



The UK's Food Supplies & the Impact of Covid 19

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Introduction

This report highlights the challenge that Covid-19 (hereafter coronavirus) poses to the UK's food supplies, and assesses the state and vulnerability of the UK's food supply generally. Food in the UK is likely to run out if consistent disruption is made to the flow of raw materials to the UK's markets due to the reliance on time sensitive supply chains and diverse food sources. Projections cannot be made yet for how quickly this might occur, as the situation is developing at an unprecedented pace.

As Liz Truss stated in the 2016 Conservative Party Conference, "we import 2/3^{rds} of cheese [consumed in the UK]. That is a disgrace". However, there are many different ways of assessing "food sufficiency", and the UK Government typically looks at market prices¹, whereas a more accurate method of assessing food sufficiency is in caloric intake and tonnage production.

Section One examines the nature of the UK's food supply chains, highlighting the real facts of import industries and export industries versus the official figures, and from where this discrepancy is derived. Time sensitive supply chains increase over-reliance on foreign imports, to the extent that even locally sourced foods are affected.

Section Two looks at the import-export deficit in real figures, and from where the essential food-stuffs of the UK's market are imported. Those countries most affected by Coronavirus are the same producers from which the UK imports, a problem made worse by over-reliance identified in Section One.

Section Three moves on to show that the UK's import market is reliant on two other major factors for the production of food that will be damaged by the outbreak of Coronavirus: labour; and machinery. Concerns that were raised over these issues by the decision of the UK to leave the European Union (hereafter 'Brexit') remain just as applicable, and are in some cases worse, if the spread of Coronavirus continues.

¹ Food Statistics Pocketbook 2020 (https://www.gov.uk/government/publications/food-statistics-pocketbook-2017/food-statistics-in-your-pocket-2017-global-and-uk-supply?fbclid=IwAR3zpzO0saU5xRHDIfKSWGEq24BYDNfx6pUiiT-vpFCzKRxyuE_uAZLbCbW#trends-in-uk-food-production-and-final-output-at-market-prices)

Section Four briefly considers the active disruption of supply chains in foreign nations, highlighting the specific scenario of the French Border Control seizing a lorry of 130,000 face-masks intended for NHS workers, and how this might be extrapolated to food supply lines.

Section Five explains how the UK's currently consumption patterns compare to the import figures, what the minimum number of calories needed to survive are, and whether Britain can fulfil this.

We believe the British Government cannot wait until the coronavirus infection disappears to take action, but rather needs to take action to protect its population now, in the area of food production and supply.

1. Supply Chains

The official figures of the UK Government, produced by the House of Lords (2018), show that nearly 50% of food consumed in the UK in 2016 was produced domestically². This figure, of 48.68% is an underestimate in that it is derived instead from products processed in the UK; the true figure of raw ingredients imported to the UK is estimated to be closer to 80%. This figure was claimed by David McCarthy, an HSBC analyst, in a research note to clients³.

What is meant by this figure of 80% is that the production of food in the UK is not focused on actual production but on processed food. For instance, the export value of the tea industry, in 2017, was £1,486,000,000, whilst the import value was £3,575,000,000⁴. What is of major concern is how rapidly some of these products are transferred from their point of production, into the UK market. One ex-CEO of HSBC explained that ‘carrots for sale in the supermarket on Thursday were in the ground in Spain on Monday’⁵.

The main reason for this is the UK climate is not suited to the production of such ‘non-indigenous’ items, but this category includes staple foods: bananas; tea; coffee; spices; strawberries; maize. The most fragile of these industries is meat, in which the UK has only been self-sufficient for four years since the early 1980s⁶.

This poses a real problem for the UK: individual preferences for food cannot be controlled, but the reliance as a nation on globalised, complex supply chains (complex here meaning rapid and diverse) means that not even localised products can be ‘separated’ from the global economy. Chocolate bars, for instance, usually contain salt (China), calcium sulphate (India), palm oil (Southeast Asia), whey (New Zealand), milk and wheat (EU) sugar (Caribbean) and, of course, cocoa (South America).

Global Food Security claims that a diversified production-base for such foods is a net positive, stating that ‘sourcing food from a diverse range of stable supplying countries enhances food security because shocks and surprises in the food production network do not equally affect

² House of Lords, 2018, page 5 (<https://publications.parliament.uk/pa/ld201719/ldselect/ldcom/129/129.pdf>)

³ Business Insider, 5th January 2019 (<https://www.businessinsider.com/no-deal-brex-it-percentage-british-food-imported-shortages-2019-1?r=US&IR=T>)

⁴ Brendon Gaille, 26th September 2018 (<https://brandongaille.com/20-uk-tea-industry-statistics-and-trends/>)

⁵ Business Insider, 5th January 2019 (<https://www.businessinsider.com/no-deal-brex-it-percentage-british-food-imported-shortages-2019-1?r=US&IR=T>)

⁶ Daily Globe, 20th August 2019 (<http://www.dailyglobe.co.uk/comment/why-does-the-uk-import-meat/>)

every country at once'⁷. This is perhaps true in a state of normality, but it ignores the obvious impact of globalisation: 'shocks and surprises' cannot be localised, as we are seeing now. At one end of the scale, true 'localised' shocks – such as earthquakes – might have more of an immediate impact on their geographic locality, but ripple-effects ensure that such shocks are carried around the world; at the other end of the scale, illnesses can travel just as fast as food, if not faster, and go undetected to that point that they are neither 'shocks' nor 'surprises', but time-bombs that can destabilise whole supply chains without warning.

2. Deficit

As indicated by the example of the tea industry, food production in the UK is in a troubling state of deficit. As Meurig Raymond, president of the National Farmers Union (NFU) admitted in 2018, 'we will never be self-sufficient in food production in the UK... the population is rising and there is huge demand for crops that cannot be grown here'⁸, as indicated above. Though Mr. Raymond is confident that the UK can increase self-sufficiency, the danger is too immediate to fundamentally restructure our agricultural industry.

Professor Tim Lang believes that, 'we'll have to cut eating meat down to once a week', likely because of the same reason highlighted in Section One. However, even if our consumption of meat falls as dramatically as that, our deficit in fruit and vegetables is alarming. The export value of fruit and vegetables in the UK is estimated at roughly £199,000,000, whilst the import value of fruit and vegetables is £5,200,000,000. This means we export roughly 4% of the fruit and vegetables that we import by value. Clearly, 'cutting down' on meat is nowhere near enough.

Section Three will look in more detail at other import industries and the figures of their import value, but the import values of different staple foods are as below⁹:

- Bread, biscuits, cakes, pastries – \$2,743,536,000 (£2,354,460,375)
- Cheese, curd - \$2,148,208,000 (£1,843,559,047)
- Poultry meat - \$1,433,881,000 (£1,230,534,608)
- Fish fillets - \$1,208,467,000 (£1,037,087,782)
- Pig meat - \$1,145,286,000 (£982,866,820)

⁷ Food Security (<https://www.foodsecurity.ac.uk/challenge/your-food-is-global/>)

⁸ Countryfile, January 5th 2018 (<https://www.countryfile.com/news/can-the-uk-feed-itself-after-brexite/>)

⁹ World's Top Exports, 7th October 2019 (<http://www.worldstopexports.com/britains-top-10-imports/>)

§ British Food Production: Cereals as a Case Study

	<i>Export Value (£1,000,000)</i>	<i>Import Value (£1,000,000)</i>	<i>Deficit/Surplus (£1,000,000)</i>
<i>Dairy products & eggs</i>	1,399	2,730	-1,331
<i>Meat & meat preparations</i>	1,585	6,152	-4,567
<i>Fish & shellfish</i>	1,662	3,020	-1,358
<i>Cereals</i>	2,335	3,261	-926
<i>Animal Feed</i>	1,135	1,977	-842
<i>Vegetables & fruit</i>	1,133	10,287	-9,154
<i>Sugar</i>	387	1,149	-762
<i>Coffee, tea, cocoa, etc.</i>	1,384	3,399	-2,015
<i>Miscellaneous foods</i>	1,843	3,181	-1,338

Table 1¹⁰: The Value of Exports and Imports of Each Major Food Group in the UK in the Year Ending 2016

If we break down the deficit (in millions of pounds) for each of the major commodities produced in Britain in the year ending 2016¹¹, we can see the following:

1. That the highest value commodity exported of is **cereals**.
2. That cereals are also only the **fourth**-most imported commodity (joint with “Miscellaneous foods” which, given its vagueness, we can set aside for the purpose of this report). This means that cereals are, comparatively, the **second-lowest** commodity in terms of a trade deficit, joint with animal-feed, and second only to sugar. In addition to this, cereals are heavily subsidised¹², with 13% of Farm Income from cereals coming from Direct Payments:

¹⁰ Office for National Statistics, 2020

(<https://www.ons.gov.uk/economy/nationalaccounts/balanceofpayments/articles/tradingoodscountrybycommodityexperimentaldata2011to2016/2018-04-16>)

¹¹ Data taken from the Agriculture and Horticulture Development Board (<https://ahdb.org.uk/cereals-oilseeds/trade-data>)

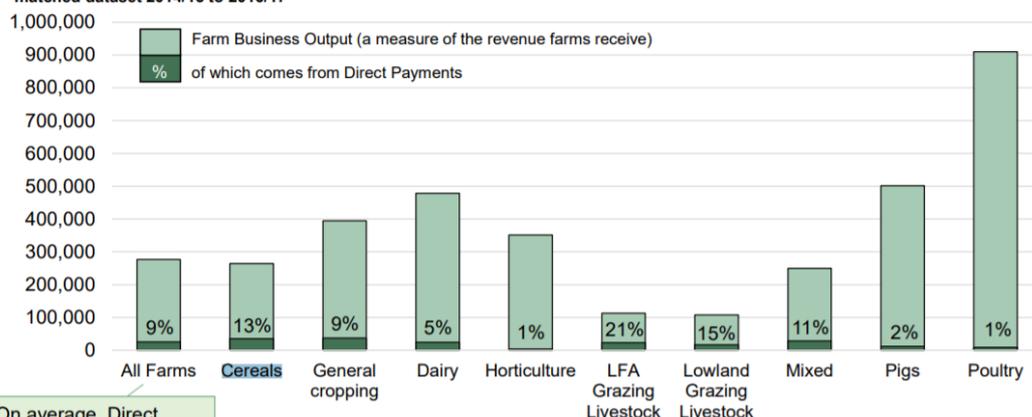
¹² DEFA (2018)

(https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/740669/agri-bill-evidence-slide-pack-direct-payments.pdf)

Revenue (Farm Business Output) is the total sales generated by a farm business.

The importance of Direct Payments varies across sectors: Direct Payments made up the largest proportion of revenue for Less Favoured Area Grazing Livestock farms (21%) and Lowland Grazing Livestock farms (15%), Cereals (13%) and Mixed Farms (11%).

Average Farm Business Output and the proportion that comes from Direct Payments by 2016 farm type (based on 3 year matched dataset 2014/15 to 2016/17)



On average, Direct Payments made up 9% of revenue across all farm types.

For Poultry, Horticulture and Pig farms, only a very small proportion of revenue comes from Direct Payments. Fewer of these farms claim Direct Payments than other farm types as they tend to be smaller, and are more likely to have land that is ineligible for Direct Payments.

Of the four cereals that the UK exports, only barley is consistently a net-export cereal, though the production of wheat has risen rapidly. In addition to these cereals, Britain imports the following cereals: maize; linseed; soyabean meal; and soyabean¹³. However, most of this is used as animal feed which, in the event of shortages, would be re-directed to human consumption, thus compromising meat production capacity¹⁴.

<i>All Cereals' Surplus/Deficit</i>									
<i>Month</i>	<i>Jul-19</i>	<i>Aug-19</i>	<i>Sep-19</i>	<i>Oct-19</i>	<i>Nov-19</i>	<i>Dec-19</i>	<i>Jan-20</i>	<i>Feb-20</i>	<i>Mar-20</i>
<i>Wheat</i>	-45,439	-26,841	186,271	182,349	13,221	-19,954	-14,473	8,741	-118,620
<i>Barley</i>	64,424	250,983	339,609	284,708	161,189	85,083	93,239	91,846	63,404
<i>Oats</i>	-767	4,257	20,593	21,487	6,486	18,272	8,555	6,186	6,605
<i>Rapeseed</i>	-35,230	-876	-94,540	-38,334	-19,632	-26,427	-18,198	-24,285	-33,068

Table 2: The Surplus/Trade Deficit of Cereals, July 2019 – March 2020 (Figures in Tonnes).

<i>Cereals Imported into UK</i>									
	<i>Jul-19</i>	<i>Aug-19</i>	<i>Sep-19</i>	<i>Oct-19</i>	<i>Nov-19</i>	<i>Dec-19</i>	<i>Jan-20</i>	<i>Feb-20</i>	<i>Mar-20</i>
<i>Maize</i>	272,293	164,830	123,821	239,448	206,106	238,284	205,991	217,053	216,990
<i>Linseed</i>	1,132	1,286	1,139	1,533	3,377	1,225	1,373	1,352	1,291
<i>Soyabean Meal</i>	181,747	252,540	153,744	166,932	289,831	101,921	217,676	159,579	178,276
<i>Soyabean</i>	64,506	2,216	65,035	58,261	120,046	11,584	78,435	65,757	57,597

Table 3: Other Cereals Imported into the United Kingdom, July 2019 – March 2020 (Figures in Tonnes).

¹³ Agriculture and Horticulture Development Board (2020) (<https://ahdb.org.uk/cereals-oilseeds/trade-data>)

¹⁴ Compassion in World Farming (<https://www.ciwf.org.uk/media/7425974/industrial-livestock-production-the-twin-myths-of-efficiency-and-necessity.pdf?fbclid=IwAR3GnsqD6VdhDA8A91woX4Ne14kwoVzP9J8VTp1ZOqQ5lGVxpKHt9y2Dg>)

3. Import Dependency: Tip of the Iceberg

Food production and self-sufficiency is vital to security of supply, though output is but the tip of the iceberg. Even if the UK's food production were to improve to a desirable extent, the other main obstacle to overcome is the question of import dependency of labour. It can be argued that our food imports are higher still as we import the labour to produce it domestically.

A labour shortage in the agriculture was a major concern in the fallout from Brexit, as the industry relies heavily on casual workers for the harvest season, many drawn from overseas. This will be exacerbated by interruptions in labour supply during crises such as the current COVID19 pandemic. Farmers Weekly issued an 'urgent plea' from industry leaders for British people to work on farms due to the coronavirus pandemic¹⁵.

It is important to note there are a remarkable number of businesses with a vast reserve of products that were stockpiled in the event of a No-Deal Brexit. Neon Nettle reports that many warehouses are 'filled to the brim' with products, and the emaciation of British shelves at the beginning of the coronavirus pandemic was due to logistics, not actual shortages¹⁶. Throughout the middle of last year, frequent reports were made of the scale of stockpiling: in April 2019, stockpiling of goods led to a three-month growth rate of 0.3%¹⁷; June 2019 confirmed this figure as £6,600,000,000 worth; and July 2019 stated that the vacancy rate for warehouses over 100,000 square feet was roughly 6.8% (compared to 23% in 2009)¹⁸. This reveals further the reliance on a 'just-in-time' (JIT) approach to production that Brexit was feared to endanger.

The claim of a JIT system is that:

¹⁵ Farmers Weekly, 20th March 2020 (<https://www.fwi.co.uk/business/coronavirus-urgent-appeal-for-brits-to-work-on-farms?fbclid=IwAR17Ht1o-N9aAtFtv8RX80uKSRxcPaoQCnMWTkwfJVinhwza--OCoIqCwFY>)

¹⁶ Neon Nettle, 21st March 2020 (<https://neonnettle.com/news/10706-uk-warehouses-full-to-the-brim-with-food-thanks-to-no-deal-brexite-preparations>)

¹⁷ Guardian, 10th April 2019 (<https://www.theguardian.com/business/2019/apr/10/uk-economy-grows-manufacturers-stockpile-brexite-gdp>)

¹⁸ Yahoo Finance, 28th June 2019 (https://uk.finance.yahoo.com/news/british-firms-stockpiled-66-bn-of-goods-in-runup-to-brexite-uk-095504748.html?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2xILmNvbS8&guce_referrer_sig=AQAAECwVXG4MJH2SxYkS8EtRcuMkM_fSdgC3w121V7Y9ojdpF_F3AFhuZ_9iTIUO4SakLPK4eGMSUIWMaUIPr82nuabtBp0QMj6-wXPUqJez0HYih_4EtGgfdomqmHm43c2sQW7nJwj_P6gzCumbEWjicCyjaHsj5C84WsjFzHWYMip)

In JIT supply chains, firms hold little or no inventories. Supplies are delivered in very small quantities at very high frequencies from suppliers which are located in nearby regions or countries. As well as reducing costs, a key advantage of such JIT systems is maximising product and service quality.¹⁹

Philip McCann and Raquel Argiles, the author of the above, claim that the frictionless trade facilitated by the European Union is threatened by Brexit, and therefore products are not likely to make it to markets ‘in time’. Perhaps. What matters more in our current circumstance is the presumption that all other factors will remain the same – something that clearly cannot be taken for granted. The presumption was that the Brexit talks would be the only disruption to this system.

Rather than taking Brexit as a chance to examine the weaknesses of a JIT system and an over-reliance on fragile supply chains, some simply took it as an opportunity to prove the need for greater integration²⁰. There are too many fragilities in the system that can be interrupted by a number of unforeseen factors (a pandemic, for instance) for our current circumstances to be maintained.

The apparent scale of stockpiling is not as impressive as raw numbers make it appear to be. When one considers that British consumers stockpiled £1,000,000,000 on food in three weeks, and the previously mentioned six billion pounds’ worth of stockpiling is not exclusively food, we can imagine that perishable food reserves will not last much longer than a few weeks of supply disruption.

4. Active Supply Line Disruption

Fragility of supply and the JIT system is at risk of disruption by foreign governments such the recent debacle²¹ of French Border Controls seizing 130,000 face masks intended for NHS staff.

The frictionless trade philosophy of the contemporary global order is a myth. The reason given by the French Government is that the needs of France allow for ‘requisition’ of necessities,

¹⁹ McCann and Argiles, 20th April 2018 (<https://ukandeu.ac.uk/could-brexit-spell-the-end-for-just-in-time-production/#>)

²⁰ Politics, 6th February 2018 (<https://www.politics.co.uk/comment-analysis/2018/02/06/just-in-time-the-production-system-brexit-is-set-to-sabotage>)

²¹ Daily Mail, 22nd March 2020 (<https://www.dailymail.co.uk/news/article-8137039/French-border-guards-impound-trucks-filled-130-000-face-masks-bound-Britain.html>)

which begs the question – what else is considered necessary for the French Government and how does this concur with free trade?

The European Union has failed to assist Italy in the current coronavirus crisis²². Moreover Italy has been fined over £7m by the EU for ‘failing to recoup illegal state aid given to the hotel industry’²³. The EU cannot be relied on to coordinate between governments. The seizure of masks in France is indicative of Realpolitik that might extend to much-needed food supplies.

5. Possibility of Subsistence

The 2018 UK population figure was estimated to be 66,435,600²⁴. Furthermore, though Britain often underreports on consumption figures, by making a mean calculation between the multiple averages possible from the data available, we have found daily consumption to be 2006 calories²⁵. In addition to this, taken from The National Institute of Diabetes and Digestive and Kidney Diseases, an average minimum consumption figure in calories is 1,450²⁶, then this means 72.28% ($1,450 / 2,006, \times 100$) of current calories can be consumed before starvation sets in. This means we need to identify what 72% of current consumption **in tonnage** is.

The Family Food publication²⁷ on the ONS shows that on average annually we consume 30,554,012 tonnes of food. To compare this to the Office for National Statistics’ UK Prodcom Data²⁸, we see that, after exports, we produce 15,265,942 tonnes of food annually, meaning that imports make up 50.07% of our annual consumption.

²² Foreign Policy, 14th March 2020 (<https://foreignpolicy.com/2020/03/14/coronavirus-eu-abandoning-italy-china-aid/>)

²³ Bloomberg, 12th March 2020 (<https://www.bloomberg.com/news/articles/2020-03-12/italy-fined-by-eu-top-court-for-failing-to-recoup-sardinian-aid>)

²⁴ Office for National Statistics (2019) <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/articles/overviewoftheukpopulation/august2019>

²⁵ Telegraph (2018) <https://www.telegraph.co.uk/news/2018/02/19/fat-britain-average-person-eats-50-calories-realise/>; and Whitton et al, 2011

²⁶ Healthy Eating (<https://healthyeating.sfgate.com/bare-minimum-food-can-eat-12451.html>)

²⁷ Family Food (2019) <https://www.gov.uk/government/collections/family-food-statistics>

²⁸ Office for National Statistics (2019) <https://www.ons.gov.uk/surveys/informationforbusinesses/businesssurveys/ukmanufacturerssalesbyproductprodcom>

	Units	Weekly		Annually	
		Per Person	Nationally	Per Person	Nationally
<i>Milk and milk products excluding cheese</i>	ml	1,786	117,958,743,492	92,881	6,133,854,661,566
<i>Cheese</i>	g	125	8,236,336,633	6,485	428,289,504,919
<i>Carcase meat</i>	g	182	11,995,483,786	9,445	623,765,156,855
<i>Non-carcase meat and meat products (poultry, bacon, etc.)</i>	g	775	51,180,780,310	40,300	2,661,400,576,143
<i>Fish</i>	g	139	9,146,714,244	7,202	475,629,140,665
<i>Eggs</i>	no.	2	131,383,039	103	6,831,918,012
<i>Fats</i>	g	158	10,416,090,843	8,202	541,636,723,853
<i>Sugar and preserves</i>	g	99	6,556,176,306	5,162	340,921,167,888
<i>Fresh and processed fruit and vegetables, including potatoes</i>	g	2,900	191,508,831,395	150,794	9,958,459,232,550
<i>Fruit Juices</i>	ml	230	15,168,381,205	11,944	788,755,822,683
<i>Bread</i>	g	527	34,818,692,418	27,416	1,810,572,005,754
<i>Flour</i>	g	75	4,935,266,189	3,886	256,633,841,811
<i>Cakes, buns and pastries</i>	g	159	10,527,105,487	8,289	547,409,485,326
<i>Biscuits and crispbreads</i>	g	160	10,581,682,996	8,332	550,247,515,801
<i>Other cereals and cereal products</i>	g	582	38,414,971,494	30,248	1,997,578,517,677
<i>Other food and drink</i>	g	884	58,405,798,816	45,989	3,037,101,538,415
<i>Confectionery</i>	g	137	9,032,955,465	7,113	469,713,684,182

Table 4: Weekly and Annual Consumption of Major Food Groups

	<i>Units</i>	<i>Annual National Consumption</i>	<i>Production Figures After Exports</i>	<i>Surplus/Deficit After Exports</i>	<i>Deficit/Surplus as a Percentage of Consumption After Exports</i>
Milk and milk products excluding cheese	g	6,170,579,658,358.29	8,526,149,143,000.00	2,355,569,484,641.71	27.63
Cheese	g	430,853,786,527.39	412,602,915,000.00	- 18,250,871,527.39	- 4.42
Carcass meat	g	627,499,802,465.08	1,834,220,428,000.00	1,206,720,625,534.92	65.79
Non-carcass meat and meat products (poultry, bacon, etc.)	g	2,677,335,079,487.59	74,359,316,000.00	- 2,602,975,763,487.59	- 3,500.54
Fish	g	478,476,857,089.04	79,018,532,000.00	- 399,458,325,089.04	- 505.52
Eggs	no.	6,872,822,497.24	11,388,000,000.00	2,839,177,502.76	29.23
Fats	g	544,879,644,992.35	- 268,075,070,000.00	- 812,954,714,992.35	303.26
Sugar and preserves	g	342,962,352,345.15	- 389,249,470,000.00	- 732,211,822,345.15	188.11
Fresh and processed fruit and vegetables, including potatoes	g	10,018,083,140,117.80	1,745,785,568,000.00	- 8,272,297,572,117.79	- 473.84
Fruit Juices	g	793,478,310,687.27	939,636,049,000.00	146,157,738,312.73	15.55
Bread	g	1,821,412,375,272.53	2,660,362,748,000.00	838,950,372,727.47	31.54
Flour	g	258,170,375,937.66	636,664,379,000.00	85,977,409,497.33	13.50
Biscuits and crispbreads	g	553,541,992,010.34	1,117,405,345,000.00	563,863,352,989.66	50.46
Other cereals and cereal products	g	2,009,538,544,234.59	- 1,135,256,235,000.00	- 3,144,794,779,234.59	277.01
Other food and drink	g	3,055,285,461,968.61	- 231,723,343,000.00	- 3,287,008,804,968.61	1,418.51
Confectionery	g	472,525,983,217.27	- 654,929,622,000.00	- 1,127,455,605,217.27	172.15
Total (Whole population)	g	30,554,012,780,773.20	15,256,942,051,000.00	- 15,297,070,729,773.20	- 50.07

Table 5: Imports as a Percentage of Consumption, Where Deficit is Fulfilled by Imports

Furthermore, if exports were re-directed to the UK and full production remained in the country (27,266,606 tonnes), then imports (31,559,046 tonnes) would still make up 53.65% of the total food supply.

Considering that annually we consume 30,554,012.78 tonnes then a daily average of this figure is 83,709.62 tonnes. In turn, we can calculate our minimum calorific consumption of 72.28% to be= 60,505.32.

To feed the nation **daily** before starvation sets in, we need to eat 60,505.32 tonnes of food.

Of this figure (60,505.32 **daily** tonnes), we currently produce (minus export figures) only 41,824.5 tonnes, meaning we would need to import 18,680.82 tonnes of our DCF. As a percentage, this import figure is **30.87%**.

*What this ultimately means is that if our import figures fall as a percentage of our daily consumption by as little as **19.15%**, then we will fail to support a basic caloric consumption.*

There are also a number of conclusions to be drawn from this fact. The first is that, as above, imports make up 53.65% of the total food supply (this is *not* food consumed, but rather the proportion of food produced, after exports, plus imports). In addition, the above data that 72.3% of current consumption is the recommended 2,000 daily calorific intakes then overall food supply can fall by 27.7% before food supply falls below the minimum recommended amount.

In turn, this means that if domestic food production reduces by more than 13.83% and imports fall by more than 13.86%, absent stockpiles the UK will soon run out of food supplies.

Food waste also currently accounts for 38.38% of the current overall food supply (calculated by removing consumption from the total food supply). However, if we changed our consumption patterns to the recommended daily caloric intake (as above), then our food supply can reduce by 71.7%, meaning that (as a share of this figure) domestic production can fall by 35.7% and imports by 35.9%. Therefore, if food imports to the UK stop completely domestic production could not drop by more than 23.55% for subsistence levels of food supply to be achieved. This is predicated on the UK continuing to export the food it does at current rates.

Given that the fallout of the 2008 economic crisis saw UK food prices rise by more than 30%, the fallout from coronavirus is likely to see even higher price rises.

However, the UK export figures equate to 44.05% of national production. In the event the UK is able to cut food waste and re-route all current food exports to the domestic market then we would potentially be able to provide the population with all of its subsistence food needs.

There are also a number of scenarios worth considering, in which imports fall in each major food category, and how much British citizens would have to reduce their intake by:

<i>Reduction in Consumption if Imports Fall By...</i>					
<i>Food</i>	10%	25%	50%	75%	100%
<i>Milk</i>	3.44ml (1.35%)	8.60ml (3.38%)	17.21ml (6.76%)	25.81ml (10.14%)	34.41ml (13.52%)
<i>Cheese</i>	2.21g (12.44%)	5.53g (31.10%)	11.05g (62.19%)	16.58g (93.29%)	22.10g (124.39%)
<i>Carcass Meat</i>	3.15g (12.17%)	7.78g (30.43%)	15.75g (60.86%)	23.62g (91.29%)	31.50g (121.71%)
<i>Non-Carcass Meat</i>	7.15g (6.48%)	17.89g (16.20%)	35.77g (32.40%)	53.66g (48.60%)	71.54g (64.60%)
<i>Eggs</i>	0.34g (118.86%)	0.84g (297.15%)	1.68g (594.30%)	2.53g (891.46%)	3.37g (1,188.61%)
<i>Fish</i>	1.97g (10%)	4.93g (24.99%)	9.86g (49.98%)	14.79g (74.97%)	19.72g (99.96%)
<i>Fats</i>	7.93g (35.28%)	19.82g (88.19%)	39.63g (176.39%)	59.45g (264.58%)	79.72g (352.77%)
<i>Sugar and Preserves</i>	8.78g (62.11%)	21.96g (155.27%)	43.92g (310.55%)	65.88g (465.82%)	87.84g (621.10%)
<i>Fruit and Vegetables</i>	47.85g (11.58%)	119.64g (28.96%)	239.27g (57.92%)	358.91g (86.87%)	478.55g (115.83%)
<i>Fruit Juice</i>	4.19g (13.28%)	10.87g (33.21%)	21.73g (66.42%)	32.60g (99.63%)	43.47g (132.84%)
<i>Cakes, biscuits, etc.</i>	4.19g (18.45%)	10.48g (46.14%)	20.96g (92.27%)	31.43g (138.41%)	43.47g (184.55%)
<i>Other Cereals</i>	36.10g (43.56%)	90.25g (108.9%)	180.49g (217.8%)	270.74g (326.7%)	360.98g (425.59%)
<i>Confectionery</i>	2.67g (13.72%)	6.68g (34.30%)	13.37g (68.61%)	20.05g (102.92%)	26.74g (137.22%)

Table 6: Reduction in Current Food Supply if Imports Fall, and Exports Continue

Conclusion, and Proposals

Britain is not nearly self-sufficient in the domestic production at current food consumption levels. Evidence indicates it never will be, with levels ranging from a low of roughly 33% on the eve of each World War, to a high of 82% in the early 1980s. The current figure of 49.93% is not only dangerously low, but it is dependent on over-stretched and fragile supply chains that are increasingly under strain. The British Government needs to act to ensure the maintenance of food supplies is secure, whilst taking this opportunity to consider how the sector might be restructured in future years.

If the UK consumes at subsistence level the amount of food we import from abroad can fall to 38% of our overall consumption, but no further. If the percentage of food we import falls below 38%, or conversely the percentage of consumption of current domestic produce increases by more than 19.15% of our total consumption, our minimum demand will exceed capacity and the UK populace will be at risk of starvation assuming no diversion from animal feed and industrial use back to human consumption, and assuming no food rationing.

The UK currently imports 50.03% of its food from overseas and produces 49.93% domestically. The British public would have to reduce their daily intake of many staples if imports were to fall, due to the very high reliance on imports for some staples.

Whilst the cost to the economy would be significant the UK has the capacity to re-route existing export products to the domestic market in the event the availability of foreign imports decreases or the cost significantly increases, however in the current context of coronavirus it is likely we will see a perfect storm of both domestic production falling and imports falling. If domestic production falls by more than 12.4% and imports fall by more than 15.2%, or 27.7% (roughly a quarter) collectively, then the UK populace will begin to starve.

We hold considerable domestic stockpile capacity, but this is obviously time limited and relies on disruption to the food supply being short-term. It would also require a sharp shift away from fresh produce to dried and canned goods, resulting in a significant change to diets.

In the event that the UK remains above per capita subsistence food levels it is still likely that the cost of many foods will rise, in some cases significantly, which combined with economic

contraction and job losses could lead to significant deprivation with poorer sections of society going without adequate food or nutrition.

In terms of proposals, we suggest three courses of action, one immediate, one medium term, and one long term. These proposals are intended to ensure the UK can achieve Sovereignty, Sustainability and Security of Supply in food:

The first is that the UK Government must become more proactive in buying up and stockpiling raw materials and non-perishables on the international market to ensure stockpiles are strong for the foreseeable future. This is a relatively short-term measure in consideration of the immediate challenges faced, but a reconsideration of stockpiling measures taken by the UK Government is, in general, necessary for future crises of a similar nature where food supplies are disrupted, or likely to be so.

Secondly, we propose a series of reforms towards making the UK economy more self-reliant for food, which inevitably involves a reconfiguration in favour of food production. These reforms are as follows:

1. Land Army Scheme: At present, the reliance on cheap, foreign labour is undermining British self-sufficiency. The call for a ‘Land Army’²⁹ in response to the coronavirus and the potential of fruit going unpicked in fields is a step in the right direction but is too contingent. We propose that a system be set up in which students are incentivised to pick fruit in the summer terms, in exchange for alterations to their loans, and in which long-term unemployed men and women deemed ‘fit for work’ be prioritised for seasonal employment.
2. Land Investment Scheme: The current Enterprise Investment Scheme (EIS) in the UK includes ‘farming or market gardening’ in its list of non-qualifying trades, where such activity makes up 20% or more of the trade. This policy needs to be addressed; either farming must be removed from the list of non-qualifying trades, or an alternative scheme designed to assist the establishment of, provision of equipment for, and education of smallholders must be established. For instance, the National

²⁹ East Anglian Times (https://www.eadt.co.uk/business/farming/place-uk-fruit-farm-receives-1-300-applications-from-uk-workers-1-6626197?fbclid=IwAR209zozsQ6Haz9flYDjLaMGiE6m_m5bkMwpzdxGgKSzBkcV_Xpp3FOAdNc)

Farmers Union has laid out suggestions for investment in agri-tech³⁰. In addition, such a fund would ensure the existence of key industries such as cod and scallop farming that have high capital outlays and delayed returns, making private investment rare; in this area, the UK could follow the example of Canada that has aimed to increase diversity in food production³¹.

3. Expansion of Abattoirs: Since 1971, the number of red meat abattoirs in the UK has declined from 1,890 to just 249. The consequence of this is the cost of preparation of meat in the UK has increased drastically, due to transportation and shortage of expertise. We propose, to remedy this, a system in which state-owned abattoirs are opened in prominent farming counties, to reduce travel costs and facilitate the increase in meat preparation capacity.
4. Reduce Diversion of Crops from Human Food: As detailed in Section Two, most cereals imported into the UK is used for the production of meat, which is an inefficient use of cereal products. For instance, 100 grams of grain protein can only produce the equivalent of 5 grams of beef³². We recommend that more cereal ingredients be re-directed to the production of products for human consumption.
5. Agricultural Modernisation: Looking to the Netherlands³³ as a model, agriculture can modernise in the UK by introducing large-scale greenhouse complexes that hugely increase yield. The artificial climate in which potatoes, lettuces and tomatoes grow would be easily replicable in the similar conditions of Norfolk, and many other under-utilised areas in the UK.
6. Subsidising and incentivising food producers in the UK that export abroad to refocus on the domestic market.
7. Finally, in order to ensure clear and reliable food security data, we recommend an national audit in food security, including the UK's food production, exports, imports, and consumption. This will be used to stress-test security, sovereignty, and sustainability of supply, but specifically in terms of actual nutritional security, rather than just farm-gate or retail value.

³⁰ https://www.farmbusinessshow.co.uk/news/blog.asp?blog_id=21646

³¹ <https://thefishsite.com/articles/700000-funding-for-scallop-farming-operations>

³² Compassion in World Farming (<https://www.ciwf.org.uk/media/7425974/industrial-livestock-production-the-twin-myths-of-efficiency-and-necessity.pdf?fbclid=IwAR3GnsqD6VdhDA8A91woX4Ne14kwoVzP9J8VTp1ZOqQ5lGVxpKHtbm9y2Dg>)

³³ National Geographic (ND), 'This tiny country feeds the world': <https://www.nationalgeographic.com/magazine/2017/09/holland-agriculture-sustainable-farming/>

Sources:

- Agriculture and Horticulture Development Board (2020), 'UK Trade Data' [online: <https://ahdb.org.uk/cereals-oilseeds/trade-data>] Accessed 19th March 2020
- Bloomberg (2020), 'Italy Fined by EU Top Court for Failing to Recoup Sardinian Aid' [online: <https://www.bloomberg.com/news/articles/2020-03-12/italy-fined-by-eu-top-court-for-failing-to-recoup-sardinian-aid>] Accessed 27th March 2020
- Brendon Gaille (2018), '20 UK Tea Industry Statistics and Trends' [online: <https://brandongaille.com/20-uk-tea-industry-statistics-and-trends/>], Accessed 20th March 2020
- Business Insider (2019), 'Say goodbye to tea and carrots: 80% of British food is imported so there will be food shortages if there's a no-deal Brexit, HSBC tells clients' [online: <https://www.businessinsider.com/no-deal-brexit-percentage-british-food-imported-shortages-2019-1?r=US&IR=T>], Accessed 19th March 2020
- Countryfile (2018), 'Can the UK feed itself after Brexit?' [online: <https://www.countryfile.com/news/can-the-uk-feed-itself-after-brexit/>] Accessed 19th March 2020
- Daily Mail (2020), 'French border guards impound trucks filled with 130,000 face masks bound for Britain for NHS workers battling coronavirus' [online: <https://www.dailymail.co.uk/news/article-8137039/French-border-guards-impound-trucks-filled-130-000-face-masks-bound-Britain.html>] Accessed 27th March 2020
- Family Food (2019) [online: <https://www.gov.uk/government/collections/family-food-statistics>] Accessed 1st June 2020
- Farm Business Innovation (2020) [online: https://www.farmbusinessshow.co.uk/news/blog.asp?blog_id=21646] Accessed 1st June 2020
- Farmer's Weekly (2020), 'Coronavirus: Urgent appeal for Brits to work on Farms' [online: <https://www.fwi.co.uk/business/coronavirus-urgent-appeal-for-brits-to-work-on-farms?fbclid=IwAR17Ht1o-N9aAtFtv8RX80uKSRxcPaoQCnMWTkwfJVinhwza--OC0IqCwFY>] Accessed 20th March 2020
- Food Security (2019), 'Your food is global' [online: <https://www.foodsecurity.ac.uk/challenge/your-food-is-global/>] Accessed 20th March 2020
- Food Statistics Pocketbook (2020) [online: <https://www.gov.uk/government/publications/food-statistics-pocketbook-2017/food->

- [statistics-in-your-pocket-2017-global-and-uk-supply?fbclid=IwAR3zpzO0saU5xRHDIfKSWGEGq24BYDNfx6pUiIT-ypFCzKRxyE_uAZLbCbw#trends-in-uk-food-production-and-final-output-at-market-prices](https://www.gov.uk/government/collections/statistics-in-your-pocket-2017-global-and-uk-supply?fbclid=IwAR3zpzO0saU5xRHDIfKSWGEGq24BYDNfx6pUiIT-ypFCzKRxyE_uAZLbCbw#trends-in-uk-food-production-and-final-output-at-market-prices)] Accessed 1st June 2020
- Foreign Policy (2020), 'The EU is Abandoning Italy in its Hour of Need' [online: <https://foreignpolicy.com/2020/03/14/coronavirus-eu-abandoning-italy-china-aid/>] Accessed 27th March 2020
- Gov.uk (2020), 'Population Estimates' [online: <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/articles/overviewoftheukpopulation/august2019>] Accessed 1st June 2020
- Guardian (2019), 'UK economy grows as manufacturers stockpile before Brexit' [online: <https://www.theguardian.com/business/2019/apr/10/uk-economy-grows-manufacturers-stockpile-brexit-gdp>] Accessed 27th March 2020
- Healthy Eating [online: <https://healthyeating.sfgate.com/bare-minimum-food-can-eat-12451.html>] Accessed 1st June 2020
- House of Lords (2018), 'European Union Committee, 14th Report of Session 2017-19: Brexit: food prices and availability' [online: <https://publications.parliament.uk/pa/ld201719/ldselect/ldeucom/129/129.pdf>] Accessed 19th March 2020
- McCann, P and Argiles, R. O. (2018), 'Could Brexit spell the end for "just-in-time" production?' [online: <https://ukandeu.ac.uk/could-brexit-spell-the-end-for-just-in-time-production/#>] Accessed 24th March 2020
- National Geographic (ND), 'This tiny country feeds the world' [online: <https://www.nationalgeographic.com/magazine/2017/09/holland-agriculture-sustainable-farming/>] Accessed 27th April 2020
- Neon Nettle (2020), 'UK Warehouses 'Full to the Brim' with Food Thanks to 'No Deal' Brexit Preparations' [online: <https://neonnettle.com/news/10706-uk-warehouses-full-to-the-brim-with-food-thanks-to-no-deal-brexit-preparations>] Accessed 24th March 2020
- Office for National Statistics (2020), Family Food Publication [online: <https://www.gov.uk/government/collections/family-food-statistics>] Accessed 1st June 2020
- Office for National Statistics (2019), Prodcom [online: <https://www.ons.gov.uk/surveys/informationforbusinesses/businesssurveys/ukmanufacturerssalesbyproductprodcom>]

- Office for National Statistics (2019), Population Estimates [online: <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/articles/overviewoftheukpopulation/august2019>] Accessed 1st June 2020
- Office for National Statistics (2020), ProdCom [online: <https://www.ons.gov.uk/surveys/informationforbusinesses/businesssurveys/ukmanufacturerssalesbyproductprodcom>] Accessed 1st June 2020
- Office for National Statistics (2020), Trade in Goods, Country by Commodity [online: <https://www.ons.gov.uk/economy/nationalaccounts/balanceofpayments/articles/tradingoodscountrybycommodityexperimentaldata2011to2016/2018-04-16>]
- Politics (2018), ‘Just-in-time: The production system Brexit is set to sabotage’ [online: <https://www.politics.co.uk/comment-analysis/2018/02/06/just-in-time-the-production-system-brexit-is-set-to-sabotage>] Accessed 24th March 2020
- Telegraph (2018), Fat Britain [online: <https://www.telegraph.co.uk/news/2018/02/19/fat-britain-average-person-eats-50-calories-realise/>] Accessed 2nd June 2020
- Whitton et al (2011), ‘National Diet and Nutrition Survey’, British Journal of Nutrition, Vol. 106, pp. 1899-1914
- World’s Top Exports (2019), ‘Britain’s Top 10 Imports’ [online: <http://www.worldstopexports.com/britains-top-10-imports/>] Accessed 20th March 2020
- Yahoo Finance (2019), ‘British firms stockpile £6.6bn of goods in run-up to Brexit’ [online: https://uk.finance.yahoo.com/news/british-firms-stockpiled-66-bn-of-goods-in-runup-to-brexit-uk-095504748.html?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2xILmNvbS8&guce_referrer_sig=AQAAAECwVXG4MJH2SxYkS8EtRcuMkM_fSdgC3w121V7Y9ojdpF_F3AFhuZ_9iTIUO4SakLPK4eGMSUIWMaU1Pr82nuabtBp0QMj6-wXPUqJez0HYih_4EtGgfdomqmHm43c2sQW7nJwj_P6gzCumbEWjjcCyjaHsj5C84WsjFzHWYMip] Accessed 27th March 2020