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Results of a Survey of UK Farmers on Food System Vulnerability over the Short and Long Term

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Abstract: We report the results of a survey of farmers and landowners to identify the most likely potential food system disruption scenarios for the UK and compare these with a previous expert elicitation with a much wider set of food system stakeholders. We found that 60% of farmers think a Societal Event in which 1 in 2000 people are injured in the UK is at least 20% likely to occur over the coming decade. Over a timeframe of 50 years, this increased to almost 90% of farmers. These results show that farmers and landowners are considerably more concerned about the vulnerability of the food system in the UK than the wider group of food system experts are. Farmers agreed with experts on the majority of potential causes of such vulnerability, which are climate change, trade policies (import and export), competition for land and ecological collapse (over 50 years). However, they also highlighted the importance of the power structure within the food system, with large corporations supplying to, or buying from, farmers creating lower revenue, making farming an unsustainable business. We conclude that an urgent systematic review of potential interventions that would improve resilience be conducted by the UK Government, in partnership with farmers.

Keywords: food systems; global catastrophic risk; climate change; extreme weather; scenarios; cascading risks

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1. Introduction

The global food system is exposed to potential large-scale shocks arising from extreme weather, cybersecurity threats, energy price increases and biodiversity loss amongst others. These shocks can interact to create cascading risks that propagate through the food system and have a significant impact on individuals and communities around the world. The particular mechanisms that determine how these cascading risks impact societies and which risks are most important within a particular country or region is less well studied and is a clear gap in knowledge.

Looking at the UK's food system, many questions remain as to how to adequately address food security, with the following recently identified by academic experts as one of the top-priority research questions [1]:

- What are the drivers of the UK's future food system and how might they interact to influence national food and nutrition security?

Therefore, this paper has the overall objective of filling this gap in knowledge by exploring which risks are deemed important by key stakeholders and experts from within the food system.

2. Literature Review

The global food system is highly vulnerable to shocks [2–5], with an increasing likelihood of such shocks occurring due to climate change and the loss of nature [6]. This vulnerability has led to significant increases in global food prices over very short periods of time [7] as well as particular vulnerabilities in supply chains [8]. This vulnerability is matched by a growing community vulnerability, including affordability issues [9,10] during a cost-of-living crisis. Within particular countries, these shocks, coupled with the local vulnerabilities, have been shown to lead to civil unrest through cascading and interacting risks [10].

While a shock may be experienced in a particular breadbasket [11] (an area that produces a substantial portion of global food), the food system is now interconnected such that shocks in one part of the world can impact consumers elsewhere. Food disruptions can be caused by a total lack of available food (a food supply problem) or an inability to get food to where it is needed (a food distribution problem) [12]. Therefore, understanding the risks in one country by taking a systems view of food supply and demand is important.

The food system in any one country has particular vulnerabilities, determined by its exposure to international trade, local transport and food infrastructure, consumption patterns and domestic production. In this paper, we build on a previous expert elicitation [12] that explored which risks were the most important from a country perspective and focussed on the United Kingdom.

Currently, 42% of the UK food supply is imported [13], and domestic production has seen disruption caused by BREXIT, including challenges with accessing seasonal migrant workers from the European Union [14] alongside significant impacts from extreme weather such as the 2022 heatwave [15] as well as from droughts and floods. Indeed, the UK food system remains highly vulnerable to disruptions, as seen during the COVID-19 pandemic [16–18].

The expert elicitation of 58 food system experts [12] involved experts from a wide range of backgrounds, including academia, business, government, charities and think tanks. However, only a small number of farmers were involved in that expert elicitation. Given the central role that farmers have in the food system, this paper therefore expands on that expert elicitation with a more focussed research objective of understanding which future risks UK farmers and landowners see as being the most important within the food system over the coming decades.

Therefore, in this paper, we surveyed a range of farmers and landowners from across the UK with regard to their perception of the UK food system's vulnerability and then compared this with a wider selection of UK food system experts. We aim to better inform the preparations to avoid a UK food system catastrophe by bringing together a focus on domestic food production challenges and a wider view of vulnerabilities to help inform future agriculture and land policy development.

As with the previous expert elicitation [12], the results of this work are not predictions of what will happen to the UK food system, but rather an indication of the range of potential outcomes based on the survey responses and the food system events, scenarios and drivers considered.

3. Methods

This paper used a backcasting approach [19]. The backcasting approach first develops a single plausible scenario which is set in the future (either 10 years or 50 years in the future). The scenario is developed from secondary qualitative (from the literature) and quantitative (from the literature and online data repositories) data sources. A survey is then developed which asks experts to consider a world in which the scenario has occurred, with a set of questions to explore what events and/or risks may have led to that particular outcome. This is different to a forward casting scenario approach, which asks experts to project forward current trends to determine a business-as-usual future to compare to scenarios under a different set of starting interventions. This backcasting approach allowed

us to understand key risks and how they translate into pathways towards civil unrest so that the impact of particular risks can be better understood and risks prioritised within a national food security review. The survey questions initially asked experts to consider the scenario set in a 10-year timeframe and subsequently a 50-year timeframe.

As with the expert elicitation, we designed a set of multiple-choice questions to identify the set of risks that farmers perceived as the most important over each timeframe. The set of survey questions is included as Supplementary Data.

Societal Event

We started by defining a Societal Event associated with civil unrest (Box 1). Here we make the link between civil unrest and food riots which have been defined, both globally and within the context of future UK food security, as "violent, collective unrest leading to a loss of control, bodily harm or damage to property, essentially motivated by a lack of food availability, accessibility or affordability, as reported by the international and local media, and which may include other underlying causes of discontent" [20–22]. The definition of the Societal Event (civil unrest) was updated from the expert elicitation [12] to ensure the direct link to the food system was more explicit.

Box 1. The Societal Event considered in this work.

Societal Event
"Civil unrest has occurred in the UK, as defined by violent injury of more than 30,000 people in one year as a result of a problem in the food system. There is violent looting, strikes, demonstrations, or crimes, including hate crime (i.e., roughly one in 2000 people are injured, which is a factor of 10 greater than the number of injuries in London riots in 2011)".

The details of the choice for the measures of civil unrest that we adopted are described in detail in the expert elicitation [12], and we do not repeat them here; however, we do note that these values are based on a rate of crime ten times greater than that seen during the London riots in 2011 [23,24].

The survey then asked respondents to consider that if the unrest had occurred, what would have been more likely to have been the cause (Box 2)?

Box 2. The two food system scenarios considered in this work.

Food System Scenario 1: Insufficient UK Food
"There are now insufficient calories available to feed the UK population, and this starts to contribute to the Societal Event"
Food System Scenario 2: Food distribution problem
"There is a food distribution problem leading to geographically isolated pockets of hunger, despite adequate total calories being available to feed the UK population, and this has contributed to the Societal Event"

A list of drivers of plausible risks, updated based on the additional free text responses in the expert elicitation [12], was then presented, with respondents asked to choose up to five of the most likely causes of the unrest. The list contained 27 potential causes and a free text box for participants to outline any other causes that they thought were missing. Participants were asked to choose the causes for each scenario over both the 10- and 50-year period. In this paper, when presenting the data we focussed on the main differences between the farmers' responses and the original expert elicitation. Farmers were asked about the most likely commodities that would be impacted; however, as the findings here were not materially different to that of the experts, they are not presented in this paper.

Given the uncertainty and the lack of data available to make probabilistic assessments of the likelihood of such events, we adopted the same approach as the previous expert elicitation [12], which was found to be well suited to capturing a well-informed probabilistic

interpretation of risk [25]. In this paper, we do not present statistical analyses or correlations of the data that were gathered through the questionnaire, as this would not offer further insight into the conclusions drawn than the qualitative approach to interpretation that we have adopted. However, we note that by including the data that was collected in a transparent manner, as well as using the previous responses to the expert elicitation [12] as a method of triangulation, we have demonstrated the robustness of our approach [26].

The survey was sent out via a number of farmers' networks across the UK through personal contacts of the authors and farmers who had contacted the authors of the expert elicitation following its publication, as well as being shared widely on social media. Farmers were also asked to forward the survey to their own contacts to support snowball sampling [27].

For our study, we aimed to cover a wide range of farm types, geographies, sizes and lengths of ownership. The survey was open for several months (January–April 2024). Participants were all anonymous. For the purpose of sampling, we used the same categories for farm types, geographies and sizes as the UK Government adopts for its annual farm census to allow for future comparisons.

We acknowledge that some bias may still exist within the data collected, as the farmers were self-selecting, and it is not possible to ensure that all views are represented. The timing of the data collection may also introduce bias, given global events such as the war in Ukraine, current policy uncertainty in agriculture in the UK and extreme weather across the UK (flooding).

In total, 47 farmers and landowners from all regions in the UK, apart from the South East (see Figure 1), completed the survey. Participants were drawn from a range of farm sizes (Figure 2), from very small to very large. The vast majority have been farmers for over 10 years (Figure 3), with more than three-quarters having been farmers for over 20 years. Participants were then asked to indicate what they farmed, with a wide range of farming practices being covered (Figure 4), with almost half of the farmers having beef cattle, a third having arable crops and just under a third farming sheep. A table summarising the participant profiles is included for further detail (Table 1).

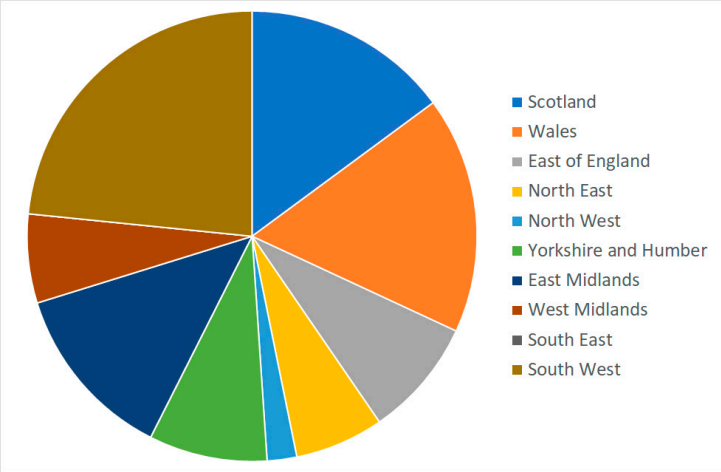

Figure 1. Classification of the location of the farmers by the UK region of the survey participants.

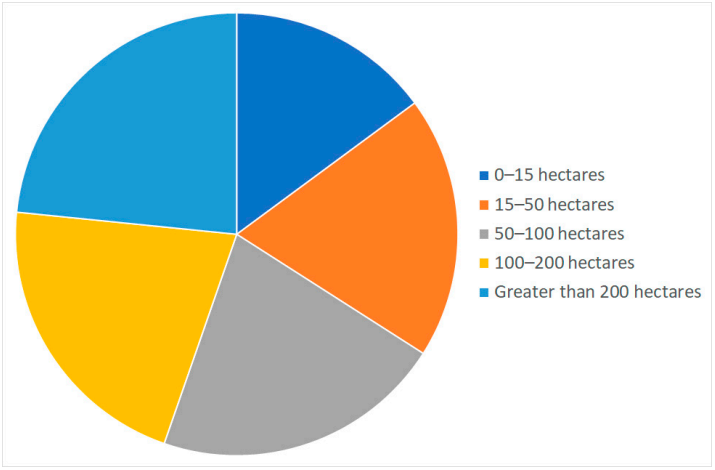

Figure 2. Classification of the size of the farms by the survey participants.

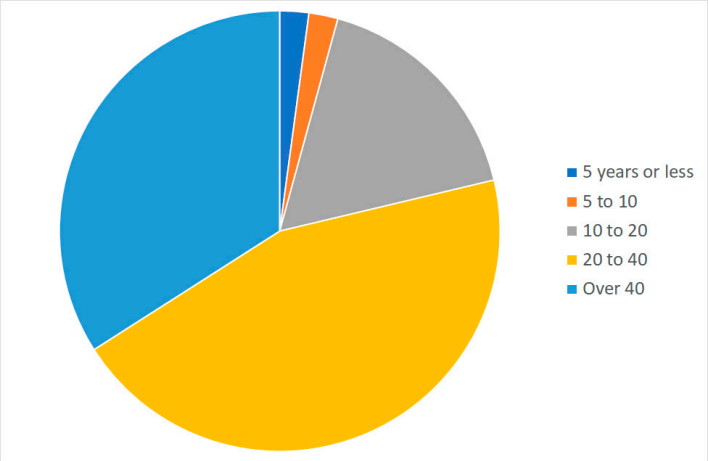

Figure 3. Classification of the length of time that the survey participants have been farmers.

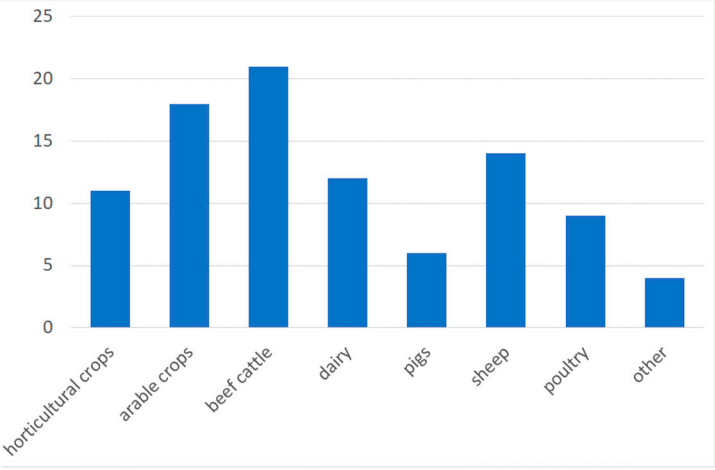

Figure 4. Classification of the types of farming of the survey participants.

Table 1. Details of the participants' backgrounds and farm types.

	UK Region	Farm Size	Duration (Years)	Type of Farming
1	South West	50–100 hectares	20 to 40	arable crops, beef cattle, dairy
2	East Midlands	>200 hectares	10 to 20	arable crops, beef cattle, sheep, other
3	South West	100–200 hectares	Over 40	dairy
4	South West	>200 hectares	20 to 40	horticultural crops, arable crops, beef cattle, dairy
5	South West	100–200 hectares	10 to 20	beef cattle, poultry
6	South West	15–50 hectares	20 to 40	arable crops, sheep, poultry
7	Wales	15–50 hectares	10 to 20	dairy, poultry
8	North West	50–100 hectares	Over 40	dairy
9	Scotland	0–15 hectares	20 to 40	horticultural crops, dairy, pigs, poultry
10	North East	>200 hectares	20 to 40	beef cattle, sheep
11	Yorkshire & Humber	>200 hectares	10 to 20	dairy
12	East Midlands	15–50 hectares	Over 40	arable crops
13	Wales	100–200 hectares	20 to 40	beef cattle, sheep
14	Yorkshire & Humber	50–100 hectares	Over 40	arable crops, pigs
15	Yorkshire & Humber	100–200 hectares	Over 40	dairy
16	South West	>200 hectares	20 to 40	horticultural crops, arable crops, beef cattle, pigs, sheep
17	Scotland	100–200 hectares	20 to 40	beef cattle, sheep, poultry
18	South West	100–200 hectares	20 to 40	arable crops, pigs
19	East Midlands	50–100 hectares	Over 40	beef cattle, other
20	Wales	100–200 hectares	Over 40	horticultural crops
21	East Midlands	>200 hectares	Over 40	arable crops
22	Yorkshire & Humber	>200 hectares	20 to 40	arable crops, beef cattle
23	North East	15–50 hectares	20 to 40	beef cattle, sheep, other
24	Scotland	>200 hectares	Over 40	beef cattle, dairy
25	South West	50–100 hectares	20 to 40	beef cattle, pigs, poultry
26	West Midlands	0–15 hectares	Over 40	horticultural crops
27	West Midlands	15–50 hectares	20 to 40	horticultural crops
28	South West	100–200 hectares	20 to 40	dairy
29	North East	>200 hectares	Over 40	arable crops
30	Scotland	15–50 hectares	20 to 40	sheep
31	Scotland	0–15 hectares	10 to 20	horticultural crops, pigs, sheep, poultry
32	South West	0–15 hectares	20 to 40	horticultural crops
33	Scotland	50–100 hectares	10 to 20	arable crops, beef cattle
34	South West	50–100 hectares	Over 40	dairy

Table 1. *Cont.*

	UK Region	Farm Size	Duration (Years)	Type of Farming
35	Scotland	100–200 hectares	10 to 20	beef cattle
36	Wales	15–50 hectares	20 to 40	arable crops, beef cattle
37	Wales	0–15 hectares	20 to 40	horticultural crops, sheep, poultry
38	Wales	50–100 hectares	Over 40	other
39	East Midlands	15–50 hectares	5 to 10	horticultural crops, beef cattle, sheep
40	West Midlands	0–15 hectares	10 to 20	beef cattle
41	East of England	>200 hectares	Over 40	arable crops
42	East of England	100–200 hectares	20 to 40	arable crops, beef cattle, sheep
43	East Midlands	0–15 hectares	5 years or less	horticultural crops
44	East of England	15–50 hectares	20 to 40	arable crops, beef cattle, dairy, sheep
45	Wales	50–100 hectares	Over 40	beef cattle, sheep
46	East of England	>200 hectares	20 to 40	arable crops
47	Wales	50–100 hectares	Over 40	arable crops, poultry

4. Results

Farmers rated the plausibility of civil unrest (Figure 5) higher than the participants in the expert elicitation [12]. Over a 10-year period, 11% of the farmers considered this "Very unlikely" (<5%), 28% "Unlikely" (5–20%), 43% "Possible" (20–50%), 17% "More likely than not" (50–80%) and 2% "Very likely" (>80%). Therefore, over 60% of the farmers considered this scenario to be at least possible over a 10-year period, which compares to 40% of the experts [9]. Indeed, none of the experts rated this scenario as "Very Likely", whilst one farmer did. When asked about the same scenario over a 50-year time period, almost 90% of the farmers found that this was at least possible, which compared to 80% of the experts. Indeed, while 10% of the experts found the scenario "Very likely" (>80%) over a 50-year time period, this figure rose to 28% for the farmers. Therefore, it is clear that the farmers view the vulnerability of the UK food system as being much higher than the wider group of food system experts do.

Over the 10-year timeframe, slightly more than half (57%) of the farmers considered a food distribution problem as more likely, compared to over 80% of the experts, who thought food distribution was the more likely cause. Over the 50-year timeframe, 81% of the farmers considered insufficient food as the more likely cause, which compared to 57% of the experts. Therefore, while the farmer and expert groups do agree on the more likely cause of the scenario event in each given timeframe, it is clear that the farmers see the absolute availability of food as more of a concern than the experts do, over both a 10- and 50-year timescale.

These two findings together show that farmers are much more concerned about potential collapses in food production over the next few years than the wider expert group are. As farmers are the key stakeholders involved in food production, this may highlight their knowledge of the many risks that food production faces currently, or it may indicate a wider frustration that their concerns are not taken into account in food security and policy discussions enough.

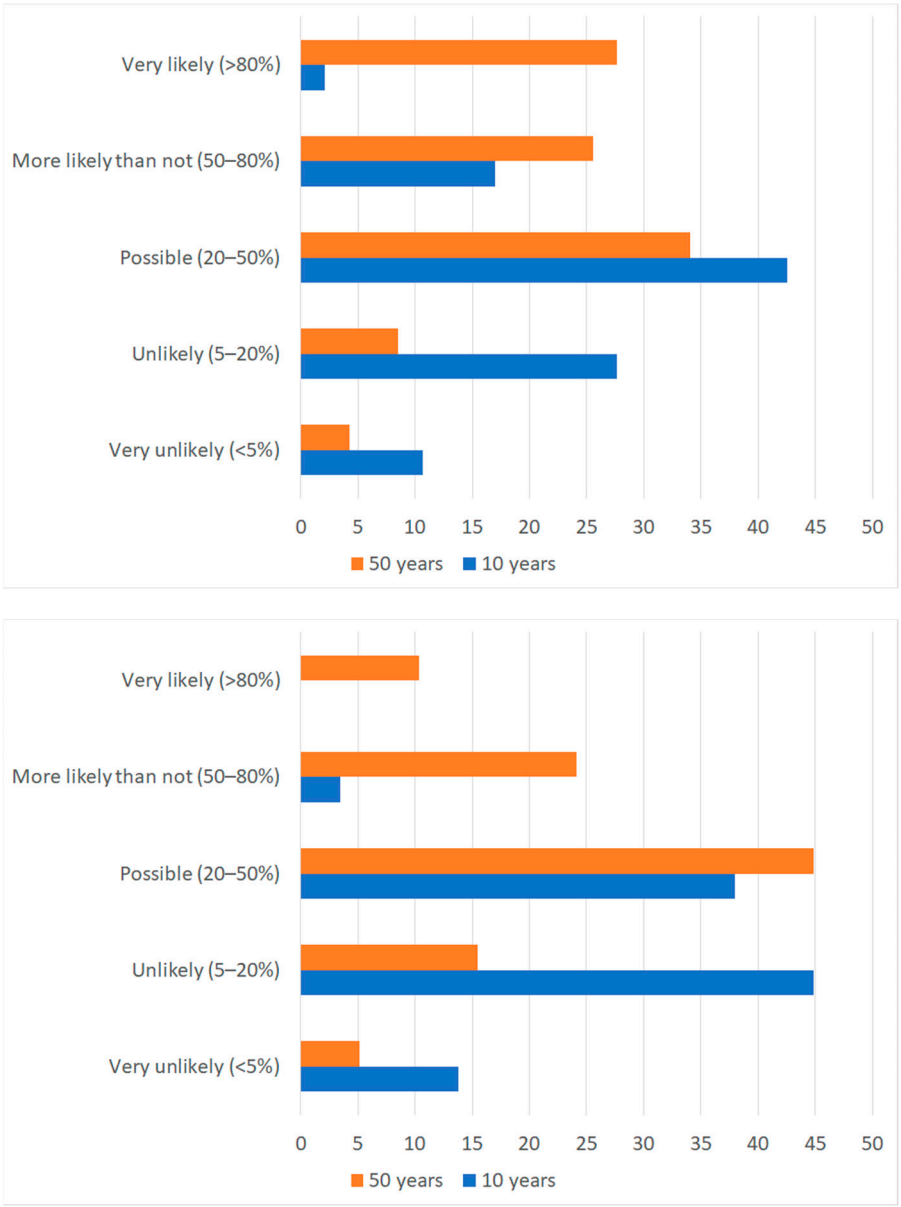

Figure 5. Plausibility of the Societal Event as a function of time. Results of "In your opinion, how plausible is this Societal Event to occur in the next 10 years?" (blue) and "In your opinion, how plausible is this Societal Event to occur in the next 50 years?" (orange). Results given as a percentage of total survey respondents. (**Top**) panel is the results from the farmer survey presented in this paper, while the (**lower**) panel is the results from the expert elicitation for comparison [12].

Causal Pathways Leading to Different Food System Scenarios

Similarly to the expert elicitation, "Extreme weather (including storm surges, flooding, snow, drought)" was the most common response for both scenarios over the 10-year period, with three-quarters of the farmers choosing it for insufficient food (Figure 6) and nearly 60% choosing it for food distribution problems (Figure 7).

For Scenario 1 (insufficient UK food), the next most popular cause for the farmers was "trade restrictions or protectionism". Following free text feedback [12], this category was separated into two for the farmer survey to focus on the impact of trade agreements which mostly affect domestic production (exposing domestic farmers to unfair international competition) and those that would affect the availability of imports. It is therefore interesting to note that farmers selected these two separate trade causes in second and third place, with very little differentiation between them.

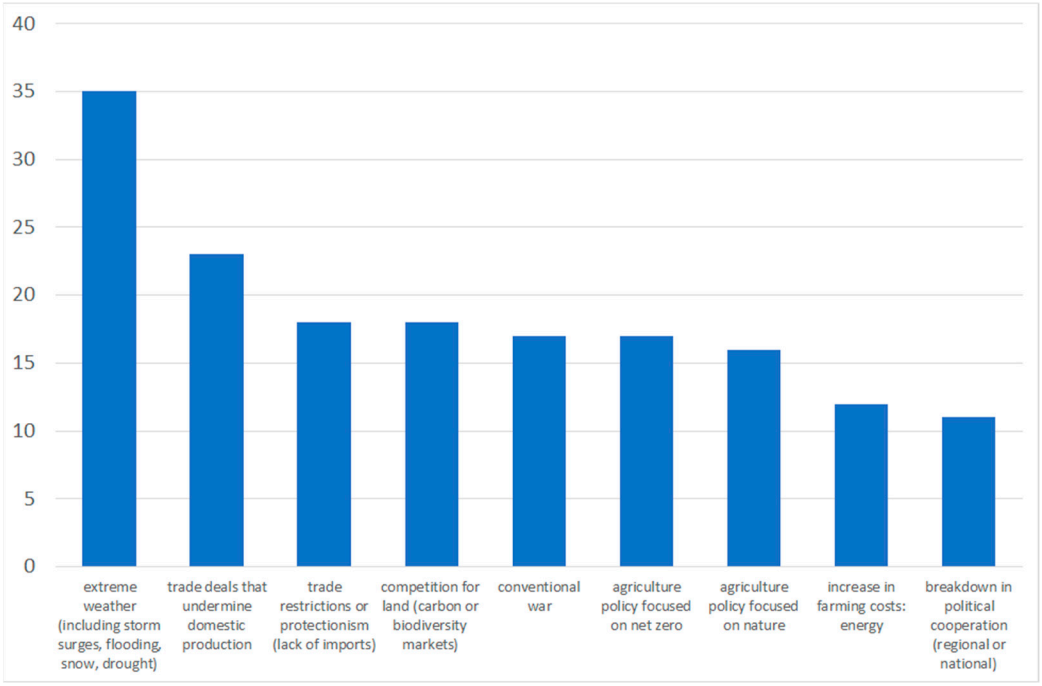

Figure 6. The causes of Food System Scenario 1 (insufficient UK food) over the 10-year time period, showing the causes that were chosen by at least 10 farmers.

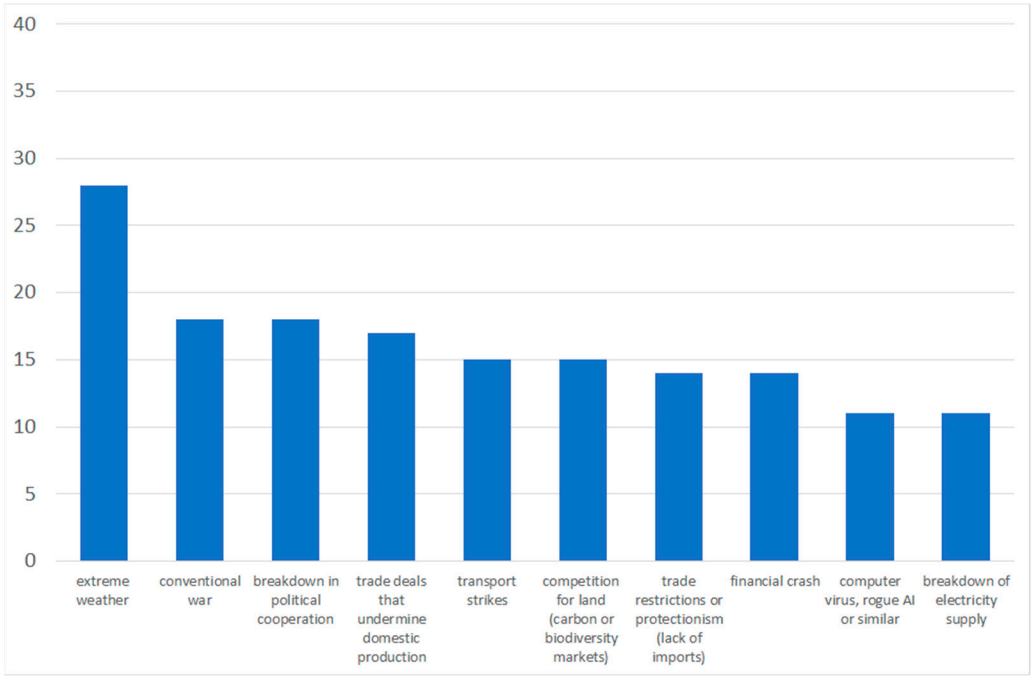

Figure 7. The causes of Food System Scenario 2 (food distribution problem) over the 10-year time period, showing the causes that were chosen by at least 10 farmers.

Three further causes which had been added to the list were "competition for land (carbon and biodiversity markets)", "agriculture policy focussed on net zero" and "agriculture policy focused on nature". These do, of course, have some overlap and were chosen by farmers as their fourth-, sixth- and seventh-highest causes, respectively. This demonstrates a clear tension between the growers of food and the government policy directed at tackling both the climate and biodiversity crises. Here we see a clear dichotomy between the concerns about extreme weather and climate resilience and policies that are

aimed at climate mitigation and conservation. This may be due to some form of cognitive dissonance, in which farmers are concerned about the impact of climate change but fail to see that their actions can contribute (significantly) to solutions, or it may be down to (legitimate) concerns about climate mitigation policy implementation, in which farmers believe they have not been properly consulted, and, as such, they perceive these policies will have an overall negative impact.

For food distribution problems over the 10-year timeframe, the farmers and experts chose similar causes, with "trade", "transport strikes" and "financial crash" as some of the main causes. Again, a number of causes added to the list (not included in the original list given to the experts) were chosen by farmers, including "Conventional war" and, again, "'Competition for land". Here we note that "Conventional war" was added as many experts identified this as an immediate risk and given the situation in the Ukraine it is potentially no surprise that this has been rated highly by farmers. Again, the competition for land is seen as a concern when trying to meet food, carbon and biodiversity outcomes together.

Over the 50-year timeframe, similar causes were chosen by the farmers as over the 10-year timeframe, with the following representing the main differences. Similarly to the experts, the farmers found that "Ecological collapse" and "Nuclear war" were of greater concern over this longer timeframe. The choice of ecological collapse as a cause is interesting, as in the free text comments experts were hesitant around ecological collapse and rather highlighted the need to include ecological degradation (as opposed to a full collapse). Therefore, while the farmers were given the opportunity to select three separate options related to ecological degradation (water quality, soil health and pollinator populations), they still opted for ecological collapse. This implies that farmers are worried about the state of nature and potential tipping points being reached over a shorter period of time. Interestingly "Animal or Plant Pathogen" was not rated as a main cause by the farmers, whilst it was chosen by a quarter of the experts.

A key difference between the 10- and 50-year timeframes was that a much higher number of farmers chose "Breakdown in political cooperation" over the 50-year timeframe, with this becoming their third most likely cause of insufficient food (scenario 1) and distribution problems (scenario 2), and a slightly lower number chose "Trade restrictions" as a cause. This may be due to the current lack of trust seen between the farming community and the UK Government, leading them to view political cooperation as a more vulnerable area of focus.

5. Discussion

Globally, there has been an exponential increase in food production over the past century, with the ability to feed a global population of over 8 billion people being achieved. However, with this increase in population growth continuing, coupled with changing expectations of diets, food production may need to double by the middle of this century. Therefore, better cooperation between farmers, scientists, policy makers and business is required to tackle the questions of how the food system can be engineered, and its resilience improved, to meet this demand [1,28].

In this paper, we explored the vulnerabilities within the food system in the context of a particular country, the UK, from the perspective of those that supply the food system, namely farmers. This is an important contribution to the knowledge, as farmers have a unique perspective on the food system and the risks that it faces now and in the future. For example, an issue highlighted by farmers but not by experts [12] was food pricing. It is clear that the true cost of producing food is not captured in food prices and while subsidies are provided to support agriculture this does not cover the full extent of the externalities that the food system faces [29]. Therefore, a lack of profit from growing food is forcing farmers to either leave the market or find alternative sources of income, including tourism, energy generation (for example, solar farms) or indeed make use of the policies supporting carbon or nature pricing.

While "Increase in farming costs" was included as four separate options (covering energy, feed, labour and other), several farmers highlighted increases in the costs of fuel and fertiliser as key challenges in the free text comments, which further supports the need for full cost accounting [30] within farming (even if the full price is not passed onto the consumer) to ensure that farms remain profitable and financially sustainable.

However, the key issue highlighted by farmers was their lack of voice in decisions within the food system and, in particular, the power of supermarkets. Supermarkets are seen as having an unfair influence over price setting and farming practices (through expectations of products). This is not an issue that is restricted to the UK [31–33] but has been highlighted globally for a number of decades (see for example [34,35]). In addition, farmers also source the inputs (such as feed and fertilizers) from large companies where their individual purchasing power is small. As one participant highlighted, "Farmers are small businesses being supplied by and supplying huge corporations. This has to change either by regulation of power or dismantling corporations so there is fairness in the supply chain that enables everyone to live off a profit". Therefore, farmers are left feeling that their voices are not heard, and they are excluded from key decision-making processes associated with the overall food system.

Currently, 7% of the UK population live in food poverty [36], and so the UK food system can already be described as vulnerable. This vulnerability is set within a complex system with multiple potential causes of breakdown. Approximately 89% of the farmers (compared to 85% of the experts) in our survey indicated that civil unrest—where 30,000 people in the UK are injured as a result of riots or protests arising from insufficient food—had at least a 1 in 20 chance of occurring in the next 10 years.

Within a single country, building resilience in food systems often includes discussions of the definition of self-sufficiency [37]. This inevitably leads to questions on the prioritisation of land use as well as policy development [38] to enable more (or different) domestic food production. Other solutions include climate-smart agricultural practices [39], regenerative agriculture [40] or alternatives such as aquaponics [41] alongside technological interventions, such as those associated with the Internet of Things [42], which provide smart monitoring solutions for farmers. However, these solutions must be considered as part of the wider food system, in which technical, political and behavioural solutions are all required, and, as highlighted, often these solutions come with their own vulnerabilities.

In this paper, we have highlighted a number of interconnected and interacting causes of food system vulnerability in the UK which need to be better understood. These causes are myriad and made more difficult as they can have multiple impacts on the pathways to food system disruption. For example, extreme weather can have both direct impacts on food production (through floods, heat [43] and drought) but also indirect impacts through both physical [44,45] and human systems [46].

Alongside a growing set of risks, farmers also see growing competition for land. With an increasing need for climate mitigation solutions, either through growing biofuels or by sequestering carbon in soils, as well as increasing biodiversity protection through nature markets [47,48], financial incentives now exist for radically different land use choices. Whether this represents real tensions in land use or tensions in the communication of policy, or badly designed policy, is not the subject of this paper. However, clearly more work is needed to help farmers and policymakers find solutions that can allow sufficient food to be grown alongside meeting carbon and biodiversity targets. While these choices may represent real options in some circumstances, there is an increasing focus on how they can be made mutually supportive, such that nature- and climate-friendly farming does not compromise the outputs of any of these goals [49–52].

Farmers feel they lack a voice in creating strategic solutions. In particular, they feel there is a power imbalance between farmers and the large companies supplying the agricultural sector or the supermarkets buying from the farmers, which acts as a barrier to change. Therefore, given that farmers have clear expertise within the food system and offer

a unique perspective on its vulnerabilities, providing clear routes for engagement with farmers and landowners on a national food security strategy is urgently needed.

6. Conclusions

In this paper, we reported the results of a survey of 47 farmers drawn from across the UK. We compared these results with those of a previous expert elicitation involving 58 food system experts [12]. In both surveys, the potential for food shortages and food distribution problems leading to civil unrest was seen as real, with a number of likely causes.

However, we found that, overall, farmers are more pessimistic about the resilience of the UK food system than the wider set of food experts were. Over a 50-year time frame, 90% of farmers thought that a major disruption to the UK food system leading to civil unrest was at least possible, and almost a third thought this "Very Likely".

This supports the call for action already highlighted by the expert elicitation, only with potentially greater urgency. We argue, as we did in the expert elicitation, that a systematic review of the UK's food system is urgently required. While farmers did rank the causes—with extreme weather and trade deals deemed most important—the UK's future food system is highly complex, with no one single driver which can be prioritised within a national food security plan.

Importantly, however, as previously highlighted [12], the diversity in responses across both surveys, including the wider food system experts and farmers, leads us towards the need for more of these types of exercises to stress test the UK food system. Indeed, we believe that the use of a backcasting-type approach offers a useful tool to explore more extreme, though plausible, scenarios for which the UK food system needs to build resilience. Further, we stress the importance (as indicated by previous studies [28]) of bringing different stakeholders together to use these approaches and develop implementable solutions.

Food system resilience in the UK needs to be improved through mitigating climate change as much as possible (while taking into account the competition for land between food and carbon), ecosystem restoration and management (accounting for land competition between food and nature), fair and transparent trade policies that do not undermine domestic farming, and sustainable and resilient agriculture practices. All of these interventions should be developed in partnership with farmers, taking into account the power dynamics between farmers and their suppliers and supermarkets.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/su16166851/s1, Supplementary Data: The Catastrophic Food System Disruption Farmer Survey. Table S1: farmer_DataForPaper_Open.

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