

# Research Needs 2020

Project Priorities



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**Food Safety Authority of Ireland**  
The Exchange, George's Dock, IFSC,  
Dublin 1, D01 P2V6

T +353 1 817 1300  
E [info@fsai.ie](mailto:info@fsai.ie)

**[www.fsai.ie](http://www.fsai.ie)**

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## Research Needs 2020

### Project priorities

The Food Safety Authority of Ireland (FSAI) has a mandate to enforce food law and protect consumer health regarding food marketed and produced in Ireland. Its brief covers food safety, hygiene and certain aspects of nutrition. Food safety research is essential to address gaps in food safety knowledge necessary to support regulation and identify emerging issues and threats to the food system in Ireland.

The FSAI is not a research funding body and therefore, it is essential for the FSAI to communicate areas of priority research to state bodies that fund research and scientists in research institutes alike. These areas can be incorporated into research calls by funding bodies or be the subject of researcher-led funding proposals submitted to research funding bodies.

This document contains priority research areas that would advance the risk assessment and risk management work of the FSAI and support the protection of public health. They are listed under broad topic headings and include suggestions for major research as well as smaller desk-top studies. Research funding bodies and/or researchers may cite this list as supporting documentation for their calls or proposals.

The FSAI would be happy to discuss the detail of proposed research topics with researchers who wish to make applications to research funding bodies in these areas of interest. Where projects are underway or planned in these research areas the FSAI would be grateful if researchers and/or research funding bodies could notify the FSAI via the FSAI Advice Line ([info@fsai.ie](mailto:info@fsai.ie)).

## Project priorities

### Exposure assessment

Research Area	Research Need
<p><b>Generate specific food consumption and analytical data on food supplements targeted at body image and body composition</b></p>	<p>Irish legislation defines food supplements as:</p> <p>‘Foodstuffs the purpose of which is to supplement the normal diet and which are concentrated sources of nutrients or other substances with a nutritional or physiological effect, alone or in combination, marketed in dose form, namely forms such as capsules, pastilles, tablets, pills and other similar forms, sachets of powder, ampoules of liquids, drop dispensing bottles, and other similar forms of liquids and powders designed to be taken in measured small unit quantities.’</p> <p>Food supplement consumption is increasing globally, driven by their use in sport and the consumers’ desire for improved body image aimed at weight loss / muscle gain goals. Such food supplements can contain excess nutrients e.g. protein, vitamins, minerals as well as hazardous chemical constituents e.g. DNP (2,4-Dinitrophenol). The value and demand for these products can also act as an incentive for fraudulent activity by illegitimate operators, including the substitution of ingredients and addition of illicit active substances.</p> <p>Food safety risk assessment requires good data on consumption and composition of these supplements for risk assessment. Specifically, data is required on:</p> <ul style="list-style-type: none"> <li>• The frequency of consumption and intake of these supplements in 9 to 65-year olds.</li> <li>• Official/self-reported harmful effects associated with these supplements.</li> <li>• Composition, particularly the possible presence of illicit substances.</li> <li>• Toxicity of substances which exert a physiological effect that are included in food supplements.</li> </ul>

Research Area	Research Need
<p><b>Generate specific food consumption data on seafoods for children</b></p>	<p>Ireland’s seafood industry is expanding and has a significant impact on rural development. However, seafood consumption is not a frequent occurrence in Ireland and as such the data generated in the major food consumption studies (e.g. IUNA) do not deliver enough data on seafood consumption to enable accurate exposure assessments for food safety risk assessment.</p> <p>A recent report by the FSAI’s Scientific Committee on marine biotoxins highlighted the need for a specific food consumption survey on shellfish to better characterise the risk from exposure to biotoxins and other contaminants from consuming shellfish.</p> <p>A FIRM project (SCaRES) funded by the Department of Food and the Marine (DAFM) and carried out by University College Dublin (UCD) generated information of seafood (fish and shellfish) consumption in adults (age 18 plus).</p> <p>Similar detailed data is required for toddlers (12-35 months) and children (3-12 years). Particular attention should be paid to capturing consumption data on bivalve molluscs.</p>
<p><b>Use and consumption patterns of seaweed and halophytes in Ireland</b></p>	<p>Seaweed is a relatively underexplored source of human nutrition in Ireland, although there has been increased interest in recent years. Market research has indicated that the amount of seaweed-flavoured foods and drinks available in Europe has increased by 7% between 2011 and 2015, mainly due to the perceived health benefits of seaweed. In 2020, the FSAI Scientific Committee published a report on the ‘Safety considerations of seaweed and seaweed-derived foods available on the Irish market’. The report noted several gaps in information necessary to conduct risk assessment.</p> <p><i>Research needs:</i></p> <ul style="list-style-type: none"> <li>• Generate quantitative information about the direct consumption of seaweed and consumption of seaweed as an ingredient in other foods (not additives e.g. thickeners) in all age groups; 1 year to old age.</li> </ul>

Research Area	Research Need
	<ul style="list-style-type: none"> <li>• A survey on seaweed preparation techniques, coupled with information on how the consumed seaweed was obtained (foraged, purchased at farmer’s markets, purchased in health food shops, online or retail).</li> <li>• A study into the effects of food processing on the presence of harmful chemicals e.g. heavy metals should be conducted to allow for advice to consumers on how to minimise exposure to such chemicals.</li> <li>• A market survey in Ireland on the availability of edible seaweed species and halophytes will inform the need for risk management actions.</li> </ul>
<p><b>Codifying national food intake data in Food Ex2 food category system (EFSA)</b></p>	<p>This work needs to be undertaken to enable food and dietary intake habits to be considered in EU-wide programmes that aim to deliver a healthier food environment. It also enables EU wide risk assessment by the European Food Safety Authority (EFSA) which accounts for eating habits in Ireland. Currently only adult food intake data (IUNA) is codified to FoodEx2.</p> <p>Recent developments at global level (FAO/WHO) have resulted in the adoption of the FoodEx2 food intake categorisation systems. Without action to fund the codification of the rich dietary intake data sets available in Ireland for all age groups (including pre-schoolers, school children , teenagers and more recent adult surveys) the population of Ireland is missing out on EU and global programmes assessing risk from nutritional and food safety perspectives.</p> <p>In addition, without codifying to FoodEx2 the detailed dietary intake data available in Ireland for almost all age groups, will not be considered when establishing EU policy measures to reduce diet-related diseases.</p>

## Emerging risks and threats

Research Area	Research Need
<p><b>The availability and mining of open-source data to predict emerging food safety risks</b></p>	<p>The FSAI needs automated systems to identify signals of emerging risk in the food chain and present them in a dashboard for evaluation by experts as the first stage of an emerging risk identification system.</p> <p>The drivers of emerging risk can be categorised into the traditional PESTLE format: P for Political, E for Economic, S for Social, T for Technological, L for Legal, and E for Environmental. Any single driver can result in the emergence of a new food safety risk but more likely more than one combine to generate an emerging risk.</p> <p>When looking for emerging risks it is important to seek data that signals their emergence. Such data can be in a structured or an unstructured form and often need to be collated and combined before data analysis, to reveal patterns and correlations.</p> <p>Trade flows, weather patterns, media reports, social media exchanges and peer reviewed literature are all examples of data sources that can be used to seek signals of emerging chemical and biological risks to food. Insights into examples of emerging risks can be gained through the EFSA emerging risk exchange network reports <a href="http://www.EFSA.europa.eu">www.EFSA.europa.eu</a> .</p>
<p><b>Food chain vulnerability assessments</b></p>	<p>Since the horse meat incident of 2013, the authorities and the food industry have become more aware of the impact of food fraud. An industry level threat/vulnerability assessment is now a required feature of the supply chain. At a government level, vulnerability assessment is necessary to prioritise monitoring and surveillance activities and to understand the security of the food chain.</p> <p>There are key supply chains in Ireland, these should be mapped, and points of vulnerability established. Data monitoring and analysis approaches to signals emanating from vulnerable parts of supply chains should be developed for early warning purposes.</p>



Research Area	Research Need
	<p>Current priorities are the beef, pork, poultry and white fish product supply chains in Ireland. Please note that a vulnerability assessment on the Irish dairy chain has already been completed by contractors on behalf of the FSAI.</p>
<p><b>Development of methods to detect food authenticity issues relevant to Ireland</b></p>	<p>Food authenticity has become an increasing feature of consumer demand and industry focus. Methods to test ingredients and validate authenticity claims are important tools for industry and regulators.</p> <p>On methods development the following are examples of priority areas for further research:</p> <ul style="list-style-type: none"> <li>• Use of molecular methods to identify and quantify plant species in wet and dried mixtures of plants e.g. herbs, botanical supplements.</li> <li>• Metagenomic approaches for accurate geographical source identification of farmed shellfish, particularly mussels, to verify origin and growing site.</li> <li>• A reliable method or suite of methods for verifying the authenticity of Irish meat and fish e.g. Irish grass-fed beef, Irish farmed salmon to verify origin claims.</li> </ul>

## Food science and technology

Research Area	Research Need
<p><b>Reduction of fat, sugar and salt in consumer foods</b></p>	<p>Obesity and cardiovascular diseases are major threats to the health of the Irish population. Reformulation to improve the nutritional profile of food is an important long-term activity to combat these threats with a focus on reductions in calories, total fat, saturated fat, sugar and salt. Reformulation improves public perception of the food industry, addresses health issues without requiring behavioural change and facilitates nutritional claims which can lead to improved sales.</p> <p>Research should focus on the feasibility of producing food products that meet all reformulation targets set by the Department of Health i.e. total fat, saturated fat, sugar and salt across all food consumer foods categories, particularly in those foods considered part of a healthy diet.</p> <p>Reformulation should address all nutrients of concern in a product simultaneously i.e. reducing sugar at expense of fat and calorie content fails to achieve the healthier product outcome goal.</p> <p>Reformulation research on sugar should seek to identify practical options for replacement with nutrients containing much lower calorific value e.g. fibre, to ensure an energy reduction in the product as well as a reduction in sugar content. Such replacement options need to be rigorously researched to ensure safety for everyone in the population including children, those with fibre-sensitive conditions such as IBS and IBD. Research identifying potential adverse effects need to be quantified and include exploration of mitigating measures (e.g. warning labels etc.).</p>
<p><b>Future trends and food safety risks of synthetic biology in food production</b></p>	<p>Genetically engineered food and feed take desired genes from one organism and cut and paste them into another organism. Synthetic biology instead treats genes like computer code, remixing DNA sequences to create foods that are not seen in nature. Research has gained momentum with development of high-speed automation and the falling cost of gene sequencing and synthesis. Food is</p>

	<p>inevitably a target for the application of this technology to meet sustainability targets and the world food requirements of the future.</p> <p>However, as with many new technologies the food safety aspects are rarely addressed during the development phase. A report that looks at synthetic biology, its potential use in the food sector and the potential food safety aspects that considers research needs would be a very useful resource for Regulatory scientists.</p>
<p><b>Rapid traceability of fresh produce farm to retail</b></p>	<p>Fresh produce has been associated with an increasing number of food safety outbreaks worldwide. In Ireland, a definitive epidemiological link has never been established but available evidence suggests potential involvement of fresh produce. Fresh produce moves rapidly through the fresh food chain and the outputs of single farms can be incorporated into multiple products. Hence, contamination at source can affect many finished products and protection of public health relies on rapid traceability backward and forward through the chain to remove affected product from the market before consumption.</p> <p>At present traceability systems held in single companies that only list customers and suppliers cannot facilitate the speed of traceability and recall required for fresh produce. Consequently, research is needed to develop a whole of chain traceability system accessible by all parties and the competent authorities that will facilitate rapid identification and recall of unsafe fresh produce. Such a system should also be capable of incorporating food safety information regarding the foodstuff e.g. results of testing for biological/chemical hazards along the chain.</p>
<p><b>Safe land spreading of organic agricultural and organic municipal material</b></p>	<p>In 2008, the FSAI’s Scientific Committee published a comprehensive report on the food safety implications of land spreading of organic agricultural waste and organic municipal/industrial waste on land in Ireland.</p> <p>Today, data is still needed in the Irish context on the concentration of chemicals and the type, numbers, prevalence and survival of</p>

	<p>pathogens in organic agricultural and, in particular, organic municipal industrial materials used for land spreading in Ireland.</p> <p>A comprehensive review of the literature on mitigation measures to reduce identified hazards is required and any gaps in knowledge need to be addressed by suitable research studies.</p>
<p><b>Improvements in detection methods for chemical and biological hazards</b></p>	<p>Contaminants, residues and microbiological hazards in foods represent a threat to the sustainability of the food industry and to the health of consumers. There is a need for more accurate methods for detection of hazards, on-line methods for processing application and multiple hazard methods capable of simultaneously detecting a number of concurrent hazards in food. Methods need to be cheaper, simpler and faster to allow for product protection and use for hazard analysis critical control point (HACCP) verification and monitoring in the manufacturing plant.</p>

## Allergens

Research Area	Research Need
<p><b>Development of data for allergen risk assessment</b></p>	<p>Currently detection of any of the EU 14 list of allergens in foods leads to withdrawal and recall if unlabelled due to the application of the precautionary principle. The FSAI's Scientific Committee has published a scientific approach to risk assessment which looks to provide a scientific basis for a more proportionate approach whilst still protecting consumer health. One element of the risk assessment requires the application of reliable data on the prevalence of immune mediated reaction to the EU 12 (EU 14 minus gluten and sulphite) allergens.</p> <p>Research is required to provide an accurate baseline of prevalence of immune mediated reaction to the EU 12 (EU 14 minus gluten and sulphite) allergens in Ireland and a scientifically robust methodology to updating such data in a national register.</p>

## Chemical safety

Research Area	Research Need
<p><b>Development of rapid test kits for detection of mycotoxins</b></p>	<p>Consumer protection from the harmful effects of mycotoxins requires for good mitigation measures to prevent contamination on farm and during storage of plant-based foods and feed. At manufacturing level, it is important that supplies of these ingredients are safe at the point of delivery. It is expected with global warming that mycotoxin contamination of Irish crops will increase in the future as warmer but wetter weather prevails.</p> <p>There is a need for the development of affordable, reliable and portable testing methodology that can be applied at an early stage during food production and which provides rapid results for food businesses to protect their ingredient supply and use as part of HACCP systems to protect consumer health.</p>
<p><b>Development of new toxicological methods to address food safety concerns</b></p>	<p>Methods to assess the safety of chemicals are evolving, with a shift from solely end point-oriented studies to mechanistic and adverse outcome pathway studies. New approach methods, and in silico models are becoming more important with a view to provide faster assessments and reduce use of animals in toxicity studies. There is also a need to further develop methods to assess exposure to multiple chemicals.</p> <p>Research into the suitability and validation of such methods for regulatory risk assessment are needed.</p>
<p><b>The impact of the circular economy on food safety at farm and manufacture level</b></p>	<p>The desire to reutilise scarce resources and focus on valorisation of waste materials is driving the expansion of the circular economy in Ireland and abroad. Recent food incidents have highlighted the use of recycled materials in animal husbandry that have led to subsequent contamination of meat and milk with persistent organic pollutants. Similarly, inappropriate use of recycled materials (e.g. plastics recycled from electronics, etc.) could lead to contamination of food with contaminants leaching out of these materials e.g. flame retardants, plasticizers.</p>

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	<p>Recent research has indicated that PCBs, PBDEs, PCDD/Fs, PCNs and PFAS showed the highest potential transfer into animal tissue/organs in laying chickens and pigs when exposed to recycled material used as bedding or for environment enrichment or from exposure to land treated with fertiliser using recycled materials.</p> <p>Establishing prevalence and nature of use of recycled materials (e.g. plastics, board/paper, rubber, insulation, wood) on farms where they can be in contact with animals, coupled with research into chemical risks associated with particular recycling streams with regard to transfer into the final food and/or farm animal could inform interventions to minimise these risks.</p>
<p><b>Modelling and migration data of substances into foods from proposed/new food contact materials</b></p>	<p>Some categories of food contact materials are subject to specific requirements under EU regulations including migration limits to protect public health. Testing for migration is generally done in simulants. However, this is a fast-changing field of work and new materials are being proposed or are researched that may pose food safety risks as yet unknown. This is an issue for so called active and intelligent packaging.</p> <p>There are two major food safety issues that arise. Firstly, there is the more general issue of risk assessment which requires an understanding of the actual migration of the constituents of approved food contact materials into real foods. The second issue is the migration of potentially unsafe chemicals from these new and emerging food contact materials that may also include recycled plastics and board.</p> <p>Research is needed on recycled or compostable plastics, board and intelligent / active packaging to look at their potential food safety implications when in contact with food. Studies investigating the safety of emerging alternatives to plastic materials are also required to safeguard consumer health and build competence for regulators to evaluate these materials.</p>

Research Area	Research Need
<p><b>Influence of GAP and processing on mycotoxin prevalence in Ireland</b></p>	<p>There is some indication that differences in agricultural and processing practices employed within the cereal sector in Ireland can lead to considerable differences in prevalence and/or formation of mycotoxins in cereal grains.</p> <p>In light of climate change and the tightening of regulatory measures it is important to fully elucidate the importance of the various stages from field to fork on the formation of individual and co-occurrence of various mycotoxins.</p> <p>Research into the currently implemented agricultural (e.g. fungicide use) and manufacturing practices (e.g. cleaning, sorting and drying procedures), including intermediate transport and storage on formation of mycotoxins would help identify critical control points and support the development of codes of practice tailored to the Irish context.</p> <p>A survey on the prevalence and co-occurrence of mycotoxins (such as fusarium mycotoxins which are of relevance in the Irish context) in cereals grown and produced in Ireland could also be used to assess the exposure of Irish consumers to mycotoxins from Irish cereals.</p>
<p><b>Prevalence of natural toxins in Irish Horticulture Crops</b></p>	<p>Increased knowledge on the toxicological risks posed by naturally occurring substances (e.g. tropane, pyrrolizidine, opium, ergot and glycoalkaloids, erucic acid, cyanogenic glycosides) has led to implementation of several regulatory measures. There is therefore a need to establish the seasonal prevalence of these hazards in Irish grown crops and to develop valid and practical mitigation strategies, where required (e.g. GAP, variety development).</p> <p>Furthermore, the potential impact on the occurrence of plant toxins (which can originate from weeds) due to changing EU policies with regard to reduced use of pesticides and enhanced biodiversity needs to be examined.</p>

Research Area	Research Need
<p><b>Study on nitrates /nitrites to ensure product safety taking into consideration Irish production methods (e.g. injection/immersion curing of meat along with tumbling in some cases)</b></p>	<p>Nitrates (NO<sub>3</sub>) and nitrites (NO<sub>2</sub>) are chemicals that can be found naturally in our food and water. In nature, nitrates are readily converted to nitrites and vice versa. Nitrates and nitrites are currently authorised as food additives within the EU. These additives function as preservatives in food and they are both used extensively to enhance the colour, flavour and extend the shelf life of processed meats. Nitrite is considered the active curing ingredient responsible for the preservation of the food in combination with other ingredients, like salt. Nitrite also prevents the growth of a harmful bacterium called <i>Clostridium botulinum</i> and it may also have preservation effects on other harmful and spoilage bacteria. Nitrate, when added to food, converts to nitrite before exerting a preservative function.</p> <p>The use of nitrates and nitrites in food products must comply with the provisions set out in Annex II part E of <a href="#">Regulation 1333/2008/EC</a> on food additives which is in force since 1 June 2013. Two main nitrite and nitrate salt forms are allowed. These are sodium and potassium nitrite and sodium and potassium nitrate. These substances have been attributed E numbers (E250, E249, E 251 and E 252 respectively).</p> <p>Controls on nitrate and nitrite in cured meat products are generally based on the ingoing amount of the additives unless there is a specific derogation contained in the legislation for a particular product which permits levels to be based on residual amounts in the product e.g. Wiltshire cured bacon and ham and dry cured bacon and ham.</p> <p>The EU Commission has proposed reductions in the maximum permitted levels for these additives and as a result there are concerns among Irish industry about what impact this may have on cured meat products in terms of their stability and shelf-life particularly traditionally produced meat products.</p>



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	<ul style="list-style-type: none"> <li>• A study should be undertaken to assess the minimum amount of these additives that are required in order to ensure microbial safety and stability throughout the shelf-life of meat products whilst at the same time ensuring no unacceptable effects on colour. The extent of protection provided to cured meats against microbial growth has been attributed to many factors including the ingoing concentration of these additives, the residual nitrite concentration, the salt concentration of the product, the addition of sodium ascorbate or isoascorbate/erythroate, the heat treatment applied, the storage temperature, initial pH of the meat and the initial spore load of the meat.</li> <li>• This study should take into account a number of factors such as the size of the meat pieces cured, production methods (e.g. immersion, tumbling), shelf-life of the products and low salt meat products.</li> <li>• The study should also determine the residual levels of these additives for products to be placed on the market as new proposed legislation will now set levels on both an ingoing and residual basis.</li> </ul> <p>Nitrite in food (and nitrate converted to nitrite in the body) may also contribute to the formation of a group of compounds known as nitrosamines, some of which are carcinogenic. A study should assess the level of nitrosamine formation in different meat products based on the known amounts of added nitrites/nitrates and the variation that can occur within the same meat product type.</p>
<p><b>Risk of increasing paralytic shellfish poisoning events in Ireland - an important food safety concern</b></p>	<p>Since 2018, the potent neurotoxin saxitoxin (and its family of compounds known as paralytic shellfish toxins (PSTs)) which are responsible for the human illness syndrome, paralytic shellfish poisoning (PSP), through the consumption of contaminated shellfish, have been observed to be increasing in their abundance and geographical distribution and occurrence in Irish coastal waters</p>

Research Area	Research Need
	<p>leading to the contamination of shellfish in classified production areas.</p> <p>Originally confined to Cork Harbour since initial PSP monitoring began in the 1990's, the causative toxigenic and non-toxigenic species of the genus <i>Alexandrium</i> has recently been observed to be increasing all around the Irish coastline, usually resulting in no or very low PSP concentrations in shellfish. During the last two years, extremely high levels of PSP have been found in Castlemaine Harbour, approx. 3 times above EU recommended regulatory levels, resulting in prolonged closures and the prohibition of placing shellfish on the market. This has also led to a number of press releases to the public highlighting the dangers of the recreational harvesting of shellfish along the shoreline. This level of contamination was unprecedented and the highest PSP concentrations recorded since monitoring for PSP commenced in Irish waters, and there is a genuine concern that these PSP occurrences will increase on a more regular basis and in their geographical distribution.</p> <p>Aims-</p> <ul style="list-style-type: none"> <li>• A full-scale study into Castlemaine Harbour looking at the environmental conditions and physical dynamics which are leading to the increased PSP in-toxification events,</li> <li>• To conduct similar studies in other important areas of aquaculture, particularly those which are subjected to blooms of <i>Alexandrium</i> species, where little or no resultant PSP toxicity is observed</li> <li>• Assessing the risk of PSP events and human illness through recreational harvesting of shellfish along unmonitored coastlines</li> </ul> <p>This work would meet research gaps identified in the FSAI's Scientific Committee report '<i>The Occurrence of Marine Biotoxins and Risk of Exposure to Seafood Consumers in Ireland</i>'.</p>

Research Area	Research Need
<p><b>Emerging novel toxins in Irish waters - Characterising toxigenic benthic organism and their potential impacts due to climate change and on human health</b></p>	<p>The emergence of marine biotoxins in geographical areas where they have never been reported before is a concern of considerable impact on seafood contamination, and consequently, on public health. Several groups of marine biotoxins, in particular tetrodotoxins, ciguatoxins, pinnatoxin and palytoxins, are included among the relevant marine biotoxins that have recently emerged in several coastal areas in Europe. The majority of these novel toxins are produced by benthic species of phytoplankton where it is not known if they occur in Irish waters as the current phytoplankton sampling does not include benthic sampling, therefore these organisms could be present and pose a contamination risk to shellfish.</p> <p>Currently in Irish waters we are aware of a known shellfish toxin Diarrhetic Shellfish Poisoning isomer producing benthic organism, <i>Prorocentrum lima</i>. However, there are several other benthic species off coastal Europe which are classed as emerging novel toxin groups which are having an effect on human health through consumption of contaminated shellfish and fish, and it would be essential to determine their presence / absence in Irish coastal waters. Ciguatoxin (CTX), tetrodotoxin (TTX) and palytoxin (PLTX) are classed as neurotoxins, where TTX is grouped with the other potent neurotoxins.</p> <p>Aims-</p> <ul style="list-style-type: none"> <li>• Sampling programme using artificial substrate around Irish aquaculture producing areas for the collection of benthic organisms</li> <li>• Using molecular methods, qPCR, to detect the following known novel toxin producing species, <i>Gambierdiscus</i>, <i>Ostreopsis</i>, <i>Vulcanodinium</i> and their respective toxins from these substrates</li> <li>• Assessing the risk of these emerging novel toxin groups and their potential impact on human health to the Irish consumer and to Irish aquaculture</li> </ul>

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	<ul style="list-style-type: none"> <li>Benthic harmful algal blooms (HABs) seem to be following the trends of other harmful algal bloom species that are increasingly reported in both temperate and tropical regions. This increase may be due to more effective detection through improved observation and monitoring capacities, but also may be due to anthropogenic forcing and global climate change. These findings have implications for disease prediction, surveillance, and public health preparedness with warming ocean temperatures.</li> </ul> <p>This work would meet research gaps identified in the FSAI’s Scientific Committee report <i>‘The Occurrence of Marine Biotoxins and Risk of Exposure to Seafood Consumers in Ireland’</i>.</p>
<p><b>Monitoring of risks not common to Irish waters in light of climate change.</b></p>	<p>The potential impacts of a changing environment (via climate change or ballast water) leading to range expansion or alien introduction of non-native harmful algal blooms (HABs) and emergence of other potential contaminants (e.g. increased conversion of mercury to methylmercury and its bioaccumulation in aquatic systems driven by ocean warming and acidification) should be assessed.</p> <p>Long-term data for new and emerging toxins and contaminants should be collected and mitigation strategies put in place to protect consumers potentially exposed to such hazards through consumption of contaminated seafood or seaweed.</p>
<p><b>Develop a framework for a nutrивigilance System in Ireland</b></p>	<p>A nutrивigilance system is an adverse event reporting system that provides early signals of emerging chemical risks where foods or food supplements are reported to be causing harm in the community. The system builds capability around recording adverse events and systematically gathers food trends and risks to help protect consumers and the food chain.</p> <p>Nutrивigilance already exists in European countries and the concept is proven however, there is no nutrивigilance system in Ireland at present. There is evidence of poisoning incidents such as_wild</p>

Research Area	Research Need
	<p>mushroom poisoning, apricot kernel poisoning and the presence of illegal steroids in sports supplements. These are documented examples of poisoning events that have occurred in recent years in Ireland (FSAI, 2014-2019).</p> <p>As the range and diversity of foods increases to reflect factors such as changing consumer preferences, health considerations, consumer demographic shifts (the ageing population), rapidly evolving technology (3D printed foods), the demand for regionally or locally sourced food, the basis for risk in the food chain has grown enormously.</p> <p>The development of a framework for Ireland that articulates how to build a food risk reporting system, identifies partnerships and networks, defines the legal framework, governance structure, management system, data handling and personnel needed to operate the system would establish the foundations for a nutriviigilance system for Ireland. The costs of creation and maintenance of such a system should be included as part of a cost benefit assessment.</p>



**Food Safety Authority of Ireland**

The Exchange, George's Dock, IFSC,  
Dublin 1, D01 P2V6

T +353 1 817 1300

E [info@fsai.ie](mailto:info@fsai.ie)



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