Horizon Scanning 2023

In this guide

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Anything else

Challenges	Possible actions
Chemical use and AMR 20 The impact of response to microbiological stability issues may drive increased chemical use and AMR.	23.1 The FSA should continue its regular surveillance of AMR on food a range of food products and consider supporting surveillance to monitor chemical use in food production.
Loss of Agricultural Land 21 Loss of agricultural land (including to solar farms) may drive food production to less safe sources.	21.1 The FSA should work with other government departments to determine the likely extent of the loss.

Challenges	Possible actions
Drinking Water Quality	
22 Increased flooding and/or drought raises concerns over drinking water quality for agricultural use. The use of contaminated water may lead to more animal disease and subsequently more antimicrobial usage. This has the potential to increase the use of antibiotics in livestock despite the recent trends in reduction antibiotic use.	22.1 The FSA should consider carrying out a systematic review to enable a better understanding of how heat stress will affect antibiotic use in livestock by looking at examples from other countries with higher temperatures.
Biofilm Prevention	
23 There is an absence of guidance for industry about preventing and removing biofilms despite increasing microbiological challenge in food processing. There is also increased pressure to reduce chemical cleaner use, sending conflicting messaging to manufacturers.	23.1 The FSA should consider developing guidance for industry on preventing biofilm formation by reviewing guidance for manufacturers for biofilm control/removal from other sectors e.g., dentistry.
Emerging viruses	
24 There is a risk of emerging respiratory viruses such as Covid taking out whole factories due to stall illness. Though this is more HSE issue than a food issue, it could have implications for food shortages.	24.1 FSA should consider working with other government departments to consider preparedness measures for respiratory viruses spread via food. 24.2 FSA should consider carrying out a systematic review to identify possible opportunistic pathogens across various food types.

Challenges	Possible actions
Disease Spread by Wildlife 28. Continued concern of transmission of disease from wildlife into commercial animals (e.g., avian influenza spread from wild bird populations into commercial poultry).	28.1 The FSA should consider commissioning research surveys for surveillance/monitoring, of migratory birds and changing flight / pathogens and rodent populations (rural and urban).

Annex 1

How in your opinion is climate change likely to affect the microbiological safety of food in the UK via the following areas?

Please consider:

- **Both trends (increasing temperature) and increasing frequency of extreme weather events (flooding, drought, forest fires)**
- **Timescales (0-10 years, 10-20 years, 20+ years)**
- **Indicators: how will we know if the effect is happening?**
- **Likelihood and magnitude of effect**
- **New as well as existing hazards**
- **Key evidence gaps**
- **How climate change might affect, and how its effects might be affected by/mitigated by, other drivers**
- **Any recommended actions for the ACMSF, the FSA, other government departments and agencies, and external stakeholders.**
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- **Challenges associated with disruption to food supply chains**

Possible interacting drivers: animal and plant disease outbreaks, geopolitical issues, shortages of materials or resources.

Member A

1. Trends and increasing frequency of extreme weather events - Cold winters and flooding have already affected UK winter/spring food production, reducing yield and quality (and associated sewage contamination risk); similarly hot, drought weather has impacted on summer/autumn crops, reducing yield and/or quality – affecting use of poor-quality irrigation water (compounded by ongoing water companies' sewage overflows into streams and rivers used for water abstraction). Even worse for imported foods, particularly food produced in areas of southern Spain and Portugal.

2. Timescales - Happening now and will only get worse.

3. Indicators - Reduced yields (reports by NFU), poorer shelf life (reports by BRC), increased reports of animal disease and AMR (reports by APHA) and foodborne disease and AMR (reports by UKHSA).

4. Likelihood and magnitude of effect - Highly likely, particularly for immunocompromised patients or animals already stressed by drought and heat.

5. New as well as existing hazards - Changes in migratory patterns of birds and bats, increasing virus risk when they feed or defaecate on crops, as well as the usual bacterial zoonoses. Increasing arthropod-borne diseases moving to warmer northern climes affecting animal health.

6. Key evidence gaps include influence of Climate Change on increased AMR and One Health; and fungal blites stressing crops and reducing quality and shelf life, and susceptibility to bacterial pathogens.

7. How climate change might affect, and how its effects might be affected by/mitigated by, other drivers - Shortage of water for human and animal drinking as well as for crop irrigation will cause increasing civil and inter-government strife, animal deaths and human migratory patterns.

- **Changes in methods of food production and new food technologies**

Possible interacting drivers: vertical farming, “blue food”, new food packaging technologies, pressure to shift to sustainable food practices, alternative proteins (insect- and plant-based, cultured meat).

Member A

1. Vertical farming will need massive increase in scale to cope with UK consumer demand, coupled with new technologies to continuously recycle the irrigation water (adding essential nutrients and removing by-products, and sterilising the water e.g., perhaps UV treatment). The infrastructure such as renewable electricity supply will also need to be installed. Consider increased mushroom production to replace meat as this becomes scarcer and more expensive? New algal growth technologies powered by solar energy to produce protein for animal and fish feed, or directly to human. We have discussed insect-based protein production in previous ACMSF meetings, and this is likely to continue.

2. Can fish farming be increased sustainably without harming the marine environment and relying on more antibiotic use driving AMR? Warmer sea temperatures might lead to increased Vibrio contamination of fish and shellfish, increasing the risk of foodborne disease (and sea bathing). Indeed, until sewage treatment companies make the massive investment necessary, the risk of faecal pathogens being actively expelled into rivers and coast lines, thereby contaminating fish and shellfish farming sites, remains high.

Member B

3. The threat and also direct impact of climate change on availability of raw materials and food and the potential effect on increased food prices will continue to drive the sustainability agenda. This may lead to reduced processing of food i.e. optimised production techniques, reduced preservation, etc, as well as pressures to increase shelf life of food and also reduced protection of food i.e. packaging. Such combinations can increase microbiological risk and tools to support informed, risk-based developments like these would be useful.

4. New production methods such as vertical farming are likely to increase dramatically especially in the provision of ready to eat fresh produce and also commodity crops. Similar novel processes such as cultured meat and dairy products all need clear industry or regulatory guidance to ensure these

- **Changes in consumer behaviour and preferences**

Possible interacting drivers: food poverty and inequality, changes in food storage/preparation practices, changes in consumer diets influenced by health or sustainability issues

Member A

1. Increases in food prices will inevitably drive food poverty, with consumers looking for “bargains” (poor attribution and adulteration mislabelling, and dubious quality; altered close to or exceeded “use by date”) and also storing food for longer if bought in bulk to reduce cost. Continuing high cost of electricity will lead to increasing the refrigeration temperature to save money, exacerbated by increasing global temperatures. More dried or canned food processing to increase shelf life but problems of scale up?

Member B

2. It is hard to see that the consumer behaviours seen in recent years will not continue such as online shopping, meal delivery, the desire to be more thrifty by reducing wastage through use of leftovers or consuming food beyond expiry dates.

Member C

3. Where food supplies are insecure, people may shift to less healthy diets and may consume more “unsafe foods” – in which chemical, microbiological and other hazards pose health risks. Increasing demand for fresh poultry, coupled with intensive production practices could continue to lead to transmission within and between poultry flocks and amplification of clones may be driven by limited use of antibiotics (e.g., tetracyclines) for disease outbreaks and individual cases. Increasing demand for fresh produce, coupled with increased risk for these foods due to contaminated irrigation water and absence of intervention methods in their preparation prior to consumption may also lead to an increasing number of cases of illness linked to these foods.

Member D

28. **Challenges associated with changes in the sizes of vulnerable groups**

Potential examples to consider: ageing population, poor nutrition of displaced groups

Member A

1. Increased costs and reduced food quality will result in less consumption and poorer nutritional value, particularly affecting the ageing population and pregnant women with higher nutritional needs.

Member B

2. The key issue is whether climate change per se is likely to increase the vulnerability of groups and / or increase the number of individuals who are in vulnerable groups in the UK. It is possible that the impact on weather may prove to be a confounding factor in increasing vulnerability i.e., hot or cold weather stress factors that lead to greater vulnerability to foodborne disease, but this would need to be extreme to have such an effect.

3. Secondly, the question infers an anticipated increase in vulnerable groups presumably due to ageing, but it is not entirely clear whether this will materialise (clearly ageing will but will vulnerability to foodborne disease?) and this may need exploration in itself.

Member C

4. The increasing ageing population in the UK will likely lead to more cases of foodborne illness, due to lack of awareness of effective controls and individuals not following cooking/preparation instructions. Increases in the chilled food market would be one area to focus on here.

Member D

5. The ageing population will continue to put added pressure in relation to infections more sever in this risk group (e.g., Listeria monocytogenes).

- **Anything else?**

What are other important issues or challenges that the Committee may face in the next 10-20 years?

Member A

1. Increased temperature might force farmers to house animals and poultry inside more often to conserve water and food (if grass and silage become short), and reduce animal heat stress, leading to increased pathogen infection rates due to close stocking rates and changes in diet.

2. Changes from using antibiotics to treat animals and humans to other antimicrobial agents (previously nicin but antimicrobial peptides are now being proposed) poses a future risk of new resistance patterns emerging and entering the food chain.

Member B

3. Concerns have been raised that the recent COVID-19 pandemic could be dwarfed by pandemics from more virulent pathogens e.g., coronavirus or avian flu virus strains. The Committee may wish to consider the prospect of what would controls might be needed if future pandemic viruses could be more readily spread via food.

Member C

4. Covering areas such as algal blooms, impact of mycotoxins – will be overlap with remit of other committees so good coordination is key to dealing with these effectively.

5. Increasing pressure on public health resources (e.g., NHS etc) may result in less effective surveillance of foodborne disease in the UK and fewer food monitoring surveillance studies which reflect the current status of risks in the food chain – this is a concern. If we are not monitoring effectively, it will be more difficult to identify changes and then react to these in a timely manner.