d. Köln, Ed.) Köln. Retrieved September 29, 2020, from https://www.iwkoeln.de/fileadmin/publikationen/2016/317823/IW-Report_2016_37_Was_kommt_nach_dem_Brexit.pdf

Matthews, A. (2017). Brexit Impacts on Irish Agri-food exports to the UK. *EuroChoices, 16*(2), pp. 26-32.

Matthews, A. (2020). *The protective effect of EU agricultural tariffs*. Retrieved March 29, 2021, from CAP Reform: http://capreform.eu/the-protective-effect-of-eu-agricultural-tariffs/

McCulloch, S. (2019). Brexit and Animal Welfare Impact Assessment: Analysis of the Opportunities Brexit Presents for Animal Protection in the UK, EU, and Internationally. *Animals, 9*(877), pp. 1-27.

McGuiness, T., & Garton Grimwood, G. (2017). Migrant workers in agriculture. *Briefing Paper 7987*. London: House of Commons Library. Retrieved January 3, 2021, from https://commonslibrary.parliament.uk/research-briefings/cbp-7987/

Ministry of Agriculture and Food. (2016). *Import tariffs for agricultural products*. Retrieved April 5, 2021, from regjeringen.no: https://www.regjeringen.no/en/topics/food-fisheries-and-agriculture/jordbruk/innsikt/handel-med-jordbruksprodukt/importvernet-for-jordbruksvarer/id2364459/

Molinuevo, M. (2018). Brexit: Trade Governance and Legal Implications for Third Countries. *Journal of World Trade, 52*(4), pp. 599-617.

Napier, I. (2017). Fish Landings from the UK EEZ and UK Landings from the EU EEZ in 2016. Shetland: NAFC Marine Centre. Retrieved from https://www.nafc.uhi.ac.uk/research/statistics/eez-reports/eez-report-2017-01-31/

NFU. (2017). Access to a competent and flexible workforce. Warwickshire. Retrieved from https://www.nfuonline.com/nfu-online/news/brexit-vision-for-the-future-overseas-labour-july-2017pdf/

OECD. (2015). OECD-Studie zur Agrarpolitik: Schweiz 2015. Paris: OECD Publishing. doi:https://doi.org/10.1787/9789264244856-de

Office for National Statistics. (2019). *International migration - terms, definitions and frequently asked questions*. Retrieved April 2, 2021, from ONS - Office for National Statistics: https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/in ternationalmigration/methodologies/longterminternationalmigrationfrequentlyasked questionsandbackgroundnotes#migration-terms-and-definitions

Office for National Statistics. (2019). *UK Business Counts - local units by industry and employment size band.* Retrieved March 24, 2021, from Nomis - Official Labour Market Statistics: https://www.nomisweb.co.uk/query/construct/submit.asp?forward=yes&menuopt=201&subcomp=

Office for National Statistics. (2020, January 21). *Employment in the UK*. Retrieved February 25, 2021, from Office for National Statistics: https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/employmentintheuk/january2020

Office for National Statistics. (2021). *EMP07: Temporary employees.* Retrieved March 3, 2021, from Office for National Statistics: https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/temporaryemployeesemp07

ONS. (2021). *Overview of the UK population*. Retrieved April 2, 2021, from Office for National Statistics: https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/articles/overviewoftheukpopulation/january2021

Owen, L.; Udall, D.; Franklin, A.; Kneafsey, M. (2018). Protected Food Names in the United Kingdom after Brexit - Understanding the key opportunities and challenges. Centre for Agroecology, Water and Resilience, Coventry University. Retrieved November 30, 2020, from https://www.researchgate.net/publication/335160814_Protected_Food_Names_in_the_United_Kingdom_after_Brexit_Understanding_the_key_opportunities_and_challenges

Pet Food Manufactures Association. (n.d.). *Pet Population 2021*. Retrieved April 2, 2021, from Pet Food Manufactures Association: https://www.pfma.org.uk/pet-population-2021

Piris, J.-C. (2016). If the UK votes to leave - The seven alternatives to EU membership. (C. f. Reform, Ed.) n.P. . Retrieved September 25, 2020, from https://www.cer.eu/publications/archive/policy-brief/2016/if-uk-votes-leave-seven-alternatives-eu-membership

Policy Department for Structural and Cohesion Policies . (2017). Implications of "Brexit" for the EU agri-food sector and the CAP: budgetary, trade and institutional issues . *Research for AGRI Committee*. Brussels . Retrieved from https://op.europa.eu/en/publication-detail/-/publication/b0b9f125-4eaf-11e9-a8ed-01aa75ed71a1/language-en

PwC UK. (2016). Leaving the EU: Implicationd for the UK economy. n.p. Retrieved September 25, 2020, from https://www.pwc.co.uk/economic-services/assets/leaving-the-eu-implications-for-the-uk-economy.pdf

Revell, B. (2017). Brexit and Tariff Rate Quotas on EU Imports: A Complex Problem. *EuroChoices, 16*(2), pp. 10-17.

Schweizerische Eidgenossenschaft. (2019a). Landwirtschaft. n.p. Retrieved from www.eda.admin.ch/europa/landwirtschaft

Schweizerische Eidgenossenschaft. (2019b). *Personenfreizügigkeit*. Retrieved November 26, 2020, from Schweizerische Europapolitik: https://www.eda.admin.ch/dea/de/home/bilaterale-abkommen/ueberblick/bilaterale-abkommen-1/personenfreizuegigkeit.html

Scotch Whisky Association. (2020). *Scotch Whisky Export Figures 2019*. Retrieved November 16, 2020, from Scotch Whisky Association: https://www.scotch-whisky.org.uk/newsroom/scotch-whisky-exports-surge-amidst-backdrop-of-tariff-uncertainty/

Scottish Fishermen's Federation. (2016, September 13). *Scottish Fisheries Post-Brexit: A Sea of Oppurtunities*. Retrieved February 26, 2021, from Scottish Fishermen's Federation: https://www.sff.co.uk/scottish-fisheries-post-brexit-sea-of-opportunities/

Seafish. (2019). 2018 Employment in the UK Fishing Fleet. Edinburgh. Retrieved December 10, 2020, from https://issuu.com/capnh/docs/seafish_2018_employment_in_fleet_fi

Serwicka, I. (2018). *Written evidence BFS0009.* UK Trade Policy Observatory. Retrieved December 20, 2020, from http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/eu-energy-and-environment-subcommittee/brexit-food-security/written/79665.html

The Food and Drink Sector Council. (2019). Preparing for a changing workforce: A food and drink supply chain approach to skills. n.p.: Food and Drink Federation . Retrieved November 3, 2020, from https://www.fdf.org.uk/workforce.aspx

The Manufacturer's Organsiation. (2017). Sector Bulletin: Food & Drink. Retrieved from https://www.makeuk.org/-/media/eef/files/reports/industry-reports/sector-bulletin-food-and-drink.pdf

Uberoi, E., Hutton, G., Ward, M., & Ares, E. (2020). UK Fisheries Statistics. *Briefing Paper Number 2788*. London: House of Commons Library. Retrieved December 9, 2020, from https://commonslibrary.parliament.uk/research-briefings/sn02788/

UK Trade Info. (2020). *Overseas Trade Data Table*. Retrieved November 14, 2020, from UK Trade Info: https://www.uktradeinfo.com/trade-data/ots-custom-table/?id=c39197f2-b8b0-4661-a67a-9cfaba973e63

United Nations. (1998). Recommendations on Statistics of International Migration, Revision 1. New York: United Nations Publication. Retrieved from https://unstats.un.org/unsd/publication/SeriesM/SeriesM_58rev1e.pdf

United Nations Conference on Trade and Development. (2019). International Classification of Non-Tariff Measures. Retrieved January 10, 2021, from https://unctad.org/webflyer/international-classification-non-tariff-measures-2019-version

von Ondorza, N. (2016). *Großbritanniens Rolle innerhalb der und außerhalb der EU*. Retrieved April 1, 2021, from Bundeszentrale für politische Bildung: https://www.bpb.de/internationales/europa/brexit/228806/grossbritanniens-rolle-in-der-welt

Walmsley, S. (2016). Brexit: Where next for UK fisheries? Southampton: ABP Mer. Retrieved from http://www.abpmer.co.uk/media/1487/white-paper-brexit-where-next-for-uk-fisheries.pdf

Wildlife and Countryside Link, and UK Centre for Animal Law. (2018). Brexit: getting the best deal for animals - A detailed analysis of current legislation, with recommendations for enhancing animal welfare, British industries, and consumer confidence and choice in post-Brexit Britain. London. Retrieved from https://www.alaw.org.uk/wp-content/uploads/Brexit-Getting-the-Best-Deal-for-Animals-Full-Report.pdf

WTO. (2017). *Rules of origin - Technical Information*. Retrieved December 7, 2020, from World Trade Organization: https://www.wto.org/english/tratop_e/roi_e/roi_info_e.htm

WTO. (n.d.a). *Glossary - ad valorem tariff*. Retrieved January 11, 2021, from World Trade Organization: https://www.wto.org/english/thewto_e/glossary_e/ad_valorem_tariff_e.htm

WTO. (n.d.b). *Schedules of concessions on goods*. Retrieved December 20, 2020, from World Trade Organization: https://www.wto.org/english/tratop_e/schedules_e/goods_schedules_e.htm

WTO, ITC, UNCTAD. (2020). World Tariff Profiles 2020. Retrieved from https://www.wto.org/english/res_e/publications_e/world_tariff_profiles20_e.htm

List of sources of law

Treaties

Consolidated Version of the Treaty on European Union (*OJ C 326, 26.10.2012, p. 13-390)*

Consolidated Version of the Treaty on the Functioning of the European Union (*OJ C 326, 26.10.2012, p.47-390)*

United Nations Convention on the Law of Sea (1982)

Directives

Council Directive 2008/120/EC of 18 December 2008 laying down minimum standards for the protection of pigs (*OJ L 047, 18.2.2009, p. 5)*

Council Directive 2008/119/EC of 18 December 2008 laying down minimum standards for the protection of calves (*OJ L 010, 15.1.2009, p.7*)

Council Directive 98/58/EC of 20 July 1998 concerning the protection of animals kept for farming purposes (*OJ L 221 8.8.1998, p. 23*)

Regulations

Regulation (EC) No. 853/2004 of the European Parliament and of the Council laying down specific hygiene rules for food of animal origin (*OJ L 139 30.4.2004, p. 55*)

Regulation (EU) 2019/216 of the European Parliament and of the Council of 30 January 2019 on the apportionment of tariff rate quotas included in the WTO schedule of the Union following the withdrawal of the United Kingdom from the Union, and amending Council Regulation (EC) No 32/2000 (*OJ L 038 8.2.2019, p. 1*)

Statutory Instruments

The Welfare of Farmed Animals (England) Regulations 2007 No.2078

Welfare of Farmed Animals Regulations (Northern Ireland) 2012 No. 156

The Plant Protection Products (Miscellaneous Amendments) (EU Exit) Regulations 2019 No. 556 The Pesticides (Maximum Residue Levels) (Amendment etc.) (EU Exit) Regulations 2019 No. 557

The Specific Food Hygiene (Amendment etc.) (EU Exit) Regulations 2019 No. 640

The General Food Law (Amendment etc.) (EU Exit) Regulations 2019 No. 641

The Genetically Modified Food and Feed (Amendment etc.) (EU Exit) Regulations 2019 No. 705

The Environment, Food and Rural Affairs (Amendment) (EU Exit) Regulations 2019 No.778

The Food Additives, Flavourings, Enzymes and Extraction Solvents (Amendment etc.) (EU Exit) Regulations 2019 No. 860

Appendices

List of Appendices

Appendix I: UK imports and exports per product category between 2015-2019

Imports

Product category	Volume in tonnes														
	2015			2016			2017			2018			2019		
	EU	Non-EU	Total	EU	Non-EU	Total	EU	Non-EU	Total	EU	Non-EU	Total	EU	Non-EU	Total
Dairy	1.277.924	8.033	1 285.957	1.256.214	9.563	1.265.777	1 382.133	4.055	1.386.188	1.465.870	3.150	1.469.020	1.362.779	2.940	1.365.719
Cheese & Curd	490.678	3.608	494.286	483.948	6.025	489.973	491.886	1.987	493.873	520.622	2.302	522.924	534.278	1.639	535.917
Beef	222.439	23.183	245.622	217.874	19.668	237.561	236.536	13.588	250.124	250.396	15.495	265.891	217.223	10.111	227.334
Fresh	167.742	15.741	183.483	160.080	12.045	172.125	168.578	9.782	178.360	169.557	8.809	178.366	150.982	6.369	157.351
Frozen	54.697	7.442	62.139	57.793	7.643	65.436	67.958	3.805	71.764	80.839	6.686	87.525	66.241	3.742	69.983
Sheep meat	8.270	76.069	84.338	8.705	73.443	82.148	13.244	60.116	73.360	13.708	56.934	70.642	13.822	43.317	57.139
Fresh	3.690	28.396	32.086	3.898	27.605	31.502	6.753	24.200	30.954	6.235	21.708	27.943	7.312	17.831	25.143
Frozen	4.580	47.672	52.252	4.808	45.838	50.646	6.491	35.916	42.407	7.474	35.226	42.699	6.510	25.486	31.996
Pig meat	819.189	1.399	820.588	876.783	1.539	878.322	916.476	1.639	918.115	907.537	1.429	908.966	844.110	1.599	845.709
Pork	338.459	839	339.298	395.956	885	396.841	428.455	888	429.343	420.724	817	421.540	410.741	807	411.548
Bacon/Ham	229.237	-	229.237	219.660	-	219.660	202.588	-	202.588	198.308	-	198.308	179.074	-	179.074
Processed Hams/Shoul-ders	127.971	-	127.971	134.540	-	134.540	143.881	-	143.881	146.389	5	146.394	111.352	-	111.352
Sausages	111.785	560	112.345	111.898	654	112.552	124.683	751	125.434	127.711	607	128.318	127.056	792	127.848
Offal	11.737	-	11.737	14.729	-	14.729	16.869	-	16.869	14.405	-	14.405	15.887	-	15.887
Poultry meat	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Cereals & oilseeds	3.869.339	4.493.297	8 362.635	4.211.978	5.302.520	9.514.498	4 318.720	4.987.550	9.306.270	4.239.752	6.222.500	10.462.252	4.005.223	5.318.368	9.323.591
Wheat	932.244	493.784	1.426.028	1.181.500	626.774	1.808.274	1.108.120	582.498	1.690.617	1.129.830	657.454	1.787.284	462.092	524.127	986.219
Maize	1.038.598	634.998	1.673.596	1.066.141	940.919	2.007.059	1 096.529	927.251	2.023.781	873.167	1.952.298	2.825.465	978.660	1.397.389	2.376.048
Rapeseeds	57.231	24	57.255	111.504	121.549	233.054	219.934	10	219.944	204.924	15	204.939	273.078	121.190	394.268
Soya cake	581.960	1.661.312	2 243.272	423.437	1.622.760	2.046.196	305.587	1.565.366	1.870.953	439.869	1.575.884	2.015.753	616.992	1.611.635	2.228.626
Sunflower oil	-	79.297	79.297	116.691	82.746	199.436	224.605	75.871	300.476	211.012	118.758	329.770	217.264	99.252	316.515
Palm oil	56.319	327.174	383.492	89.352	313.604	402.956	142.381	280.189	422.570	132.009	285.153	417.161	140.532	273.758	414.290
Potatoes	821.857	68.658	890.515	895.469	59.830	955.299	887.847	53.081	940.928	969.310	50.108	1.019.418	995.628	49.439	1.045.067
Fresh	102.057	64.536	166.593	126.385	56.020	182.405	80.859	49.188	130.047	79.468	45.433	124.901	160.063	43.280	203.343
Frozen	564.752	929	565.681	614.166	1.164	615.330	646.493	252	646.745	713.447	136	713.583	660.630	182	660.812
Fruits	*	*	3.705.000	*	*	3.867.000	*	*	4.013.000	*	*	3.661.000	*	*	3.636.000
Bananas	*	*	1.152.000	*	*	1.211.000	*	*	1.235.000	*	*	1.074.000	*	*	1.074.000
Grapes	*	*	258.000	*	*	275.000	*	*	271.000	*	*	274.000	*	*	282.000

Apples	*	*	413.000	*	*	382.000	*	*	525.000	*	*	372.000	*	*	336.000
Oranges	*	*	286.000	*	*	292.000	*	*	287.000	*	*	271.000	*	*	265.000
Vegetables	*	*	2 256.000	*	*	2.369.000	*	*	2.184.000	*	*	2.268.000	*	*	2.309.000
Tomatoes	*	*	402.300	*	*	402.500	*	*	398.300	*	*	410.900	*	*	405.500
Onions	*	*	390.700	*	*	394.900	*	*	342.000	*	*	399.700	*	*	457.000
Lettuce	*	*	207.400	*	*	221.400	*	*	192.200	*	*	215.600	*	*	214.900

Table A-1: UK imports per product category between 2015 and 2019. Source: IHS Maritime & Trade, as citied in: AHDB, 2021a, 2021b, 2021c, 2021d, 2021e, 2021g; DEFRA, 2020d

* no data available

Exports

Product category	Volume in tonnes														
	2015			2016			2017			2018			2019		
	EU	Non-EU	Total	EU	Non-EU	Total	EU	Non-EU	Total	EU	Non-EU	Total	EU	Non-EU	Total
Dairy	1.014.150	112.820	1.126.970	984.465	109.798	1.094.263	1.207.465	102.602	1.310.067	1.260.324	107.279	1.367.603	1.327.797	130.767	1.458.564
Cheese & curd	125.705	26.007	151.712	128.832	34.884	163.676	139.489	32.002	171.692	154 550	35.723	190.272	170.551	37.459	208.009
Milk & cream	644.795	20.140	664.935	624.996	21.632	646.627	835.180	14.996	850 536	871.487	10.049	881.536	853.585	8.431	862.016
Beef	83.272	7.429	90.701	89.245	10.932	100.177	82.924	12.392	96.316	89.222	11.639	100.861	103.373	22.328	125.701
Sheep meat	136.845	7.550	144.395	132.722	5.898	138.620	149.043	9.613	158.656	140 251	7.659	147.910	162.071	9.928	171.999
Pig meat	164.839	94.232	259.071	165.574	127.618	293.192	175.614	129.865	305.479	179 579	140.002	319.581	175.749	173.614	349.363
Pork	120.032	51.835	171.868	120.492	69.953	190.445	126.932	70.083	197 015	127.789	73.842	201.631	119.765	107.057	226.822
Offal	11.165	40.875	52.040	14.644	56.271	70.915	16.665	58.328	74.993	17.550	63.740	81.290	23.333	63.180	86.513
Poultry meat	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Cereals & oilseeds	4.808.009	1.710.245	6 518.254	3.080.484	723.613	3.804.097	2.614.881	418.471	3.033.352	2.413.436	358.239	2.771.675	3.421.014	958.696	4.379.710
Wheat	2.267.035	565.665	2 832.700	1.140.534	297.083	1.437.617	443.020	1.925	444 945	330 942	27.132	358.074	959.045	245.894	1.204.939
Barley	1.308.043	656.237	1 964.280	977.212	49.012	1.026.224	1.022.851	78.574	1.101.425	812.620	50.339	862.958	1.387.105	402.762	1.789.867
Flour	222.017	6.523	228.540	251.629	6.350	257.979	217.220	6.366	223 586	240 323	5.831	246.154	207.106	4.724	211.830
Malt	10.523	168.624	179.147	14.754	190.077	204.831	28.045	181.885	209 930	30.543	150.691	181.234	24.802	128.709	153.510
Rapeseeds	418.773	24.756	443.530	186.895	157	187.052	114.148	197	114 345	105 392	34	105.426	73.911	101	74.012
Rapeseed oil	142.295	42.180	184.475	46.392	39.422	85.814	138.617	18.338	156 955	226.124	22.321	248.446	160.903	21.712	182.615
Potatoes	252.146	101.371	353.517	267.431	108.932	376.363	317.896	107.726	425.622	339 587	104.697	444.284	286.797	112.999	399.796
Seed	23.573	72.461	96.034	23.115	76.998	100.113	34.649	67.854	102 503	26.740	64.817	91.557	25.228	77.180	102.408
Crisp	17.696	2.706	20.402	21.255	3.740	24.995	23.894	2.765	26.659	23.361	2.891	26.252	21.665	3.479	25.144
Fruits	*	*	130.000	*	*	142.000	*	*	177 000	*	*	156.000	*	*	161.000
Oranges	*	*	29.000	*	*	30.000	*	*	31.000	*	*	29.000	*	*	33.000
Bananas	*	*	32.000	*	*	55.000	*	*	59.000	*	*	29.000	*	*	33.000
Apples	*	*	20.000	*	*	17.000	*	*	26.000	*	*	22.000	*	*	19.000
Vegetables	*	*	153.300	*	*	155.200	*	*	129.400	*	*	145.400	*	*	141.700
Carrots & turnips	*	*	38.500	*	*	21.100	*	*	22.700	*	*	29.000	*	*	30.300

Table A-2: UK imports per product category between 2015 and 2019. Source: IHS Maritime & Trade, as citied in: AHDB, 2021a, 2021b, 2021c, 2021d, 2021e, 2021g; DEFRA, 2020d

* no data available

Appendix II: State of play of EU trade agreements

Types of EU trade agreement

There are three main types of agreement:

1. Customs Unions
    - eliminate customs duties in bilateral trade, and
    - establish a joint customs tariff for foreign importers.
2. Association Agreements, Stabilisation Agreements, (Deep and Comprehensive) Free Trade Agreements and Economic Partnership Agreements
    - remove or reduce customs tariffs in bilateral trade.
3. Partnership and Cooperation Agreements
    - provide a general framework for bilateral economic relations, and
    - leave customs tariffs as they are.

Agreements in place (not listed are agreements, that are still being adopted, ratified or negotiated)

Trade partner	Type of agreement	In force since
Albania (Western Balkans)	Stabilisation and Association Agreement	2009
Algeria	Association Agreement	2005
Andorra	Customs Union	1991
Antigua and Barbuda (CARIFORUM)	Economic Partnership Agreement	Provisionally applied since 2008
Armenia	Comprehensive and Enhanced Partnership	Provisionally applies since 2018
Azerbaijan	Partnership and Cooperation Agreement	In force since 1999, negotiations on modernisation began in 2017, on hold since 2019
Bahamas (CARIFORUM)	Economic Partnership Agreement	Provisionally applied since 2008
Barbados (CARIFORUM)	Economic Partnership Agreement	Provisionally applied since 2008

Belize (CARIFORUM)	Economic Partnership Agreement	Provisionally applied since 2008
Bosnia and Herzegovina (Western Balkans)	Stabilisation and Association Agreement	2015
Botswana (SADC)	Economic Partnership Agreement	Provisionally applied since 2016
Cameroon (Central Africa)	Interim Economic Partnership Agreement	Provisionally applied since 2014
Canada	Comprehensive Economic and Trade Agreement	Provisionally applied since 2017
Chile	Association Agreement and Additional Protocol	In force since 2003, negotiations on modernisation began in 2017, on hold since 2019
Colombia (with Ecuador and Peru)	Trade Agreement	Provisionally applied since 2013
Comoros (ESA)	Interim Economic Partnership Agreement	Provisionally applied since 2019, negotiations on modernisation began in 2019
Costa Rica (Central America)	Association Agreement with a strong trade component	Provisionally applied since 2013
Côte d'Ivoire (West Africa)	Steppingstone Economic Partnership Agreement	Provisionally applied since 2016
Dominica (CARIFORUM)	Economic Partnership Agreement	Provisionally applied since 2008
Dominican Republic (CARIFORUM)	Economic Partnership Agreement	Provisionally applied since 2008
Ecuador (with Colombia and Peru)	Trade Agreement	Provisionally applied since 2013
Egypt	Association Agreement	2004
El Salvador (Central America)	Association Agreement with a strong trade component	Provisionally applied since 2013
Eswatini (SADC)	Economic Partnership Agreement	Provisionally applied since 2016
Faroe Islands	Agreement	1997
Fiji (Pacific)	Interim Partnership Agreement	Provisionally applied since 2014

Georgia	Association Agreement	2016
Ghana (West Africa)	Steppingstone Economic Partnership Agreement	Provisionally applied since 2016
Grenada (CARIFORUM)	Economic Partnership Agreement	Provisionally applied since 2008
Guatemala (Central America)	Association Agreement with a strong trade component	Provisionally applied since 2013
Guyana (CARIFORUM)	Economic Partnership Agreement	Provisionally applied since 2008
Honduras (Central America)	Association Agreement with a strong trade component	Provisionally applied since 2013
Iceland	Economic Area Agreement	Provisionally applied since 2008
Israel	Association Agreement	2000
Iraq	Partnership and Cooperation Agreement	Provisionally applied since 2012
Jamaica (CARIFORUM)	Economic Partnership Agreement	Provisionally applied since 2008
Japan	Global agreement	2019
Jordan	Association Agreement	2002
Kazakhstan	Enhanced Partnership and Cooperation Agreement	Provisionally applied since 2016
Kosovo	Stabilisation and Association Agreement	2016
Lebanon	Association Agreement	2006
Lesotho (SADC	Economic Partnership Agreement	Provisionally applied since 2016
Liechtenstein	Economic Area Agreement	1995
Madagascar (ESA)	Economic Partnership Agreement	Provisionally applied since 2012, negotiations on modernisation began in 2019
Mauritius (ESA)	Economic Partnership Agreement	Provisionally applied since 2012, negotiations on modernisation began in 2019
Mexico	Global Agreement	In force since 2000, negotiations on modernisation began in 2016, ‘Agreement in principle’ on the trade part reached in 2018

Moldova	Association Agreement	2016
Montenegro (Western Bal-kans)	Stabilisation and Association Agreement	2010
Morocco	Association Agreement	In force since 2000, negotiations on modernisation began in 2013, on hold since 2014
Mozambique (SADC)	Economic Partnership Agree-ment	Provisionally applied since 2016
Namibia (SADC)	Economic Partnership Agree-ment	Provisionally applied since 2016
Nicaragua (Central America)	Association Agreement with a strong trade component	Provisionally applied since 2013
North Macedonia (Western Balkans)	Stabilisation and Association Agreement	2004
Norway	Economic Area Agreement	1994
Palestinian Authority	Interim Association Agreement	1997
Papua New Guinea (with Fiji)	Interim Partnership Agreement	Provisionally applied since 2013
Madagascar (ESA)	Economic Partnership Agree-ment	Provisionally applied since 2009
Peru (with Colombia and Ec-uador)	Trade Agreement	Provisionally applied since 2013
Samoa (Pacific)	Economic Partnership Agree-ment	Provisionally applied since 2018
San Marino	Customs Union	1991
Serbia (Western Balkans)	Stabilisation and Association Agreement	2013
Seychelles (ESA)	Economic Partnership Agree-ment	Provisionally applied since 2012, negotiations on modernisation began in 2019
Singapore	Free Trade Agreement	2019
Solomon Islands (Pacific)	Economic Partnership Agree-ment	Provisionally applied since 2020
South Africa	Economic Partnership Agree-ment	Provisionally applied since 2016
South Korea	Free Trade Agreement	2015

St Kitts and Nevis (CARIFORUM)	Economic Partnership Agreement	Provisionally applied since 2008
St Lucia (CARIFORUM)	Economic Partnership Agreement	Provisionally applied since 2008
St Vincent and the Grenadines (CARIFORUM)	Economic Partnership Agreement	Provisionally applied since 2008
Suriname (CARIFORUM)	Economic Partnership Agreement	Provisionally applied since 2008
Switzerland	Agreement	1973
Trinidad and Tobago (CARIFORUM)	Economic Partnership Agreement	Provisionally applied since 2008
Tunisia	Association Agreement	In force since 1998, negotiations on modernisation began in 2015, on hold since 2019
Turkey	Customs Union	1995
Ukraine	Deep and Comprehensive Free Trade Agreement Association Agreement	Provisionally applied since 2016
Vietnam	Free Trade Agreement	2020
Zimbabwe (ESA)	Economic Partnership Agreement	Provisionally applied since 2012, negotiations on modernisation began in 2019

Table A-3: Current EU trade agreements, as of March 29th 2021. Source: European Commission, 2021

Appendix III: Pros and Cons of selected post-Brexit trade scenarios

Scenario	Pros	Cons
Norway (EEA)	• Belong to the EU single market (four freedoms apply). • No longer subject to certain EU policies (especially agriculture & fisheries). • Can negotiate trade deals independently of the EU.	• Must implement single market policies without representation in EU decision making. • Must comply with rules of origins to the EU. • Must contribute to the EU budget. • Renegotiation of FTAs.
Swiss (bilateral agreements)	• Free trade in goods and free movement of people with the EU. • No longer subject to certain EU policies (especially agriculture & fisheries). • Can negotiate deals independently of the EU.	• Adopt EU rules without representation in EU decision making. • Must comply with rules of origins to the EU (although weakened). • Pay a fee to participate in EU programmes. • Renegotiation of FTAs.
Turkey (Customs Union)	• Free movement of goods with the EU with no requirement to adopt many EU regulations → no rules of origin apply. • No longer subject to certain EU policies (especially agriculture & fisheries). • No funding of the EU budget.	• Required to adopt EU external trade policy for imports but not able to access existing and future EU trade deals with third countries for exports. • No free movement of people with the EU. • Renegotiation of FTAs
Canada (CETA)	• No longer subject to certain EU policies (especially agriculture & fisheries). • Can negotiate trade deals independently of the EU. • No funding of the EU budget.	• Exporters must comply with EU rules and regulations when exporting to the Single Market. • Must comply with rules of origins to the EU (although weakened). • Differing standards and rules may become non-tariff trade barriers with the EU or others. • No free movement of people with the EU. • Renegotiation of FTAs
WTO	• Not required to adopt EU policies and regulations. • No longer subject to certain EU policies (especially agriculture & fisheries). • Can negotiate trade deals independently of the EU.	• Trade with EU subject to MFN tariffs and any non-tariff barriers that comply with WTO agreements. • No free movement of people with the EU. • Exporters must comply with EU rules and regulations when exporting to the Single Market.

	• No funding of the EU budget.	• Must comply with rules of origins to the EU. • Renegotiation of FTAs

Table A-4: Pros and Cons of selected post-Brexit trade scenarios. Adapted from: Dhingra, Ottaviano, Rappoport, Sampson, & Thomas, 2018, p. 20

Appendix IV: Main components of the CAP

CAP objectives (Art. 39 TFEU)	European Agricultural Guarantee Fund (EAGF)
- increase agricultural productivity by promoting technical progress and ensuring the optimum use of the factors of production, particular labour; - ensure a fair standard of living for farmers; - stabilise markets - assure the availability of supplies; - ensure reasonable prices for consumers.	With the EAGF, the CAP funds direct payments to farmers and measure to regulate agricultural markets.
European agricultural fund for rural development (EAFRD)	**Import tariffs**
The EAFRD finances the CAP's contribution to the EU's rural development objectives. The objectives are realised through national and regional rural development programmes, which are co-financed by the EAFRD and the national budgets of EU countries. During 2014 to 2020, the EAFRD contributed €100 billion to rural development programmes.	Duties are charged on the importation of certain agricultural products from non-EU countries, so they protect EU produced goods by increasing world prices in line with EU prices, which are generally higher.

Table A-5 Main components of the CAP. Source: EUR-Lex, n.d.; Matthews, 2020; gov.uk, 2016; European Commission, 2019

Appendix V: Agriculture support in selected non-EU countries

Non-EU country	Agriculture support
Norway	- Objectives for agriculture in a White Paper of 2012: o food security o agriculture throughout Norway o creating added value o sustainability - policy is characterised by large direct payments for income support (differentiated by region and farm size) and tariffs at the border designed to support prices
United States	- reformed its agricultural policies with the Farm Act 2014 - move away from direct payments and towards insurance-based support
Canada	- reformed agricultural policy in 2012: shifting from reactive income support to protecting producers from market and natural disasters - agricultural support consisting of layers of subsidised risk management tools for farmers: o income insurance o subsidised savings o insurance against natural perils o ad-hoc disaster assistance
Brazil	- two agricultural ministries: one covering the commercial sector, and another dealing with small-scale family farming - support consists of: o price support o rural credit o agricultural insurance
New Zealand	- low levels of support for agriculture (reflect its position as a competitive exporter: New Zealand is the world's largest dairy and sheep meat exporter) - support is limited to general service such as agricultural research and biosecurity

Table A-6: Agriculture support in selected non-EU countries. Source: HM Government, 2014, p. 23

Appendix VI: Main components of the CFP

Fisheries management	**European Maritime and Fisheries Fund (EMFF)**
- ensuring that fish are caught within their maximum sustainable yield - determining and allocating fishing quotas to member states - technical regulations on what kinds of gear can be used - the landing obligation which prohibits discard of fish - control and enforcement	The EMFF supports sustainable fishing and helps coastal communities. The UK was allocated €243.1 million in fisheries funding from 2014-2020.
Common Organisation of Markets	**Import tariffs**
- common marketing standards - common consumer information and competition rules - market intelligence	CFP allows import tariff reductions for certain fish and fish products from outside the EU. This helps increase supply at times when EU supply cannot meet the demand of fish processors.

Table A-7: Main components of the CFP. Source: Hirst, 2017, p. 4

Appendix VII: Classification of non-tariff measures

Im-ports	**Technical measures**	Sanitary and phytosanitary measures
		Technical barriers to trade
		Pre-shipment inspection and other formalities
	Non-technical measures	Contingent trade-protective measures
		Non-automatic import licensing, quotas, prohibitions, quantity-control measures and other restrictions not including sanitary and phytosanitary measures or measures relating to technical barriers to trade
		Price-control measures, including additional taxes and charges
		Finance measures
		Measures affecting competition
		Trade-related investment measures
		Distribution restrictions
		Restrictions on post-sales services
		Subsidies and other forms of support
		Government procurement restrictions
		Intellectual property
		Rules of origin
Ex-ports		Export-related measures

Table A-8 Classification of non-tariff measures. Source: United Nations Conference on Trade and Development, 2019, p. 8

Appendix VIII: Requirements to trade with third countries

	Live animals (not pets)	Germinal product (semen/embryos)	Product of Animal Origin (e.g. meat)	Animal (not human food)	Plants	Seeds
EU needs to approve country as an exporter?	Yes	Yes	Yes	Yes	Some → National Rules apply	Some → National Rules apply
EU needs to approve the country's residue plan?	Not applicable	Not applicable	Yes	Not applicable	Not applicable	Not applicable
EU to audit the country, by each trading commodity?	Yes – broader scope than within the EU	Yes – broader scope than within the EU	Yes – broader scope than within the EU	Yes – broader scope than within the EU	No	No
Each premises/manufacturer in the country needs to be approved by the EU?	Some (assembly centres only)	Yes	Yes	Yes	Some – National Rules apply	Some – National Rules apply
Passport required to export to an EU country?	Only horses and cattle	Not applicable	Not applicable	Not applicable	Yes → Plant Certificate	Yes → Plant Certificate
Requires official certification?	Yes → Export Health Certificate	Yes → Export Health Certificate	Yes	Yes	Yes → Plant Certificate	Yes → Plant Certificate
Needs pre-movement tests/checks?	Yes	Yes	No	Some	Most	Most
Requires official inspection on departure?	Yes	Yes	Yes	Yes	Yes	Yes
Movement is pre-notified on EU's TRACES system?	Yes	Yes	Yes	Yes	No	No
Need to enter EU via Border Inspection Post?	Yes	Yes	Yes	Yes	Yes, also via postal hubs	Yes, also via postal hubs

Table A-9: Requirements to trade with third countries. Source: HRMC, 2017

Appendix IX: Selected major food-related formal EU institutions whose functions must be repatriated or abolished

Institution	Location	Function	UK public relevance
European Parliament	Brussels + Strasbourg	Co-decisions on EU policy; audit function; European Parliament committee system	Democratically elected; audits Commission; audit national actions
Council of Ministers	Mostly in Brussels but occasionally in country holding rotating Chair of the Council	Direct member states ministerial meetings	Negotiations of decisions
European Commission	Brussels	European civil service	Makes policy decisions happen; current ten priorities include jobs, migration, justice and digital
DG Agriculture & Rural Development	Brussels	Implementation of farm and rural policies (farm to food, environment to quality)	Overarching framework for food production to consumption
DG Environment	Brussels	Overview of environmental regulation	Key sensitivity with environmental NGOs
DG Health and Food Safety (SANTE)	Brussels	Overview of health and food safety legislation	Consumer protection, health, safety, information, from antimicrobials to contamination
DG Trade	Brussels	Trade and investment	Internal and external trade relations. UK will this negotiate with this on Brexit
Health and Food audits and analysis	Grange (Ireland)	Animal health overview	Safety, especially meat. Big implications for both Food Standards Agency and the Animal & Plant Health Agency
European Food Safety Authority	Parma (Italy)	Food safety risk assessments	Safety is key consumer concern since UK sparked food safety scandals: BSE (1980s) to horsemeat (2010s)
Joint Research Centre	Brussels, Geel, Ispra, Karlsruhe, Petten, Seville	EU-owned research institution, located at multiple sites	Equivalent to US CDC and USDA research hubs

European Medicines Agency	London	Human and veterinary medicines marketing, safety, auditing, and information	Underpinning human and animal health
Rapid Alert System	Intergovernmental: EU-27 member states food safety authorities, Commission, EFSA, ESA, Norway, Liechtenstein, Iceland & Switzerland	Rapid Alert System for Food and Feed (RASFF)	After Brexit, RASFF is not needed
European Chemicals Agency	Helsinki, Finland	Chemicals regulation	Co-ordinates scientific infrastructure and harmonised standards, e.g. REACH, the EU system of registration, evaluation and authorisation of chemical use, keeping these to protect human and environmental health
European Environment Agency	Copenhagen	Inform and advise EU environment policy-making	Impacts on environmental standards relating to food production and waste disposal

Table A-10: Selected formal EU institutions whose functions must be repatriated or abolished. Source: Lang, Milstone, & Marsden, 2017, p. 60

Appendix X: Selected key Agri-Food Policies which must be addressed in Brexit

Sector	Issue	EU element	UK 'partner'
Input industries	Agrichemicals	REACH; pesticides	Defra; Environment Agency
	Agricultural machinery	European Innovation Partnership for Agricultural Productivity and Sustainability	Dept. for Business, Energy and Industrial Strategy
Fisheries/Sea	Fisheries	Common Fisheries Policy	Defra/Wales, Scottish, Northern Ireland governments
	Inland seafood (e.g. trout, mussel and oyster farming)	Water quality control	Defra/Wales, Scottish, Northern Ireland governments, Environment Agency
Agriculture	Farmland	Directives on water, biodiversity	Defra/Wales, Scottish, Northern Ireland governments
	Subsidies	CAP subsidies	HM Treasury
	Labour (seasonal + specialists)	Free movement within member states	Defra and BIS
	Agrichemicals	Regulated	Defra
	GM	EU legislation 2001ff	Defra
	Veterinarians	EU regulated; membership of Food & Veterinary Office	Defra; Dept Health; Public Health England
	Animal health	EMA, EU Animal Law 2015	Defra; Dept Health; Public Health England
	Antimicrobials	EMA	Defra; Public Health England
Food manufacture	Abattoirs	Meat inspection toughened post BSE/Food Safety White Paper 2000	Meat Hygiene Service of the FSA, Defra; Public Health England
	Additives	Approval system	FSA and DH
	Residues & contaminants	EU sets Maximum Residue Limits	FSA, DH & Defra
	Nutrition & health claims	Food Regulations e.g. public register	Defra; Public Health England
	Food labelling	Food labelling Regs 2014	Defra; Public Health England; Dept. for Business, Energy & Industrial Strategy

	Rapid Alert System for Food & Feed	EU member states food safety collaboration	Defra; Public Health England; Dept. for Business, Energy & Industrial Strategy
	Food law enforcement	UK system of Environmental Health Practitioners (EHP) and Trading Standards Officers sits alongside continental use veterinarians	Defra; Public Health England; Dept. for Business, Energy & Industrial Strategy
Logistics	Live Animals movement	Regulation on live animal exports	Animal & Plant Health Agency
	Foods of Animal origin must enter via Ports with Border inspections	EU Veterinary checks regulation	Port Health Authorities, and Animal Health Agency
	Restrictions on food trades	EU Foods with restrictions	Public Health England, Port Health Authorities, Defra
Food Retail	Labelling	EU consumer information (labelling)	Defra
	Food risk management	EU EFRA Food risk toolbox	FSA, Public Health England, Dept of Health
Consumers	Food supplements	Directives 2004 to 2015	FSA and Dept of Health
	Fortification	Directives 2006 to 2014	Public Health England
	Food authenticity and integrity	Geographical indications (PGI, PDO, TSG) system	National Food Crime Unit in FSA
	Food advertising and marketing	Freedom of advertising and consumer information	Advertising Standards Authority

Table A-11: Selected key Agri-Food Policies which must be addressed in Brexit. Source: Lang, Milstone, & Marsden, 2017, p. 62

Appendix XI: Protected food name schemes and UK registered products

Protected designation of origins: These are products that are produces, processed and prepared in a specific geographical area, using the recognised know-how of local producers and ingredients from the region concerned. The characteristics from those products are linked to their geographical origin.

Protected geographical indication: This identifies products whose quality or reputation is linked to the place or region where it is produced, processed or prepared, although the ingredients used to need not necessarily come from that geographical area.

Traditional speciality guaranteed: This identifies products of a traditional character, either in the composition or means of production, without a specific link to a particular geographical area.

Figure A-1: Description of protected food name schemes. Source: European Commission, n.d.g

UK registered products (DEFRA, n.d.)

Protected food name with protected geographical indication:

Arbroath Smokies

Armagh Bramley Apples

Ayrshire New Potatoes /Ayrshire Earlies

Carmathen Ham

Cornish Pasty

Cornish Sardines

Dorser Blue Cheese

Exmoor Blue Cheese

Fenland Celery

Gloucestershire Cider

Gloucestershire Perry

Herefordshire Cider

Herefordshire Perry

Kentish Ale

Kentish Strong Ale

London Cure Smoked Salmon

Lough Neagh Eel

Melton Mowbray Pork Pie

New Season Comber Potatoes/Comber Earlies

Newmarket Sausage

Orkney Scottish Island Cheddar

Pembrokeshire Earlies/Pembrokeshire Early Potatoes

Rutland Bitter

Scotch Lamb

Scottish Farmed Salmon

Scottish Wild Salmon

Stornoway Black Pudding

Teviotdale Cheese

Traditional Ayrshire Dunlop

Traditional Cumberland sausage

Traditional Grimsby Smoked Fish

Traditional Welsh Caerphilly/Traditional Welsh Caerffili

Traditional Welsh Cider

Traditional Welsh Perry

Vale of Evesham Asparagus

Welsh Beef

Welsh Lamb

West Country Beef

West Country Lamb

West Wales Coracle Caught Salmon

Whitstable Oysters

Worcestershire Cider

Worcestershire Perry

Yorkshire Wensleydale

Protected food name with protected designation of origin:

Anglesey Sea Salt/Halen Môn

Beacon Fell Traditional Lancashire Cheese

Bonchester Cheese

Buxton Blue

Conwy Mussels

Cornish Clotted Cream

Dovedale Cheese

East Kent Goldings

Fal Oyster

Isle of Man Manx Loaghtan Lamb

Isle of Man Queenies

Jersey Royal Potatoes

Lakeland Herdwick

Lough Neagh Pollan

Native Shetland Wool

Orkney Beef

Orkney Lamb

Shetland Lamb

Single Gloucester

Staffordshire Cheese

Stilton Blue Cheese

Stilton White Cheese

Swaledale Cheese

Swaledale Ewes' Cheese

The Vale of Clwyd Denbigh Plum

Welsh Laverbread

West Country Farmhouse Cheddar Cheese

Yorkshire Forced Rhubarb

Protected food name with traditional speciality guaranteed:

Traditional Bramley Apple Pie Filling

Traditional Farmfresh Turkey

Traditionally Farmed Gloucestershire Old Spots Pork

Traditionally Reared Pedigree Welsh Pork

Appendix XII: EU and Canada import tariff rates and TRQs of selected main raw and processed agricultural products exported by the UK to the EU

Dairy

HS-Code	Product	Tariff rate		TRQ
		EU import tariff	Canada	
04012099	Milk and cream, fat content 3–6%, not concentrated or sweetened	€21.8/100 kg	Tariff preference: 0%	-
04015039	Milk and cream, fat content 21–45%, not concentrated or sweetened	€109.1/100 kg	Tariff preference: 0%	-
04021019	Milk and cream in solid forms, unsweetened, fat content <=1.5%	€118.8/100 kg	Tariff preference: 0%	47.50€/100 kg (annual quota: 68 537 t)
04022919	Milk and cream in solid forms, sweetened, fat content 1.5–27%	€1.31/kg of lactic material + €16.8/100 kg net	Tariff preference: 0%	-
04041002	Whey in solid forms, unsweetened, protein content <=15%, fat content <=1.5%	€7.0/100 kg	Tariff preference: 0%	-
0405101920	Natural butter, fat content <=85% in packs of >1 kg	€189.6/100 kg	Tariff preference: 0%	94.80€/100 kg (annual quota: 11 360 t)
04059010	Fats and oils derived from milk, fat content >=99.3%	€231.3/100 kg	Tariff preference: 0%	94.80€/100 kg (annual quota: 11 360 t)
0406103010	Fresh mozzarella	€185.2/100 kg	Tariff preference: 0%	13.00€/100 kg (annual quota: 5 360 t)
04061080	Unripened or uncured cheese, fat content >=40%	€221.2/100 kg	Tariff preference: 0%	13.00€/100 kg (annual quota: 5 360 t)
0406902110	Cheddar cheese (not grated or for processing)	€167.1/100 kg	Tariff preference: 0%	21.00€/100 kg (annual quota: 15 005 t)

Table A-12: EU import tariff rates and TRQS for selected dairy products. Source: European Commission, n.d.a

Meat

HS-Code	Product	Tariff rate		TRQ
		Europa import tariff	Canada	
02011000	Fresh/chilled cattle carcases	12.8% + €176.8/100 kg	Preferential tariff rate quota: 0%	-
02013000	Fresh/chilled beef, boneless	12.8% + €303.4/100 kg	Preferential tariff rate quota: 0%	-
02023090	Frozen beef, boneless	12.8% + €304.1/100 kg	Preferential tariff rate quota: 0%	UK excluded
02031110	Fresh/chilled pig carcases	€53.6/100 kg	Tariff preference: 0%	UK excluded
02031955	Fresh/chilled pork, boneless	€86.9/100 kg	Preferential tariff rate quota: 0%	UK excluded
02041000	Fresh/chilled lamb carcases	12.8% + €171.3/100 kg	Tariff preference: 0%	UK excluded
02042100	Fresh/chilled sheep carcases	12.8% + €171.3/100 kg	Tariff preference: 0%	UK excluded
02042290	Fresh/chilled sheep meat, bone-in, excluding short fore-quarters, chines/best ends	12.8% + €222.7/100 kg	Tariff preference: 0%	UK excluded
02071310	Fresh/chilled chicken, boneless	€102.4/100 kg	€102.4/100 kg + TRQ	UK excluded
02071460	Frozen bone-in chicken legs	€46.3/100 kg	€46.3/100 kg + TRQ	UK excluded

Table A-13: EU import tariff rates and TRQS for selected meat products. Source: European Commission, n.d.a

Processed meat

HS-Code	Product	Tariff rate		TRQ
		Europa import tariff	Canada	
16010099	Cooked sausages (excl. liver sausages)	€100.5/100 kg	Tariff preference: 0%	UK excluded
16023211	Uncooked processed chicken (>=57% meat)	€276.5/100 kg	Tariff preference: 0%	63€/100 kg (annual quota: 15 800 t)
16023219	Cooked chicken (>=57% meat)	€102.4/100 kg	Tariff preference: 0%	UK excluded
16023230	Processed chicken (25–57% meat)	€276.5/100 kg	Tariff preference: 0%	UK excluded
16023290	Processed chicken (<25% meat)	€276.5/100 kg	Tariff preference: 0%	UK excluded
16023929	Other cooked poultry meat (>=57% meat)	€276.5/100 kg	Tariff preference: 0%	UK excluded
16024110	Processed hams	€156.8/100 kg	Tariff preference: 0%	UK excluded
16024950	Processed pig meat (<40% meat)	€54.3/100 kg	Tariff preference: 0%	UK excluded
16025010	Uncooked processed beef	€303.4/100 kg	Tariff preference: 0%	-

16025095	Cooked beef (excl. corned beef)	16.6%	Tariff preference: 0%	-

Table A-14 EU import tariff rates and TRQS for selected processed meat products. Source: European Commission, n.d.a

Cereals

HS-Code	Product	Tariff rate		TRQ
		Europa import tariff	**Canada**	
1001190012	Durum wheat (excl. seed)	€0/t	€0/t + TRQ	UK excluded
10019120	Seed of wheat/meslin	€95/t	Tariff preference: 0%	-
10019900	Wheat and meslin (excl. seed and durum wheat)	€0/t	€0/t + TRQ	UK excluded
10031000	Seed of barley	€93/t	Tariff preference: 0%	UK excluded
10039000	Barley (excl. seed)	€93/t	Tariff preference: €34.875/1000 kg	UK excluded
10041000	Seed of oats	€89/t	Tariff preference: €33.375/1000 kg	-
10049000	Oats (excl. seed)	€89/t	Tariff preference: €33.375/1000 kg	-
10059000	Maize (excl. seed)	€0t	Tariff preference: 0%	UK excluded
120110	Seed of soybean	0%	0%	-
15141190	Crude Rapeseed oil	6.4%	Tariff preference: 0%	-
15149990	Refined rapeseed oil	9.6%	Tariff preference: 0%	-
10063098	Milled long-grain rice (excl. parboiled)	€175/t	Tariff preference: 0%	UK excluded

Table A-15: EU import tariff rates and TRQS for selected cereal products. Source: European Commission, n.d.a

Vegetables

HS-Code	Product	Tariff rate		TRQ
		Europa import tariff	**Canada**	
20052020	Potatoes in thin slices, cooked in fat or oil, whether or not salted or flavoured, in airtight packings, suitable for direct consumption, not frozen	14.10%	Tariff preference: 0%	-
07011000	Seed potatoes	4.5%	Tariff preference: 0%	-
07019090	Fresh/chilled potatoes, excluding new, seed and potatoes for manufacture of starch	11.5%	Tariff preference: 0%	-
07051900	Fresh/chilled lettuce	10.4%	Tariff preference: 0%	-

07101000	Frozen potatoes, uncooked or boiled/steamed	14.4%	Tariff prefer-ence: 0%	-
07142010	Whole fresh sweet potatoes	3.8%	Tariff prefer-ence: 0%	-

Table A-16: EU import tariff rates and TRQS for selected vegetables. Source: European Commission, n.d.a

Fruits

HS-Code	Product	Tariff rate		TRQ
		Europa import tariff	**Canada**	
08039010	Bananas	€114/t	Tariff preference: 0%	-
0805108010	Oranges	16%	Tariff preference: 0%	-
08071100	Watermelons	8.8%	Tariff preference: 0%	-
080400010	Avocados	4.00%	Tariff preference: 0%	-
0804500010	Mangoes	0%	0%	-
080810	Apples	0%	0%	-

Table A-16: EU import tariff rates and TRQS for selected fruits. Source: European Commission, n.d.a

Eidesstaatliche Versicherung

Ich versichere hiermit, dass ich meine vorliegende Masterarbeit mit dem Titel

“An analysis of the possible impacts of selected Post-Brexit trade scenarios on the UK agri-food sector and their possible consequences for trade in agricultural products between the UK and the EU“

ohne fremde Hilfe selbständig verfasst habe und nur die angegebenen Hilfsmittel benutzt habe. Wörtlich oder dem Sinn nach aus anderen Werken entnommene Stellen sind unter Angabe der Quelle kenntlich gemacht.

Hamburg, den 08.04.2021