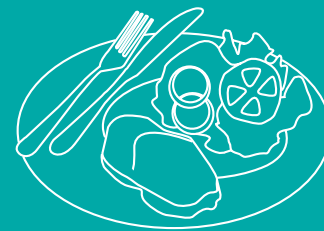
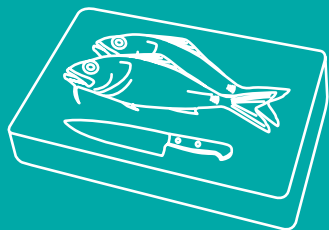


RESEARCH PORTFOLIO

2000—2005

Chemistry and Toxicology • Food Hygiene • Food Safety Knowledge and Risk Communication • Microbiology • Nutrition • Surveillance



RESEARCH PORTFOLIO 2000—2005

Chemistry and Toxicology · Food Hygiene · Food Safety Knowledge and Risk Communication · Microbiology · Nutrition · Surveillance

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Introduction

Purpose of the Research Portfolio

The **safefood** Research Portfolio 2000 to 2005 has been prepared to provide information, where relevant, the findings of research projects funded by **safefood** since its establishment in December 1999.

It describes, in broad terms, the research projects that **safefood** has commissioned since 2000 across key subject areas. This portfolio will be of interest to government agencies, research institutions, public health professionals and other parties across Ireland.

Who are safefood?

safefood, the Food Safety Promotion Board, was set up under the British–Irish Agreement Act, 1999. It operates under the brand name of **safefood**. Its headquarters are in Cork, with a sub–office in Dublin. However, it conducts its work on an all–island basis, and reports to the North–South Ministerial Council.

What do safefood do?

The governing legislation confers the following specific functions on **safefood**:

- promotion of food safety
- research into food safety
- communication of food alerts
- surveillance of foodborne disease
- promotion of scientific co–operation and laboratory linkages
- development of cost–effective facilities for specialised laboratory testing
- scientific assessment of the safety and hygiene of the food supply.

Although this document covers the research commissioned by **safefood**, this is only one aspect of our legislative remit with regard to research. **safefood** has responsibilities for food safety research on the island of Ireland as follows;

- Identifying priorities for research
- Commissioning and funding research projects
- Establishing a database of research programmes
- Disseminating research findings
- Recommending action arising from research findings
- Maintaining links with international research bodies.

Research policy in terms of our legislation

As described above, **safefood** has a legislative remit to carry out food safety research. **safefood** however does not consider this function in isolation but as an integral component of its primary function to ‘bring about general acceptance that responsibility for the provision of safe food is shared among producers, processors, distributors at all levels, caterers and the general public’. Promotion of food safety is targeted at the whole food chain and as a consequence, so is **safefood** research.

Backdrop to safefood’s research programme

Food safety has an enormous impact on both the welfare and economy of the island. Each year there are over half a million cases of gastroenteritis on the island causing considerable suffering and mortality, particularly among the frail and elderly. We inhabit a world characterised by significantly evolving lifestyle changes. The public demand foods to be free from chemical preservatives, be minimally processed, microbiologically safe, but at the

same time be convenient and have an extended shelf life. Issues such as new food products, emerging pathogens, antibody resistance, and an increasing variety of imported foods give rise to ongoing food safety challenges for the whole food chain.

The link between diet and health is well documented and nutrition has been highlighted as a key public health issue. Diet related diseases such as cardiovascular disease, type II diabetes, some cancers and nutritional deficiencies are the principal burden on European health care systems (EURODIET 2001). Overweight/obesity is one of the key public health concerns in Europe and constitutes a major risk factor in the development of diet related chronic diseases.

Against this backdrop, **safefood** has been charged with an exceptionally responsible role, to provide all responsible for the provision of safe food and the general public with the best, most up to date knowledge in relation to food safety, nutrition and diet.

safefood recognises that the information it provides must be well-informed and of considerable quality. The cutting edge science that uncovers emerging risks and hazards must be at hand for **safefood** to ensure that we can offer the very best advice to those entrusted with the production of food, the general public and government policy makers.

Scope of **safefood's** research programme

safefood's food safety research programme has been designed and structured to acquire and assimilate the necessary knowledge to support sound science-based policy decisions. The focus of the programme is to promote impartial, multidisciplinary science of acknowledged international status on issues relevant to food safety, diet and health and consumer sciences. **safefood** keeps abreast of international developments in relation to all

aspects of food safety. However, where necessary information is not already available from other sources, **safefood** has the capacity to commission research to address the issues.

Setting priorities for research

safefood research office serves **safefood** by looking outward and widely for guidance in setting priorities for research. The office in its analysis of emerging issues and horizon scanning, seeks and implements where possible advice and recommendations from the Scientific Advisory Board of **safefood** and the views of stakeholders. **safefood** Research Office adopts a comprehensive evidenced based approach that takes into account biological, physical, social, behavioural and ethical issues. The office collaborates with other agencies on the island and with food safety agencies abroad to ascertain future information needs. It also reviews the research portfolios of other European food safety agencies. This comprehensive evidence based approach allows **safefood** to provide complete and wide-ranging knowledge of food safety and nutrition issues affecting public health on the island. **safefood** may also have to commission research at short notice to address urgent issues.

Ensuring quality research

safefood always ensures that the scientific research it commissions is of the highest quality and is relevant to the general public across Ireland. Each research proposal is very thoroughly and robustly evaluated to ensure that it meets **safefood's** needs. **safefood** evaluates research proposals under a number of criteria, including relevance to the research call, quality of the science, experience of the researchers and realism of the research.

Most projects must incorporate a cross-border element. The aim is to increase interaction between workers within similar fields but to also encourage multidisciplinary interactions and increase the potential value of food safety research on the island.

safefood research programmes

safefood commissions and supports research through a number of different routes, such as:

- Open research calls for proposals on any aspect of food safety
- Focussed research calls for proposals on particular research themes, such as food safety communication, or for specific project areas
- Postgraduate fellowships scheme
- Community health and student placement research schemes
- Synergy Programme, which encourages collaboration between food control laboratories across Ireland
- **safefood** research networks.

safefood open and focussed research calls

Most of **safefood's** research has been commissioned in annual research calls. In more recent years, **safefood** has moved away from non-specific open research calls and has made calls for specific projects to meet identified requirements for research in specific areas. Between 6 and 8 large scale projects have been commissioned through this mechanism on an annual basis since 2000.

safefood postgraduate fellowship scheme

The **safefood** postgraduate fellowship scheme was established in 2002. The scheme was launched in recognition that **safefood** was moving away from open research calls towards calls for specific research requirements, but that **safefood** could still significantly benefit from a horizon scanning mechanism. The scheme was established with a broad base remit to encompass both science and social science disciplines in relation to food safety. It was hoped that the establishment of such prestigious awards would encourage good graduates to enter the field of food safety while at the same time acting as a cost effective means for **safefood** to support its food safety research. Between 3 and 5 fellowships have been awarded on an annual basis following open competition.

Research networks

safefood has 'a general remit to promote research into all aspects of food safety'. It was recognised that **safefood** research could be "more" than our own research portfolio and that the body could have an influence on food safety research activities throughout the island – particularly in the promotion of research in areas that **safefood** has identified as requiring action.

To this end, **safefood** established a number of research networks on specific food safety topics. All relevant individuals and organisations on the island have been invited to become members of the respective network. Initially, five networks were established on the following topics:

- Foodborne viruses
- Chemical residues
- *Salmonella*
- *Cryptosporidium*
- Verocytotoxin producing *E.coli* (VTEC).

These networks are intended to serve a number of purposes:

- To develop interdisciplinary and inter-jurisdictional relationships between researchers working on common research themes
- To generate awareness of ongoing research and surveillance activities on the island
- To generate awareness of research expertise, techniques and equipment available at institutions on the island
- To provide an opportunity for sharing and dissemination of research findings
- To ultimately encourage a more integrated and co-ordinated approach to food safety research.

Synergy Projects

safefood funds collaborative projects between food control laboratories through the Synergy Programme. This programme has two aims:

- To assist in filling gaps in the food safety system
- To promote scientific co-operation and laboratory linkages between food control laboratories.

The initiative is not aimed at the current regulatory activities within the individual laboratories, but rather at new projects. The results of these projects may be subsequently incorporated into a laboratory's routine activities.

Laboratories that share a common interest in a particular area of work may make a joint application to **safefood** for funding. A minimum of two partner laboratories are required and the duration of these projects is normally one year. The Synergy Programme is available

to all publicly-funded health, agriculture and marine laboratories on the island and **safefood** strongly promotes cross-border collaborative projects.

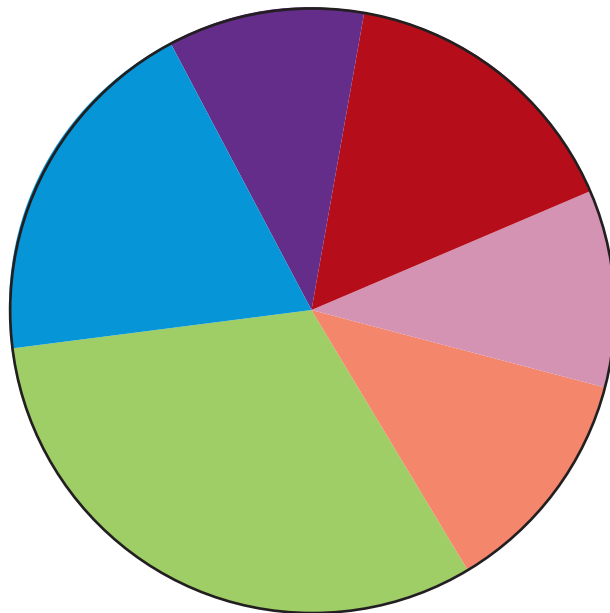
The Synergy Programme provides laboratories with an opportunity to engage in innovative projects that will broaden their expertise and services, and will facilitate technology transfer. The collaborative nature will ensure that the workload is spread and will enhance day-to-day laboratory interaction.

How **safefood** advertises for research proposals

safefood advertises its research calls on the **safefood** website at www.safefoodonline.com. Researchers are notified of any research calls by e-mail. The organisation welcomes any interested parties keen to receive updates to either contact **safefood** or log onto the **safefood** website and register their contact details for research alerts.

The research subject areas

Research projects funded to date can be categorised broadly into the following subject areas:



Research Area

Number of projects

● Chemistry and Toxicology	9
● Food Hygiene	6
● Food Safety Knowledge and Communication	7
● Microbiology	18
● Nutrition	11
● Surveillance	6

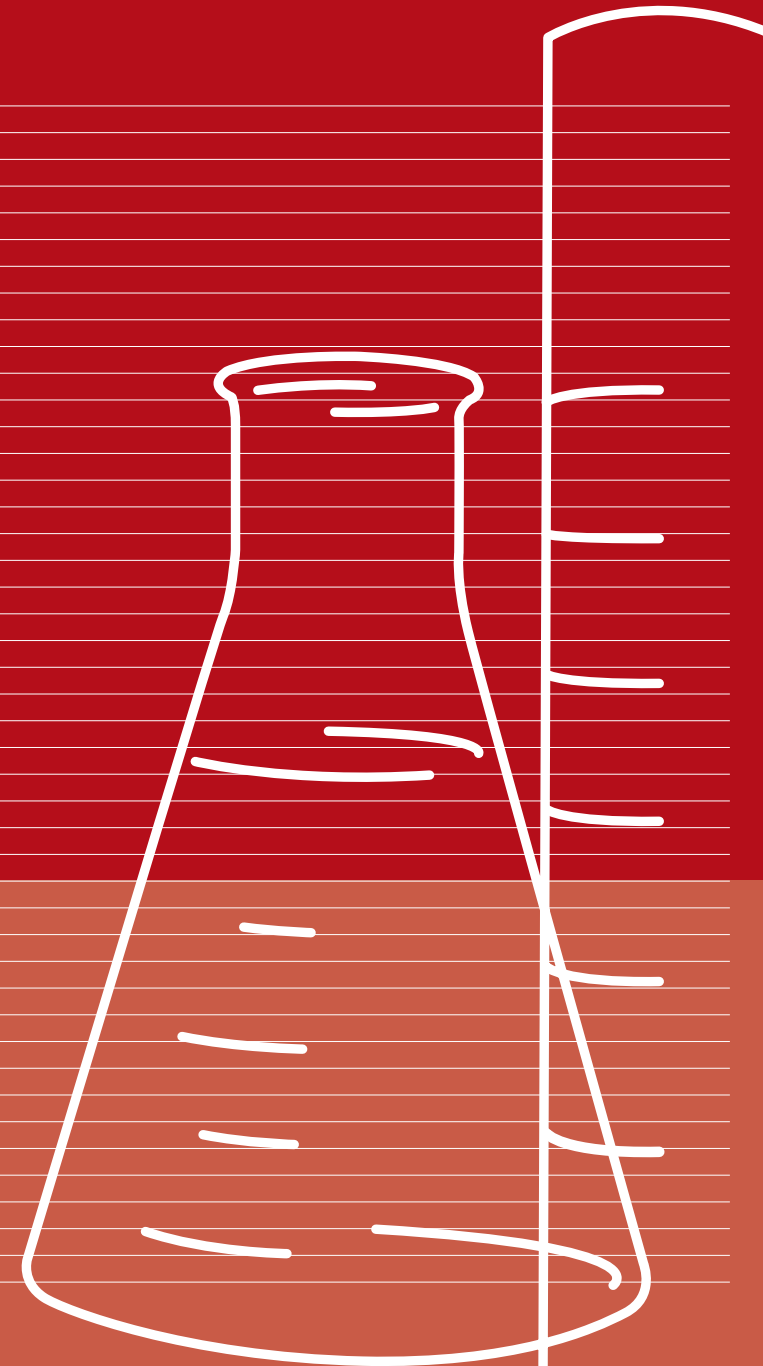
Figure 1: Number of **safefood** research projects by subject (2000 to 2005)

1

▼ Chemistry and Toxicology

The toxicological risk assessment of foods falls under the remit of **safe food** and, in particular, the identification of chemicals and natural constituents in food that affect sexual and reproductive development and act as endocrine disruptors and carcinogens. The toxicology of foodstuffs is an area with obvious implications for the health of individuals on the island of Ireland. However, it is also a very broad area, ranging from the toxic effects of pesticide residues to the potential endocrine disrupting effects of soya-based foods. Our toxicological remit also covers issues such as food allergies and hypersensitivity.

Public concern over the presence of residues, such as antibiotics and pesticides in food, has risen in the past few years. **safe food** has responded to this concern by supporting projects involved in developing appropriate and efficient analytical methods to detect the presence of food contaminants. This is vital in providing the island with appropriate methods to ensure that food safety standards are maintained. As well as replacing older, less sensitive and less efficient techniques, there is also a need to develop techniques to measure new food contaminants.



1.0 Poultry meat – improving food safety by improving chemical residue surveillance

Project code: 00-RESR-050

Research status: **Completed**

Poultry have a high susceptibility to a parasitic disease called 'coccidiosis'. Veterinary drugs (commonly known as 'coccidiostats') are routinely used in intensively-reared poultry. While they are very effective agents for this purpose, they are potent pharmacological agents and display marked cardiovascular effects. As a result, it is important for poultry and egg producers to prevent the residues of coccidiostats from emerging in food products.

This project involved the development of a suitable analytical test for the detection of ionophore drug residues in poultry. The project also aimed to involve and educate stakeholders within the poultry industry across Ireland. Guidelines for 'Prevention of Nicarbazin residues in broilers - a guide for the poultry industry' has been drawn up in consultation with the poultry industry and other stakeholders. Copies may be obtained by contacting **safefood**.

Researchers: Dr Chris Elliott, Queens University Belfast (QUB); Dr Michael O'Keeffe, Teagasc.

1.1 Development of a screening system capable of detecting a broad range of toxic and illegal drugs in red meat

Project code: 01-RESR-009

Project status: **Completed**

Clenbuterol (Angel Dust) has been the most widely abused drug in European farming over the past decade. It has caused more cases of chemically-derived food poisoning in Europe than any other substance. To prevent the misuse of this illegal drug, tests were developed in the 1990s to detect residues of clenbuterol in live animals and meat produce. However, at present there may be a wide array of illegal 'clenbuterol-like' drugs available to farmers on the island of Ireland that are undetectable by current analytical techniques. This is a major cause for concern.

The primary objective of this research was to use the recent advances in drug residue detection technology to develop a biosensor screening system that is capable of detecting a wide range of illegal drugs in red meat. The tests developed may be used to determine the level of this abuse across Ireland.

In the future, regulatory laboratories could potentially use these tests to deter the use of illegal growth promoters by unscrupulous farmers.

Researchers: Professor Richard O'Kennedy, Dublin City University (DCU); Dr Chris Elliott, QUB.

1.2 Food and a primary link to human cancer: Developing techniques to measure a potent carcinogen present in cooked foods

Project code: 02-PG-007

Project status: **In progress**

One of the research recommendations that emerged from the World Health Organisation (WHO)/Food and Agriculture Organisation (FAO) Acrylamide in Food Network was the need to develop simple, low-cost methods for routine monitoring of acrylamide. **saferfood** is sponsoring a research project on acrylamide, which involves the design of a rapid and accurate test for the carcinogen.

The researchers hope, over the next few years, to successfully design and produce two antibody-based tests for acrylamide that can be used over a wide range of foods and in every human blood type, giving accurate and rapid results. The aim is to make these tests available worldwide to aid in the understanding of acrylamide formation in food and the impact it really has on human health.

Researchers: Dr Chris Elliott, QUB.

1.3 Investigation of the presence of anti-nutritional and toxic compounds in health foods

Project reference: 04-RESR-03

Project status: **In progress**

There has been much concern surrounding the presence of natural toxins in health food products. Two groups of products have been particularly highlighted and are of particular concern. These are aristolochic acid which has been found in different Chinese herbal medicines and is known to be carcinogenic, mutagenic and cytotoxic and also blue-green algal products which are known to be hepatotoxic. Concern about these toxins has led to recent notification being issued by agencies such as Health Canada and the US Food and Drug Administration.

The principal objective of this project is to investigate the presence of aristolochic acids and the two main blue green algae toxins called microcystin and nodularin, in health products consumed on the island of Ireland. This project will develop state of the art analytical technologies. These technologies will then be applied in an all-island survey of Chinese medicines and health products available on the market, allowing the identification and the subsequent removal from the marketplace of potentially unsafe products.

Researchers: Dr Martin Danaher, Teagasc; Dr Andrew Baxter, Xenosense Ltd, Belfast.

1.4 Profiling for abuse of anabolic agents in meat production

Project reference: 04-RESR-06

Project status: **In progress**

The abuse of anabolic steroids in cattle production has been prevalent across Europe since the mid 1980s. These substances are used to increase the muscle mass of the animals and therefore make the carcasses more valuable at slaughter. In recent years, more sophisticated anabolic cocktails comprised of a mixture of potent hormones are being used. They are particularly difficult to detect because each individual hormone present is at lower levels. There have been a number of high profile cases of Police Service of Northern Ireland and Garda Siochana seizures of these illegal anabolic hormone cocktails on the island in recent times. This project will profile the abuse of anabolic agents in meat production. It will also include the development of a high throughput and rapid detection method to allow the targeting of cattle treated with anabolic agents. The project will also include a survey of the level of usage of such compounds on the island.

Researchers: Dr Chris Elliott, QUB, Dr Michael O'Keeffe, Teagasc.

1.5 Introduction and set-up of the BioDetection Systems DR-CALUX cell culture assay for the detection of dioxins in food

Synergy project

Project status: **Complete**

The DR-CALUX assay uses genetically modified animal cells to detect, both specifically and quantitatively, dioxin and dioxin-like PCB toxicity from a wide array of matrices, including foodstuffs. This assay detects dioxins based on their specific biological activity towards genetically modified living cells through light generation from the recombinant cells. The dioxin screen method was successfully set up in the Western Region Public Analysts Laboratory (WRPAL). A survey of 66 samples including meats, milk and dairy products, eggs, oily fish and fish oils, and other fats and vegetable oils was carried out using the new system, to ascertain the levels of dioxins in these food products. Researchers concluded that the quality of food available in Ireland in respect of their dioxin content is good. However, further sampling of suspect food types e.g. fish oils and foods from areas suspected to be 'hotspots' of dioxin contamination would also be prudent.

Researchers: Mr. Peadar Canavan, WRPAL, Mr. Michael Walker, Northern Ireland Public Analyst Laboratory (NIPAL).

1.6 Introduction and set-up of a High Performance Liquid Chromatography (HPLC) system for the detection and determination of preservatives, sweeteners, artificial colours and other additives and contaminants in specified foods

Synergy project

Project status: **Complete**

This project enables the food control laboratories to enhance their service provision. The aims were to provide reassurance to consumers with regard to food additives, explore practices in areas where abuses may be going undetected, and to enhance data capture, collation and distribution so that future areas of work can be better targeted and prioritised. During the project 121 samples of soft drinks were analysed for preservatives, sweeteners, artificial colours and other additives and contaminants. 8 samples were found to be adulterated, 103 were genuine with no adverse content and 10 attracted some criticism e.g. for labelling irregularities.

Researchers: Mr. Michael Walker, (NIPAL); Mr. Peadar Canavan, (WRPAL).

1.7 The quantification of genetically modified (GM) soya and maize in selected foods and authentication of meat in meat products using Real Time PCR techniques – an inter-laboratory collaborative study

Synergy project

Project Status: **In progress**

The aim of this inter-laboratory study is to determine, across the island of Ireland, the level of GM soya and maize in certain foods. It also aims to determine the extent of substitution or contamination of meat products by inferior meat species, in contravention of European food labelling legislation and in the interest of food safety and public health concerns.

It is a unique opportunity to establish a fully equipped DNA food testing laboratory facility, and to develop inter-laboratory co-operation in a rapidly developing analytical area.

Food samples will be taken from three different sites in the Republic of Ireland and in Northern Ireland, and will include 100 soya products, 60 products containing maize and 40 meat products. All samples will be analysed at the Cork Public Analyst Laboratory (PAL).

Researchers: Dr. Fred Davidson, Cork (PAL); Mr. Michael Walker, (NIPAL); Northern Ireland Food Liaison Group (NIFLG).

1.8 LC–MS–MS Method optimisation for determination of malachite and leuco malachite green in farmed finfish

Synergy project

Project status: **In progress**

This project addresses an important gap in food safety assurance in the marine finfish sector by developing and validating an LC–MS–MS method for screening and confirmation of malachite green and leuco–malachite green in farmed fish. Malachite green has been widely used as a fungicide and ectoparasiticide in the fish farming industry. Although an illegal substance, there is still evidence of use due to low cost, efficacy and lack of suitable alternative. The Food Safety Authority of Ireland has signalled its desire for greater capacity within Ireland to monitor for these substances in salmon. The output of this project will contribute to the overall consumer confidence in farmed finfish and will thus underpin the sustainable development of the €50 million Irish finfish sector. The new state of the art LC–MS–MS will provide rapid confirmation of positive screening samples, which will contribute to preventing contaminated seafood products reaching the market. Additionally it will assist in the efficient follow up investigation and possible prosecution of offenders using malachite green.

Researchers: Dr. Peter Heffernan and Dr. Evin McGovern, Marine Institute; Dr. Pascal Sanders, Agence Française de Sécurité Sanitaire des Aliments.

2

▼ Food Hygiene

safefood has had a multi-sector approach to food hygiene in the funding of research. As well as projects examining food safety in the home, food safety in both the catering industry and food production plants have been addressed. The overall aim of this programme is to assess the status of hygiene in these sectors and to provide tools to the industry for improving food safety.



2.0 Assessing the effectiveness of HACCP implementation and maintenance in food production plants

Project code 00-RESR-041

Project status: **Published**

Hazard Analysis Critical Control Point (HACCP) is now well established as a food safety management system which is capable of maintaining high standards of food safety in the production and distribution of food. The primary objective of this project was to assess the effectiveness with which HACCP was being implemented and maintained in food manufacturing plants across the island of Ireland.

In-depth audits of HACCP systems were carried out on-site at 44 food production companies across the island (equal representation from Northern Ireland and the Republic of Ireland). The majority (93%) of food manufacturing companies surveyed had HACCP systems in place that were rated average or good by the auditors. Some deficiencies were noted in the areas of hazard analysis, verification and maintenance. The audit team revisited six of the companies and there was evidence of significant improvement in these areas between visits. It was concluded that shortage of technical expertise was a key factor contributing to the deficiencies observed.

Researchers: Verner Wheelock Associates, Yorkshire.

2.1 Food safety knowledge, microbiology and refrigeration temperatures in restaurant kitchens on the island of Ireland

Project code 01-RESR-109

Project status: **Published**

Catering establishments such as restaurants, cafes and canteens are a major source of food poisoning outbreaks. The aim of the project was to identify hazards associated with food handling, storage, preparation and service in commercial catering premises throughout the island of Ireland. This was achieved through a microbiological survey, an audit of 100 catering establishments and a questionnaire survey of kitchen managers' current practices and food safety knowledge.

A number of key areas where catering establishments could improve hygiene and food safety practices were identified in the course of this study and appropriate remedial actions were recommended. The research report of this study is available on the **safefood** website at www.safefoodonline.com.

Researchers: Dr Declan Bolton, Teagasc; Professor Ian Blair, University of Ulster (UU).

2.2 Food safety knowledge, microbiology and refrigeration temperatures in domestic kitchens on the island of Ireland

Project code 00-RESR-102

Project status: **Published**

This project involved a survey of the incidence of a range of significant food poisoning bacteria, including *Salmonella* spp., *Campylobacter* spp., *Listeria monocytogenes*., *Aeromonas* spp. and *Escherichia coli* 0157, in the domestic refrigerators of households throughout the island of Ireland. It also incorporated a questionnaire survey to ascertain consumer food safety practices and knowledge.

The survey found that certain food poisoning bacteria were commonly present in domestic refrigerators: *E. coli* (6%), *Listeria monocytogenes* (6%) and *Staphylococcus aureus* (41%). The questionnaire revealed that 78% of people did not know that the correct operating temperature for their fridge should be between 1–5°C.

The findings of this project were used to enhance **safefood** communication to support advertising campaigns on fridge hygiene and the use of fridge thermometers. The results of this survey are available as a report on the **safefood** website at www.safefoodonline.com.

Researchers: Dr Declan Bolton, Teagasc; Professor Ian Blair, UU.

2.3 Assessment of the standards of food hygiene observed in household kitchens on the island of Ireland. The benefits of providing practical food hygiene instruction and food safety kits

Project code 01-RESR-112

Project status: **Completed**

Poor food-handling and hygiene practices in domestic kitchens are thought to be the cause of a significant number of cases of foodborne illness. However, there is insufficient information on how food is prepared in the home and how hygienic household kitchens are. This pilot survey was commissioned by **safefood** in order to investigate the standards of hygiene observed in domestic kitchens across the island and to obtain information about the consumers' knowledge of food safety issues. An extensive questionnaire was completed by 150 householders across the island of Ireland.

The project also assessed the impact of providing the household with information and advice on the best ways to prepare, cook and store food. The project team made two visits to households, six to eight months apart, and compared the hygiene practices at each visit.

This study was a detailed qualitative rather than a quantitative study. The useful data that this study generated provided **safefood** with information to advance its communication strategy. The study confirmed the general impression of ignorance amongst householders about the relationship between food hygiene and illness, and it demonstrated that food-handling practices in the domestic kitchen could be improved by providing basic scientific information and reference guides.

Researchers: Ms Anna Brooker-McCormack, Jean Cahill, Dublin Institute of Technology (DIT); Amy Burns, Adele Dunn, NI Catering College.

2.4 Temperature abuse in retail outlets

Project reference 04-RESR-11

Project status: **In progress**

safefood has previously conducted research on temperature abuse both in the home and in catering establishments. This project is designed to supplement this work by examining temperature abuse at retail level. Temperature abuse in conjunction with poor operational practices are the dominant factors in the mishandling of chilled food which often results in foodborne disease outbreaks. As the food service industry handling of perishable foods continues to grow significantly, compliance and safety of temperature-critical practices, namely chill storage, is essential in ensuring a safe food. The equipment scaling, maintenance and day-to-day operation are important factors to be controlled if microbial risks are to be minimised.

The key areas which this project will target are the control and abuse of refrigeration and freezing in retail premises to include: fitness of equipment for the purpose and volume, defects in equipment and suitability of its position, maintenance and cleaning programmes, temperature monitoring, loading and stock rotation, staff responsibilities and training. The project will involve a survey and risk assessment and work closely with Environmental Health Officers in Northern Ireland and Republic of Ireland. Information gained will be used to drive **safefood** safe storage campaign at retail level and assist the environmental health service in discerning risks and targeting inspections at retail level.

Researchers: Dr Nissreen Abu Ghannum; Dr Jesus Frias, DIT.

2.5 Persistence and dissemination of *Salmonella* and *Campylobacter* in domestic kitchen environments

Project reference 03-RESR-013

Project status: **In progress**

A considerable proportion of foodborne illness is acquired from food prepared in domestic kitchens. This is often due to unsafe food production, storage and service practices, and result in cross-contamination with pathogenic microorganisms. There is limited information available on where and how food pathogens survive in kitchens, how they adapt and which subsequent food preparation activities are most important in transferring these pathogens to food.

This study will generate information on the survival, adaptation and spread of two major pathogens, *Salmonella* and *Campylobacter*, in kitchens. The resulting information will lead to better advice on safe food preparation and kitchen activities for consumers, which will reduce the risk of exposing themselves or their families to foodborne illness.

Researcher: Professor David McDowell, UU

3

▼ Food Safety Knowledge and Risk Communication

This programme of research recognises that food safety knowledge, intention and perceptions do not necessarily result into good food safety behaviour. It is hoped that the results of this groundbreaking research will provide **safe food** with the necessary tools to tackle difficult lifestyle issues and persistent food safety public health concerns. Much of this research has been specifically targeted at those 'at risk' groups such as low-income sectors of the population, teenagers and young children.

The outcomes of this research will also help provide mechanisms for communicating probability. Probability risk communication is a recognised hurdle for public health specialists, and the experiences of communicators in dealing with issues such as Foot and Mouth and Genetically Modified Organisms (GMOs) will be scrutinised to identify best practice.

3.0 The development of a risk communication model, based upon food safety behaviour in the home, to facilitate adoption of best practice in disseminating information with a food risk component

Project code: 01-RESR-043

Project status: **In progress**

The primary aim of this project is to map the factors that influence food safety behaviour in the home. This will allow the prediction of consumer's response to communications with a food risk component and will lead to the production of a risk communication model and best practice guidelines for risk communication messages.

The project involves the production of a 'food diary' by primary school children across the island of Ireland. This allows the collection of descriptive accounts of 'normal' food safety practices within the home environment. Following this, a novel multimedia approach has been developed to assess the target group of consumers' ability to cognitively recognise food risk, thereby indicating their likely behaviour in the home. The target groups include consumers in general as well as the parents of children who participated in the food diary study.

Both urban and rural populations across the island are being studied in parallel, in order to highlight potential regional differences. Risk communications may need to be adapted depending upon the target audience. The resulting model will help educators, policy makers and industry representatives to develop risk communications that strive to eliminate or minimise the negative impacts that these messages often create, which will improve consumer protection as a result.

Researchers: Dr Roy Nelson, Loughry College; Dr David McCleery, QUB; Professor Jim Phelan, University College Dublin (UCD).

3.1 Novel strategies for food risk communication

Project code: 02-RESR-018

Project status: **Completed**

The principal aim of this project was to develop new strategies for food risk communication. The project team conducted an in-depth analysis of the consumer's understanding of scientific messages that relate to a variety of food risk issues. The project also examined the potential barriers to effective risk communication and assessed differences in the understanding of food safety and nutrition messages across various demographic groups.

This project specifically aimed to address the needs of vulnerable social groups, such as low-income sectors of the population. The results of this survey are available as a summary on the **safefood** website at www.safefoodonline.com.

Researchers: Dr Mary McCarthy, Dr Alan Kelly (UCC); Mary Brennan, Prof Christopher Ritson, University of Newcastle.

3.2 Communicating the healthy eating message: Use of an interactive multimedia CD-ROM for the prevention of obesity in eight to nine year old children

Project code: 02-RESR-009

Project status: **Completed**

Rates of paediatric obesity are increasing and the recent Northern Ireland ‘Young Hearts’ project found that boys and girls aged 12 are approximately 5% heavier than they were 10 years ago. Inappropriate food choices play a major role in the cause of childhood obesity. There is an urgent need to develop novel, effective, positive and personally relevant communication strategies to improve the dietary habits of children, especially at a time when their own individual attitudes towards food are being formed.

The overall aim of the study was to design, develop, pilot-test and evaluate a multimedia CD-ROM for communicating healthy eating messages to eight and nine year old children. The design was based on feedback from storyboard testing with children. The approaches used to develop the CD-ROM were based on the teaching practices of social learning theory, which combines increased knowledge about food and nutrition with other spheres of influence such as the environment, personal attributes, behavioural skills and experience.

It is anticipated that the CD-ROM approach will help children to develop a positive relationship with food, which could make an important contribution to reducing the proportion of children who will become overweight or obese as adults. **safefood** hopes to evaluate and subsequently disseminate this CD to schools.

Researchers: Professor Barbara Livingstone, Dr Anne Moran, UU.

3.3 Factors influencing the efficacy of food risk and dietary communications directed at young people

Project code: 02-RESR-003

Project status: **Published**

There is little data available on the way young people perceive food hazards, or on the way that their perceptions relate to their behaviour. This group are of particular importance in achieving large-scale changes in behaviour and attitudes towards food hazards and nutrition. They are agents for change in their households and are the next generation of adult consumers.

The main objectives of this project were to assess the extent to which young people (aged between 13 and 16 years old) understand the range and nature of key food-related hazards, and to identify any significant gaps in their basic knowledge of these hazards. The project investigated the relationships between perceptions, intentions, and behaviour, together with the key sources of influence on their perceptions of food risk. The barriers (psychological, social and economic) that hinder young people’s understanding of food risk messages were investigated to allow the development of an effective food risk communication strategy directed at this key age group. The outcome of this research is published as a report on the **safefood** website at www.safefoodonline.com.

Researchers: Dr Karen Trew, Dr Orla Muldoon, QUB; Dr Julie Barnett, University of Surrey; Prof Glynnis Breakwell, University of Bath.

3.4 Food safety education: a cross-border, comparative study of food risk perception in post-primary schools and the development of a model for implementing effective curricular change

Project code: 03-PG-015

Project status: **In progress**

Young people's food risk perceptions are of interest to educators, health promoters, food policy makers and the food industry, as dietary habits established at this stage are often carried through into adulthood. This project seeks to examine, both qualitatively and quantitatively, how food risk perceptions in young people might differ from those of the 'stakeholders' in order to identify information needs for the post-primary age group.

The ultimate aim of the project is to develop a model of food safety perceptions and information needs, with a view to curricular change and management that will be informed by a range of opinions, including the opinions of young people themselves.

Researchers: Dr Michael Strain, Dr Barbara Stewart-Knox, Ms Dorothy Black, UU.

3.5 Food poverty in Northern Ireland

Project reference: 04-RESR-01

Project status: **In progress**

There is a growing awareness of food and nutrition as determinants of short and long term public health. The quality and quantity of food intake is a contributory factor in the main causes of morbidity and mortality. Poverty, of which food insecurity is a key component, compromises an individual's ability to acquire an adequate and nutritious diet. Barriers to dietary improvement are diverse, ranging from issues surrounding affordability, access and psychosocial factors.

The project aims to determine the nature and extent of food poverty in Northern Ireland with a view to developing policies and practical initiatives to tackle the issue and increase awareness of the importance of food and nutrition from a low-income perspective. It is hoped that this project will heighten awareness at both strategic and operational level of the issue of food poverty and the implications for public health.

This work will also assist in informing other key policy areas which **safefood** is currently engaged in, such as the development of an all island Food and Nutrition Forum and the Working Group on Food and Nutrition Strategy.

Researchers: Gary McFarlane, Northern Ireland Public Health Alliance (NIPHL); Kim Willis, Chartered Institute of Environmental Health (CIEH); Jorun Rugkasa, Institute of Public Health in Ireland IPH, Harold Harvey, UU.

3.6 A systematic review of the effectiveness of social marketing models in communicating nutrition and food safety messages

Project code 03-RESR-017

Project status: **Completed**

A rigorous, systematic review of the literature in relation to models of social marketing has been carried out. It examined both national and international research and critically evaluated the best models for communicating nutrition and food safety messages.

The key objectives of this project were to identify the most effective methods to positively impact on knowledge, perception and behaviour, and to make recommendations for further research based on the reviewed material. The report will shortly be published to the **safe food** website.

Researchers: Prof Gerard Hastings, University of Strathclyde; Dr Mike Rayner, University of Oxford.

4

▼ Microbiology

The main objective of this area of research is to increase our understanding of both how and where pathogenic microorganisms enter the food chain, their prevalence and their distribution. The research also examines the means for controlling and preventing such pathogens. The **safefood**-funded report 'Acute Gastroenteritis, North and South - a telephone survey' highlighted the scale of this problem, showing up to half a million people suffering from gastroenteritis each year. The information provided by this programme of research will be useful in addressing the need for further research in this area and for developing strategies for increasing microbiological food safety.



4.0 Development of rapid tests for the detection of *Mycobacterium avium* subsp. *paratuberculosis* (MAP) and their use to determine survival in food matrices

Project code: 00-RESR-060

Project status: **Completed**

This large-scale project was funded by **safefood** in collaboration with Food Institutional Research Measure (FIRM). The principal aim of the project was to develop novel rapid methods for the detection of MAP in faeces, milk and other dairy products, although other aspects of MAP were studied.

The development of real-time Polymerase chain reaction (PCR), monoclonal antibody-based Enzyme-Linked Immuno-Sorbent Assay (ELISA) and Ribonucleic Acid (RNA)-based (Reverse Transcripts (RT) – PCR and Nucleic Acid Sequence Based (NASBA) detection methods were principally investigated. High risk herds from the register of the Department of Agriculture and Food (ROI) were selected for the study. A survey of faeces and milk from these animals was completed using both culture based and molecular detection methods to determine the prevalence and distribution of MAP. The effect of different pasteurisation conditions on survival of MAP in milk was also investigated as part of the project.

Researchers: Majella Maher, National University of Ireland, Galway (NUIG); Dr Michael Rowe, QUB; Dr Colin Hill, UCC; Dr John Egan Central Veterinary Research Laboratory Abbotstown (CVRL); Dr Pat Murphy, Teagasc.

4.1 Detection and molecular characterisation of selected pathogenic organisms isolated in unpasteurised milk using milk filters

Project code: 00-RESR-046

Project status: **Completed**

Consumption of raw milk by farm families is not advisable due to the risk of pathogenic microorganisms being present, although the practice still continues.

As well as completing a questionnaire survey of raw milk consumption by farm families, this study determined baseline values for the incidence of a number of pathogens in unpasteurised milk from 100 commercial dairy herds located in County Cork. These pathogens, which included *Mycobacterium avium* subsp. *paratuberculosis* (MAP), *Verocytotoxigenic Escherichia coli* (VTEC), and *Salmonella* species, were identified by testing in-line milk filters.

The survey revealed that 67% of families on the farms studied regularly consumed raw milk. MAP, *Salmonella* spp. and VTEC were isolated from milk filters on some of the farms providing clear evidence that farm families are exposing themselves to potentially harmful microorganisms by consuming unpasteurised milk.

MAP is a bacterium that causes Johne's disease in cattle and is also a possible cause of Crohn's disease in humans. Finding MAP in milk filters from several of these Cork farms, which had no prior history of clinical Johne's disease, raised concerns that there may be sub-clinical Johne's disease in some of the dairy herds. This possibility warranted further veterinary investigation of the suspect dairy herds and further work was commissioned by **safefood** (project 03-RESR-001).

Researchers: Jim Buckley, Cork County Council (CCC); Dr Michael Rowe, QUB; Professor Seamus Fanning, UCD.

4.2 Epidemiological assessment of *Mycobacterium avium* subsp. *paratuberculosis* (MAP) in target Munster herds

Project code: 03-RESR-001

Project status: **Completed**

In the course of a survey of in-line milk filters from dairy farms in County Cork (**safefood** project: 00-RESR-046), a number of herds were identified as potentially infected by MAP, despite the fact that these herds had no history of Johne's disease. Further research was commissioned by **safefood** to carry out a follow-up veterinary investigation of the suspected MAP-positive herds.

The objectives of this research were:

- Validate the use of milk filters as a cost-effective, reliable method for screening dairy herds for the presence of MAP
- Identify the critical risk factors for the potential of MAP infection to spread between and within herds on milk production holdings by testing milk filters, bulk tank milk, bloods from individual animals, water sources and rabbit faeces from the suspect farms
- Recommend practical control measures to the farmers concerned in relation to herd health, herd management, hygiene practices and environmental standards.

Researchers: Jim Buckley, CCC; Dr Michael Rowe, QUB; Prof Seamus Fanning, UCD; Dr John Egan, CVRL.

4.3 A comparative study of thermophilic *Campylobacter* isolates of clinical and food origin using genotypic and antimicrobial characterisation techniques

Project code: 00-RESR-086

Project status: **Completed**

Campylobacter spp. is the most common cause of bacterial gastroenteritis in humans worldwide. Epidemiological data on the diversity and distribution of strain types within human populations across Ireland is limited, as is any information relating to *Campylobacter* isolates from foods.

The principal objective of this project was to examine the genotypic profiles of thermophilic *Campylobacter* isolates obtained from retail food samples in three population centres – Dublin, Galway and Belfast. Once isolates were collected, the project determined the levels, species, biotypes, antibiotic resistance patterns and genotypes of *Campylobacter* spp. found in food samples, and in clinical samples obtained in the three areas allowing effective comparisons. This project also included an examination of the role of companion animals in the transmission of this infectious agent.

This research aimed to establish whether specific strains isolated from foods are responsible for human gastroenteritis cases across Ireland enabling public health professionals to make appropriate recommendations to control *Campylobacter* infection. A summary report of this research is published on the **safefood** website www.safefoodonline.com.

Researchers: Dr Paul Whyte, Professor Dan Collins, UCD; Dr Cyril Carroll, NUIG; Dr Eleanor McNamara, Cherry Orchard Hospital (COH); Dr Bob Madden, QUB; Dr John Moore, Belfast City Hospital (BCH); Prof Martin Cormican, University College Hospital Galway (UCHG).

4.4 Surveillance of dairy herds for emerging pathogens

Project code: 04-RESR-13

Project status: **In progress**

This project involves surveillance and monitoring of milk production holdings (bovine, ovine and caprine) supplying milk for farmhouse cheese production. The monitoring programme is being carried out during a number of seasonal cycles in order to establish baseline data on the prevalence and characteristics of the following key pathogens; *Salmonella*, *Campylobacter*, *Listeria*, *Enterobacteriaceae*, *Staphylococcus aureus* and *Mycobacterium avium paratuberculosis*.

The information generated will provide key information which can be applied for risk assessment and epidemiological investigations in particular with regard to the food safety risks associated with unpasteurised dairy products. **safefood** is funding this project collaboratively with the Food Safety Authority of Ireland (FSAI).

Researchers: Jim Buckley, CCC.

4.5 Development of a harmonised system for approval and monitoring of private laboratories testing foodborne pathogens

Project code: 00-RESR-105

Project status: **In progress**

This project aims to develop an agreed protocol for approving and monitoring the testing of foodborne pathogens in private laboratories. The project has organised a number of all-island inter-laboratory proficiency testing trials, as well as the development of a database of *Salmonella* tests and the compilation of a collection of isolates. It is also hoped that this database and collection will be extended to include other bacteria, if feasible.

Researchers: Dr John Egan, Dr Paul Rafter CVRL, Dr Stanley McDowell, Veterinary Science Division (VSD), DARD-NI, Dr Nola Leonard, UCD.

4.6 Use of high pressure to improve safety and quality of shellfish

Project code: 01-RESR-105

Project status: **Completed**

The aim of this project was to study the potential use of a relatively novel food processing technology called 'high pressure processing' (HPP) by the sea food industry across Ireland. The project investigated the effect of HPP on the inactivation of different strains and species of *Escherichia coli* and *Listeria* spp. and viruses in shellfish, such as mussels and oysters. It extensively examined the impact of HPP on the sensory quality and shelf life of shellfish.

HPP should result in a stable product that has all the flavour and character of the fresh raw food, but has a greatly extended shelf life and is safer to eat. Results of this project are being disseminated to the sea food industry across Ireland and are also available from **safefood**.

Researchers: Dr Alan Kelly, UCC, Dr Margaret Patterson, QUB.

4.7 *Arcobacter* spp. in retail foodstuffs in Ireland: optimising isolation procedures and an investigation of their genetic relatedness.

Project reference: 04-PG-17

Project status: **In progress**

Arcobacters have been historically associated with veterinary diseases, notably abortion and or other reproductive disorders. More recently however, *A. butzleri* and *A. cryaerophilus* have been recognised as human foodborne pathogens, most commonly associated with gastroenteritis, but also with cases of septicaemia. The lack of standardised detection techniques and the fact that *Arcobacter* isolation is not a routine hospital laboratory procedure has hindered accurate assessment of association of *Arcobacter* with human illness.

This project will optimise isolation procedures for *Arcobacter*. The latest genotyping methods will be applied and the genotype distribution assessed. These procedures will then be used to examine the contamination of foodstuffs.

Researcher: Dr Robert Madden, QUB.

4.8 Incidence and survival of potential human pathogens in the production of the common cultivated mushroom (*Agaricus bisporus*)

Project code: 02-PG-029

Project status: **In progress**

This project is investigating the prevalence and potential risk of human pathogenic bacteria in cultivated mushrooms. Bacteria play an important role in the production of the mushroom fruiting body. However, other microorganisms that cause mushroom disease are still prevalent, despite prevention and control procedures. This gives rise to concern that microbes, which are harmful to humans, may also be present on mushrooms at retail level.

This research is especially timely considering the increase in availability and consumption of 'ready-to-eat' vegetables.

Researcher: Dr Patrick Naughton, UU.

4.9 *Listeria monocytogenes* in low pH foods: an examination of the influence of food constituents on survival and gastric transit

Project code: 02-PG-031

Project status: **In progress**

The ability to tolerate highly acidic environments enhances the potential for the growth of *Listeria monocytogenes* in low pH foods, and permits survival during transit through the stomach. One mechanism that the bacterium uses to survive under such conditions is the 'arginine deiminase system'. This is a three-enzyme pathway that liberates ammonia from arginine, resulting in an increase in intracellular pH. This enables the cells to survive at otherwise lethal pH levels.

During the course of this project, it is intended to examine the extent to which arginine and other food constituents play a role in the survival of *Listeria monocytogenes* in low pH foods. The project will also investigate the role of these protective systems in determining the infectious dose of this important foodborne pathogen.

Researchers: Dr Cormac Gahan, Dr Colin Hill, UCC.

4.10 Genetic analysis of resistance to detergents and industrial cleaning solutions in *Listeria monocytogenes* growing as planktonic cells and biofilms

Project code: 03-PG-009

Project status: **In progress**

Listeria monocytogenes continues to be a significant threat to the food industry on the island of Ireland. Investigation of several outbreaks of listeriosis worldwide has indicated that the contamination appears to have occurred from a persistent source of the pathogen in the food manufacturing plant that survived industrial cleaning protocols.

The objective of this project is to identify the genes involved in the resistance of planktonic *L. monocytogenes* cells to detergents and industrial cleaning agents. Mutants exhibiting reduced detergent resistance will subsequently be analysed for detergent resistance in biofilms. In addition, the correlation between detergent and bile resistance will be investigated to test the hypothesis that industrial detergents may select for bile resistant strains of *L. monocytogenes* in the food-processing environment.

Researchers: Dr Cormac Gahan, Dr Colin Hill, UCC.

4.11 A study of the factors controlling the survival, germination and outgrowth of *Bacillus cereus* in rice-based model foods using novel rapid flow cytometry methods and biochemical markers

Project code: 03-PG-011

Project status: **In progress**

The consumption of takeaway meals and cooked chilled foods containing rice is popular nowadays. The main pathogen associated with cooked rice is *Bacillus cereus*, which can cause emetic or diarrhoeal food poisoning. It poses a food safety hazard because of its ability to exist as dormant spores and sub-lethally injured vegetative cells after cooking.

In this project, a novel flow cytometric method for detecting *B. cereus* will be developed, capable of rapidly identifying and enumerating viable and spore-forming cells. This method will subsequently be used to assess the impact of various processing, storage and cooking regimes on the survival and reactivation of *B. cereus* in a rice-based food system.

The information generated from this project will assist **safefood** in the development of guidelines and codes of practice for manufacturers, caterers and consumers.

Researcher: Dr Martin Wilkinson, University of Limerick (UL).

4.12 Identification and characterisation of antibiotic resistance genes in poultry meat

Project code 03-PG-022

Project status: **In progress**

Bacteria containing transferable antibiotic resistance genes found in the gastrointestinal tract of animals can pose a potential threat to food safety. The rise in antibiotic resistance will result in this threat being increased.

This project will use a bioinformatics approach to analyse published data relating to the occurrence of antibiotic resistance genes in poultry meat across Ireland. It will allow the project to identify the most commonly occurring antibiotic resistance genes. Primers will be developed that target specific resistance genes, and a survey of poultry meat from producers and retailers across Ireland will be carried out.

The information generated by this project should provide sufficient preliminary information to support the development of an innovative DNA micro-array assay for the detection of antibiotic resistance genes in poultry meat.

Researcher: Dr Patrick Naughton, UU.

4.13 Development of a risk assessment model for *Salmonella* in shell eggs and processed eggs in Ireland

Project code: 03-RESR-005

Project status: **In progress**

Over the past two decades, *Salmonella Enteritidis* has become prominent as a significant cause of human infections, with hens' eggs being recognised as a principal source of the organism. This project will investigate the effect of the vaccination of layers and the application of Quality Assurance (QA) schemes on the risk of human infection with *Salmonella* spp. from the consumption of eggs and processed liquid egg produced in Ireland.

An extensive survey of a representative sample of shell eggs and processed liquid eggs from both Northern Ireland and the Republic of Ireland will be undertaken. This will provide data on the prevalence of *Salmonella* spp. in eggs across Ireland. Data from this survey will be used to develop two quantitative Microbiological Risk Assessments, one for Northern Ireland and one for the Republic of Ireland. These will estimate the risk posed by this food product in the two jurisdictions to human health. They will also facilitate comparison of the effect of different risk reduction strategies, such as vaccination in layers versus non-vaccination, and QA schemes versus non-QA, without the need for experimental studies. The results of this study will inform policy decisions and advise the egg industry on the island on appropriate risk control measures to protect the consumer from exposure to *Salmonella* from eggs.

Researchers: Dr Robert Madden, QUB, Prof Seamus Fanning, Dr Paul Whyte, UCD; Dr Louise Kelly, Uni of Strathclyde.

4.14 Occurrence of *Salmonella* on pork on the island of Ireland and an assessment of the risk factors contributing to its transmission

Project reference: 04-RESR-08

Project status: **In progress**

Salmonella species have been consistently associated with food borne illness and are the second most common cause of bacterial food borne illness. Pork has now taken over from eggs as one of the most important food borne sources of *Salmonella*. Outbreaks of *S. Typhimurium* DT104 in Dublin (1998) and the West of Ireland (2000) linked to cooked ham resulted in 78 people and 140 people becoming ill respectively.

In the Republic of Ireland and Northern Ireland, two different approaches are taken to the control of *Salmonella* in pigs. In the Republic of Ireland, every pig herd is tested on farm on a quarterly basis to establish its *Salmonella* status. The category status assigned determines the treatment at slaughter and affects the need for further treatment or the destination of the meat. In Northern Ireland, there is no statutory requirement for *Salmonella* testing in pork. There is a voluntary system in place which tests juice from meat samples for *Salmonella* antibodies as they go through the abattoir. Results are compared to the national average and specialist advice is given to farms producing pigs which display high levels of contamination.

The overall aim of this project is to assess the effectiveness of current control programmes and the public health risk and economic cost attributable to *Salmonella* on pork on the island of Ireland. This project aims to draw together and build on existing work in this area and will carry out a risk assessment of the product pathway from farm to retail level. The expected outcome will be to establish approaches by which risk and costs attributable to *Salmonella* can be reduced. This project will also conduct a comparison and benefit analysis of the prevention programmes available separately to Northern Ireland and Republic of Ireland.

The project is being carried out in collaboration with the key policy makers and stakeholders in the pork industry on the island.

Researchers: [Dr Geraldine Duffy, Teagasc](#), [Dr Francis Butler](#), [Dr Maeve Henchion](#), [Dr Nola Leonard](#), [Prof Seamus Fanning, UCD](#), [Dr Patrick Naughton, UU](#), [Dr Bob Madden, QUB](#).

4.15 Laboratory detection of *Cryptosporidium parvum* in foodstuffs – an inter-laboratory evaluation study

Synergy project

Project Status: **In progress**

Scientific knowledge on the prevalence of *Cryptosporidium parvum* and methods for the detection of the organism in food are still somewhat limited. Considered to be an emerging pathogen in Europe's food and water chain, the actual risk it poses has yet to be fully determined.

This project involves the development of an optimised protocol for the detection of *Cryptosporidium parvum* in vegetables for routine laboratory testing. The laboratories involved will test 1,000 samples of locally-grown lettuce, local organic produce, imported produce and prepared and packaged 'ready-to-eat' salads for this intestinal parasite.

Researchers: Dr. John Moore, Northern Ireland Public Health Laboratory (NIPHL); Dr. Fiona Kenny, Sligo Public Health Laboratory (SPHL).

4.16 Validation of the Qualicon ABAX® system for use as an accredited rapid method for the detection of *Listeria* and *Salmonella* in food

Synergy project

Project Status: **Complete**

The goal of this project was to attain Irish National Accreditation Board (INAB) approval of ILAB accreditation for the use of the ABAX® system. This is a PCR based commercial system which allows rapid and accurate detection of these two pathogens. The validation project showed the ABAX assay methods for *Salmonella* and *Listeria* to be highly specific and sensitive for both inoculate and naturally contaminated foods. The project tested 303 samples for *Salmonella* and 212 samples for *Listeria* spp. and *L. monocytogenes*.

Researchers: Mr. Noel Shanaghy, Waterford Public Health Laboratory (WPHL); Ms. Helen Cowman, Cork Food Microbiology Laboratory (CFML).

4.17 Establishment of the prevalence of *Listeria monocytogenes* food samples and faecal samples

Synergy project

Project Status: **In progress**

There is a scarcity of data on the incidence of *Listeria monocytogenes* in butter spreads and in fresh, soft and semi-hard cheeses. There have been a number of large outbreaks, mainly in North America, where *Listeria monocytogenes* was identified as the causative agent.

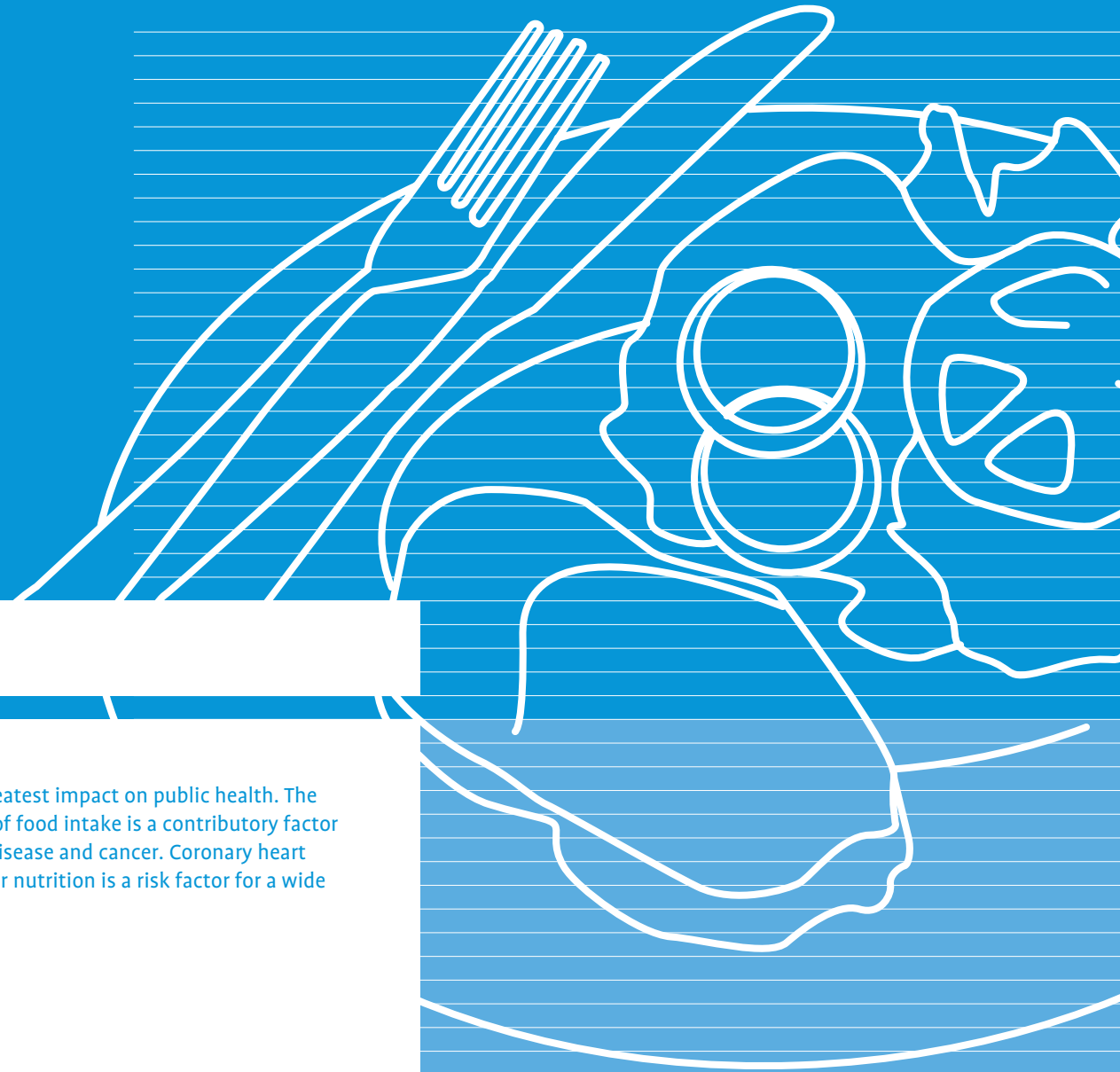
The aim of this project is to establish the prevalence of *Listeria monocytogenes* in dairy products, butter, cheese and pates purchased from retail outlets in the Waterford area. The project will also try to compare the strains found in food with those of clinical isolates. The work will also provide a bank of isolates which will be stored for potential use in further follow-up studies or research.

Researchers: Mr. Noel Shanaghy, WPHL.

5

▼ Nutrition

safefood is aware that, in terms of its food safety remit, nutrition has the greatest impact on public health. The relationship between nutrition and health is clear. The quality and quantity of food intake is a contributory factor in the two main causes of morbidity and mortality, namely, cardiovascular disease and cancer. Coronary heart disease accounts for approximately 43% of all deaths each year. Chronic poor nutrition is a risk factor for a wide range of diseases including osteoporosis, diabetes and obesity.



5.1 Dietary strategies for achievement of nutritional goals for healthy eating: towards evidence based public health nutrition programmes

Project code: 01-RESR-001

Project status: **Completed**

Chronic diseases such as cardiovascular disease, cancer, diabetes and gastrointestinal disease represent a major public health problem across the island of Ireland. However, through dietary change there is considerable scope for reducing the risk of these conditions.

A detailed analysis of consumer behaviour in relation to diet and lifestyle was carried out to provide the scientific information necessary for the development of food-based dietary guidelines for healthy eating. In particular, three categories of nutritional goal were examined: energy balance, overweight and obesity; intakes of total fat and individual fatty acids; and intakes of fruit and vegetables, fibre and carbohydrates. The analysis provided scientific data on:

- the extent to which body weight and food/nutrient intakes comply with nutritional goals
- the patterns of food consumption and nutrient intakes across groups of subjects achieving or not achieving nutritional goals
- the socio-demographic, lifestyle (including physical activity) and attitudinal determinants of food choice, food consumption patterns and nutrient intake and body weight.

The outcomes of this project will enable agencies concerned with public health nutrition to develop food-based dietary guidelines and effective evidence-based public health nutrition programmes for the promotion of healthy eating.

Researchers: Professor Albert Flynn, UCC; Professor Sean Strain, UU.

5.2 Interaction between B vitamins and homocysteine and its relevance to a food fortification programme

Project code 02-PG-018

Project status: **In progress**

Homocysteine is an amino acid found naturally in the body. Increased levels of this amino acid may contribute to heart disease or stroke. Around 15% of the population are genetically predisposed to high homocysteine levels. However, recent research has suggested that homocysteine levels can be lowered by supplementation with certain B vitamins. There are four B-vitamins involved in homocysteine metabolism (breakdown) – folate, riboflavin (B₂), pyridoxine (B₆) and B₁₂. Some or all of these vitamins are used to fortify foods such as bread and breakfast cereals.

This project will examine the relative importance of supplementation with folate, B₂ and B₆ on homocysteine levels, in order to quantify the extent to which homocysteine elevation is attributable to marginal deficiency in individual B vitamins. It will also investigate potential masking of B₁₂ deficiency in humans by supplementation with folic acid at levels potentially consumable in fortified foods in a normal diet.

Researchers: Professor Ian Young, QUB.

5.3 An investigation of the potential application of cDNA array technology in testing the efficacy and safety of potential functional food ingredients

Project code: 02-PG-033

Project status: **In progress**

Recent technological advances in technology have enabled nutritional scientists to produce new functional foods. However, their beneficial effects and any evidence that they have no adverse effects have not been proven. For example, probiotics may promote calcium absorption, but at the same time may increase risk of colonocyte proliferation.

This project is using a new technology called cDNA array to evaluate functional food ingredients in terms of both their efficacy and their safety. This project is using two examples of nutrients that are currently being added to or enriched in foods – vitamin A and conjugated linoleic acid – to test the sensitivity, specificity and potential application of cDNA array technology in characterising certain physiological events related to disease prevention or promotion.

Researcher: Professor Kevin Cashman, UCC.

5.4 An investigation of the effects of lutein and zeaxanthin supplementation on inflammatory markers, oxidative stress and age-related macular degeneration risk

Project code: 03-PG-006

Project status: **In progress**

Age-related macular degeneration (AMD) is the leading cause of irreversible loss of vision in industrialised countries, and carotenoid intake has been proposed to play a role in AMD.

This project aims to assess whether the carotenoids lutein and zeaxanthin, in comparison to beta-carotene, exert effects on inflammatory markers and oxidative stress that may influence AMD development. A randomised, double-blind, placebo-controlled study, in which smokers and non-smokers receive dietary supplements of lutein and zeaxanthin, will be carried out and the various indicators of inflammatory status will be monitored over a two-month period. A further study will examine delivery of these carotenoids using food supplements (carrot juice for carotene and dried spinach powder for lutein and zeaxanthin).

Researcher: Dr Jayne Woodside, QUB.

5.5 Longitudinal study of changes in body mass index (BMI), anthropometric measures, dietary intake and physical activity in cohorts of school going adolescents in both junior and post-junior cycles

Project code: 04-PG-20

Project status: **In progress**

Worldwide, the prevalence of childhood obesity is increasing. Obesity in adolescence is a strong predictor of adult obesity. This project involves a longitudinal study over a 3-year period of changes in Body Mass Index (BMI) and other anthropometric measures together with information on dietary and exercise patterns in a cohort of students in the junior school cycle. A similar longitudinal survey will be conducted in a second cohort of students in the post-junior cycle. This will generate new data on the adolescent age group 12–18yrs. This data is important in understanding the evolution during adolescence of changes in anthropometric measures and dietary and exercise patterns, which tend to be maintained into adulthood where they have a major impact on chronic disease.

Researchers: Dr Nora O' Brien, Dr Tom O'Connor, UCC.

5.6 The effect of γ -tocopherol (γ -T) supplementation on γ -t status, antioxidant capacity and nitrosative stress in apparently healthy smokers

Project reference: 04-PG-05

Project status: **In progress**

Vitamin E is found in vegetable and seed oils, in wheat germ and, in smaller quantities, in meats, fish, fruits and vegetables. Epidemiological studies have shown an inverse correlation between acute coronary events and high intake of dietary vitamin E. Vitamin E may help prevent or delay coronary heart disease by limiting the oxidation of Low-Density Lipoprotein (LDL)-cholesterol. Vitamin E also may help prevent the formation of blood clots, which could lead to a heart attack. However, clinical trials with the main form of Vitamin E called γ -T have been disappointing. Currently in Ireland, approximately 25% of adults augment their diets with commercially available nutritional supplements.

This study will investigate the role of the different forms of vitamin E and their protective effects and will investigate the appropriateness of supplementation of the diet with vitamin E. The study will be carried out with special reference to smokers, as other factors may have to be considered in the provision of advice to this subsection of the population.

Researchers: Dr Julie Wallace, Dr PJ Robson, Prof JJ Strain, UU.

5.7 All-island learning from the ‘Decent Food for All’ programme

Project code: 03-RESR-004

Project status: **In progress**

The ‘Decent Food for All’ (DFfA) programme is a community-based intervention being implemented in the Armagh and Dungannon Health Action Zone (HAZ). The programme aims to tackle poverty by increasing food awareness and improving physical and financial access to safe, healthy food. It incorporates community education, healthy lifestyle choices, the regeneration of local communities and markets, and sustainability.

The objectives of this research project are to:

- assess the impact of the DFfA programme in the Armagh and Dungannon HAZ, with a focus on all-island learning
- identify how community-based strategies could support **safefood’s** all-island communication and marketing campaigns on food safety and hygiene issues
- examine how the DFfA programme, or similar community-based strategies, could be applied across Northern Ireland and the whole of the island of Ireland.

The expected benefits of the DFfA programme are related to improving attitudes to and awareness of food safety and healthy food, improving the knowledge of food and nutrition, and improving healthy eating behaviour. The research will have an impact on food-related policy, both locally and in a broader context, to ensure a greater emphasis on safe and healthy food.

Researchers: [Dr Kevin Balanda](#), [Dr Jane Wilde](#), [Jorun Rugkasa](#), [Dr Niamh Shortt](#), IPH.

5.8 Dietary patterns, food intakes, attitudes and their determinants among low socio-economic adults and children and an in-depth quantitative and qualitative analyses

Project code: 03-RESR-006

Project status: **In progress**

Many studies have documented socio-economic differences in nutrient and food intakes. The food intakes of those with a lower socio-economic status appear to be further from dietary guidelines than those with a higher socio-economic status. **safefood** has commissioned a diet and nutrition survey and analysis of low-income consumers across the island, in order to provide statistically robust data on food consumption patterns and nutrient intake. The survey will be representative of the low-income groups in the population of the whole of Ireland, and will include both adults and children.

It is hoped that this study will shed light on the underlying factors (socio-demographic, attitudinal, behavioural and anthropometric) affecting the dietary patterns of low-income consumers.

Researchers: [Dr John Kearney](#), DIT; [Dr Barbara Stewart Knox](#), UU; [Dr Sinead McCarthy](#), Trinity College Dublin (TCD).

5.9 Standard of healthy living on the island of Ireland

Project code: 03-RESR-011

Project status: **In progress**

Ireland has distinct social inequalities in health, which can be seen in the variation in health outcomes, especially mortality, across the different social groupings. Social inequalities in dietary behaviour have been documented within the Republic of Ireland, but not on the island as a whole. This study will determine the pattern of household and individual food purchasing and food availability information across a range of socio-demographic and socio-economic household types across the whole island. It will also seek to identify a budget standard (the amount of money needed to provide a healthy diet, material security, social participation and sense of control) for a low-income family comprised of two parents and two children.

Researchers: Dr Sharon Friel, Australian National University (ANU), Dr Diarmuid O Donovan, Geraldine Nolan, NUIG; Dr Colin Thunhurst, Dr Brendan McElroy, UCC; Professor Ciaran O' Neill, UU.

5.10 Hit on Health: a healthy food initiative in takeaway/fast-food outlets

Project code: 03-CHR-01

Project status: **Completed**

Food sold in fast-food outlets tends to be energy-dense and often low in other nutrients such as vitamins and minerals. This is of concern as studies have shown that a high fat, energy-dense diet and sedentary lifestyle are strongly associated with the increased risk of obesity. Building on the 'Happy Heart' catering award, which is currently active within the Republic of Ireland, this project endeavoured to educate and promote healthy food and healthy eating within the fast food industry. The programme provided an opportunity for consumers to make healthy choices, and provided education and positive publicity for the retailer involved.

Researcher: Elmary Purtill, Health Service Executive (HSE) –Midland Area.

5.11 Directory of nutrition activities on the island of Ireland

Project code: 04-RESR-14

Project status: **In progress**

Through discussions with key stakeholders in the nutrition field on the island of Ireland, the need for an all-island directory of nutrition activities has been identified. This has received the support of the convening group of the Food and Nutrition Forum. The first phase in the development of the directory is the creation of a database of activities in the dietetics field. Dietitians form the largest stakeholder group in nutrition on the island of Ireland.

The Irish Nutrition & Dietetic Institute (INDI) has been commissioned to carry out the project. Their main objective of the project is to create a database of ongoing dietetic (acute, primary care, health promotion and research) activities in both Northern Ireland and the Republic of Ireland. The outcomes of this project will form the core of a directory of all nutrition activities on the island of Ireland. The overall aim of the project is to provide health professionals and other key stakeholders in the nutrition field with a valuable information resource that will facilitate exchange of information and collaboration.

Researcher: Margot Brennan, Irish Nutrition Dietetic Institute (INDI).

6

▼ Surveillance

safefood has been involved in assessing the burden of foodborne illness in conjunction with other agencies on the island. This research has been very fruitful in terms of providing an insight into the prevalence and demographic relationships of foodborne disease.



6.0 Acute Gastroenteritis in Ireland, North and South – a telephone survey

Project code: None

Project status: **Published**

This project involved a telephone survey to investigate the epidemiology of self-reported gastrointestinal symptoms, in terms of incidence, duration and seasonality. The project also aimed to determine the socio-demographic profile of those who reported illness, in order to determine the characteristics and risk factors with a view to prevention and health promotion policy. This report was co-funded with FSAI, HPSC in collaboration with UCD, CDSC-NI and FSA-NI. This report is available on the **safefood** website at www.safefoodonline.com.

Researchers: Dr Margaret Fitzgerald, HSE- Eastern Region.

6.1 Gastrointestinal symptoms in Ireland, North and South – a survey of general practitioners

Project code: 01-RESR-123

Project status: **Published**

This project involved an all-island survey of 1,200 general practitioners to examine the burden of gastroenteritis in general practice. It also set out to examine the attitudes towards and practices in the management and prevention of gastroenteritis, particularly relating to food-borne illness. The study also aimed to describe GPs views on the surveillance and notification of certain areas of acute gastroenteritis. The report of this research is available on the **safefood** website at www.safefoodonline.com.

Researchers: Dr Margaret Fitzgerald, HSE- Eastern Region, Elaine Scallan, FSAI, Dr Derval Igoe HPSC, Dr Leslie Daly, UCD, Dr Dominique Crowlet UCD, Dr Claire Collins UCD, Tom Robinson, FSA-NI, Dr Brian Smyth CDSC-NI.

6.2 Economic impact of gastroenteritis in Ireland

Project code: 03-RESR-018

Project status: **In progress**

Building on the findings of the report on 'Acute Gastroenteritis in Ireland, North and South: a Telephone Survey' published in September 2003, this project will assess the economic impact of gastroenteritis across Ireland. It will take into account the burden on individuals, families, informal carers, primary care and hospital services. This will be achieved by carrying out:

- A study in general practices to provide data to improve the estimates of the overall number of cases and patterns of different pathogens
- A study of treatment and the costs of treatment in primary care
- A survey of the families of patients with gastroenteritis to assess the impact on individuals, families and informal carers
- A study of hospital treatments and associated costs for people with gastroenteritis, drawn from hospital admission data.

Researchers: Professor Jenny Roberts, Prof Laura Rodrigues, London School of Hygiene and Tropical Medicine (LSHTM) Prof Charles Normand, TCD.

6.3 Sentinel surveillance of *Campylobacter* in Ireland

Project reference: 04-RESR-04

Project status: **In progress**

Campylobacter species are the most common bacterial cause of acute gastroenteritis in the developed world (Friedman et al. 2001). On the island of Ireland there are approximately 2,500 confirmed cases of campylobacteriosis per year. However, the true burden of *Campylobacter* infections is thought to be much higher, a point of view supported by such surveys as the **safefood** acute gastroenteritis telephone survey in 2003. In particular, the epidemiology of *Campylobacter* infection is still poorly understood.

This project will involve the collection of detailed clinical and microbiological information on cases of *Campylobacter* infection, in order to generate hypotheses as to potential risk factors for infection. Food, animal and human sources of *Campylobacter* will be targeted. This project will bring together the Public Health Medical Practitioners, Clinical/Food Laboratory Personnel, Veterinary Health Specialists and Food Safety research expertise to address the growing issue of campylobacteriosis in Ireland.

Researchers: Dr Declan Bolton, Teagasc, Prof Seamus Fanning, UCD, Dr Margaret O' Sullivan, HSE- Southern Area.

6.4 Development of a training pack to allow GPs to develop their role in the prevention and control of food-related disease outbreaks

Project reference: 04-RESR-12

Project status: **In progress**

safefood has recognised that gastroenteritis is a huge community burden accounting for 3.2 million new cases each year or 8,800 per day. The **safefood** study 'Acute Gastroenteritis in Ireland, North and South – A Study of General Practitioners' found that it is also a common problem in the primary care setting accounting for almost 1 in every 20 consultations. A key conclusion of that survey was the realisation that there was a critical provision to encourage General Practitioners (GPs) to develop their role in the prevention and control of food-related disease outbreaks. This project will develop a training programme for GPs on the clinical management of gastroenteritis. This will provide a mechanism to update GPs about food borne illness and to provide practical and concise information about diagnosis, treatment and notification. The key aims are:

- To improve treatment practices of GPs especially in relation to antibiotic and anti diarrhoeal use
- To provide guidance to GPs on exposure history in gastroenteritis and food poisoning
- To develop GP awareness of their role in prevention of disease – hygiene, safe food practices, hand washing, advice on sickness leave
- To support the development of patient information leaflets
- To provide guidance on criteria for stool sampling
- To improve GPs understanding of the notification system.

Researchers: Prof Philip Reilly, Royal College of General Practitioners (RCGP), Fionan O'Cuinneagain, Irish College of General Practitioners (ICGP).

6.5 Epidemiology and molecular analysis of Norovirus outbreaks in Ireland

Project code: 03-RESR-002

Project status: **In progress**

Gastroenteritis due to viral infection of the gastrointestinal tract is a common illness in humans, with high morbidity reported worldwide. It has been increasingly recognised that noroviruses (previously known as Norwalk-like viruses or small, round, structured viruses) are a major cause of gastroenteritis, causing large outbreaks of infectious intestinal disease in a number of settings.

The overall aim of this project is to carry out surveillance of norovirus outbreaks across Ireland and to link the available epidemiological and molecular data on these outbreaks into a common database. This data will be used to review evidence for different transmission pathways, for example, from person-to-person or foodborne. If food sources are suspected epidemiologically, available foods implicated in norovirus outbreaks, such as seafood, will be tested for noroviruses. In addition, molecular epidemiological data from Ireland will be compared with data from other countries through participation in surveillance networks such as the 'Foodborne Viruses in Europe' network.

Researchers: Dr Maureen Lynch, Mater Hospital Dublin, Dr Paul McKeown, Health Protection Surveillance Centre (HPSC); Dr Margaret Fitzgerald, HSE-Eastern Region; Dr Suzie Coughlan, Prof William Hall, National Virus Reference Laboratory (NVRL); Prof Seamus Fanning, UCD; Dr Brian Smyth, Communicable Disease Surveillance Centre (CDSC), Dr Hugh O'Neill, Dr Peter Coyle, Regional Virus Reference Laboratory (RVRL), Belfast.

▼ Summary of Projects

The following table provides a summary of all the projects funded by **safe food** since 2000 on the project completion dates.

Code	Title	Principal contractor	Collaborators	End
00-RESR-050	Poultry meat: improving food safety by improving chemical residue surveillance	QUB	Teagasc	Jun 05
01-RESR-009	Development of a screening system capable of detecting a broad range of toxic and illegal drugs in red meat	DCU	QUB	Dec 04
02-PG-007	Food and a primary link to human cancer: Developing techniques to measure a potent carcinogen present in cooked foods	QUB	-	Oct 06
04-RESR-03	Investigation of the presence of anti-nutritional and toxic compounds in health foods	Teagasc	Xenosense Ltd, Belfast	Jul 08
04-RESR-06	Profiling for abuse of anabolic agents in meat production	QUB	Teagasc	Apr 08
Synergy	Introduction and set-up of the BioDetection Systems DR-CALUX cell culture assay for the detection of dioxins in food	Western Region PAL	NI PAL	May 04
Synergy	Introduction and set-up of a High Performance Liquid Chromatography (HPLC) system for the detection and determination of preservatives, sweeteners, artificial colours and other additives and contaminants in specified foods	NI PAL	Western Region PAL	Oct 04
Synergy	The quantification of genetically modified soya and maize in selected foods and authentication of meat in meat products using Real Time PCR techniques	Cork PAL	NI PAL	Jul 05
Synergy	Optimisation Of LC-MS-MS method for determination of malachite and leuco malachite green In farmed finfish	Marine Institute		Oct 05

Code	Title	Principal contractor	Collaborators	End
00-RESR-041	Assessing the effectiveness of HACCP implementation and maintenance in food production plants	Verner Wheelock Associates Limited	-	Dec 03
01-RESR-109	Food safety knowledge, microbiology and refrigeration temperatures in restaurant kitchens on the island of Ireland	Teagasc	UU	Jul 05
00-RESR-102	Food safety knowledge, microbiology and refrigeration temperatures in domestic kitchens on the island of Ireland	Teagasc	UU	Jun 05
00-RESR-112	Assessment of the standards of food hygiene observed in household kitchens on the island of Ireland. The benefits of providing practical food hygiene instruction and food safety kits	DIT	NIHCC	Oct 02
04-RESR-11	Temperature abuse in retail outlets	DIT	-	Jun 07
03-RESR-013	Persistence and dissemination of <i>Salmonella</i> and <i>Campylobacter</i> in domestic kitchen environments	UU	-	Dec 07

Code	Title	Principal contractor	Collaborators	End
01-RESR-043	The development of a risk communication model based upon food safety behaviours in the home to facilitate adoption of best practice in disseminating information with a food risk component.	QUB	UCD	Nov 05
02-RESR-018	Novel strategies for food risk communication	UCC	Univ. Newcastle	July 05
02-RESR-009	Communicating the healthy eating message: Use of and interactive multi-media CD-ROM for the prevention of obesity in 8-9 year old children	UU	-	Sept 05
02-RESR-003	Factors influencing the efficacy of food risk and dietary communications directed at young people	QUB	Univ. Bath, Univ. Surrey, NUIG	Sept 05
03-PG-015	Food safety education: a cross-border, comparative study of food risk perception in post-primary schools and the development of a model for implementing effective curricular change	UU	-	Oct 06
04-RESR-001	Food poverty in Northern Ireland	NIPHL	CIEH, IPH	Oct 07
0-RESR -017	A systematic review of the effectiveness of social marketing models in communicating nutrition and food safety messages	Univ. Strathclyde	Univ. Oxford	June 05

Code	Title	Principal contractor	Collaborators	End
00-RESR-060	Development of rapid tests for the detection of <i>Mycobacterium avium</i> subsp. <i>paratuberculosis</i> (MAP) and their use to determine survival in food matrices	NUIG	QUB,UCC, DPRC, CVRL	Feb 04
00-RESR-046	Detection and molecular characterisation of selected pathogenic organisms isolated in unpasteurised milk using milk filters	CCC	QUB, CIT	Sep 04
03-RESR-001	Epidemiological assessment of MAP in target Munster herds	CCC	QUB, CVRL, UCD	Oct 04
00-RESR-086	A comparative study of thermophilic <i>Campylobacter</i> isolates of clinical and food origin using genotypic and antimicrobial characterisation techniques	UCD	NUIG, COH, QUB, BCH, UCHG	Sep 04
04-RESR-13	Surveillance of dairy herds for emerging pathogens	CCC	-	Mar 06
00-RESR-105	Development of a harmonised system for approval and monitoring private laboratories testing food borne pathogens	CVRL	-	May 05
01-RESR-105	Use of high pressure to improve safety and quality of shellfish	UCC	QUB	Jan 05
04-PG-17	<i>Arcobacter</i> spp. in retail foodstuffs in Ireland: optimising isolation procedures and an investigation of their genetic relatedness.	QUB	-	Dec 07
02-PG-029	Incidence and survival of potential human pathogens in the production of the common cultivated mushroom (<i>Agaricus bisporus</i>)	UU	-	Oct 06
02-PG-031	<i>Listeria monocytogens</i> in low PH foods: and examination of the influence of food constituents on survival and gastric transit	UCC	-	Oct 06

Code	Title	Principal contractor	Collaborators	End
03-PG-009	Genetic analysis of resistance to detergents and industrial cleaning solutions in <i>Listeria monocytogenes</i> growing as planktonic cells and biofilms	UCC	-	Oct 06
03-PG-011	A study of the factors controlling the survival, germination and outgrowth of <i>Bacillus cereus</i> in rice-based model foods using novel rapid flow cytometry methods and biochemical markers	UL	-	Oct 06
03-PG-022	Identification and characterisation of antibiotic resistance genes in poultry meat (GENECHASER)	UU	-	Jan 07
03-RESR-005	Development of a risk assessment model for <i>Salmonella</i> in shell eggs and processed eggs in Ireland	QUB	UCD, Univ. Strathclyde	Dec 07
04-RESR-08	Occurrence of <i>Salmonella</i> on pork on the island of Ireland and an assessment of the risk factors contributing to its transmission	NFC	UCD, UU, QUB	Jul 08
Synergy	Laboratory detection of <i>Cryptosporidium parvum</i> in foodstuffs – an inter-laboratory evaluation study	NI PHL	Sligo PHL	Oct 04
Synergy	Validation of the Qualicon ABAX® system for use as an accredited rapid method for the detection of <i>Listeria</i> and <i>Salmonella</i> in food	Waterford PHL	Cork FML	Sep 03
Synergy	<i>Listeria monocytogenes</i> in food samples and faecal samples	Waterford PHL	-	May 05

Code	Title	Principal contractor	Collaborators	End
01-RESR-001	Dietary strategies for achievement of nutritional goals for healthy eating: towards evidence based public health nutrition programmes	UCC	UU	Sep 03
02-PG-018	Interaction between B vitamins and homocysteine and its relevance to a food fortification programme	QUB	-	Oct 06
02-PG-033	An investigation of the potential application of cDNA array technology in testing the efficacy and safety of potential functional food ingredients	UCC	-	Oct 06
03-PG-006	An investigation of the effects of lutein and zeaxanthin supplementation on inflammatory markers, oxidative stress and age related macular degeneration risk	QUB	-	Oct 06
04-PG-20	Longitudinal study of changes in body mass index (BMI), anthropometric measures, dietary intake and physical activity in cohorts of school going adolescents in both Junior and post-Junior cycles	UCC	-	Oct 07
04-PG-05	The effect of Tocopherol (γ -T) supplementation on γ -T status, antioxidant capacity and nitrosative stress in apparently healthy smokers	UU	-	Jul 08
03-RESR-004	All- island learning from the 'Decent food for All' programme	IPH	-	Nov 06
03-RESR-006	Dietary patterns, food intakes, attitudes and their determinants among low socio-economic adults and children and an in depth quantitative and qualitative analyses	DIT	UU, TCD	Apr 07

Code	Title	Principal contractor	Collaborators	End
03-RESR-011	Standard of healthy living on the island of Ireland	UCC	UU, NUIG, ANU	Dec 05
03-CHR-01	Hit on Health: a healthy food initiative in takeaway/fast-food outlets	HSE-Midland Area	-	Jun 04
04-RESR-14	Directory of nutrition activities on the island of Ireland	INDI	-	Jul 05

Code	Title	Principal contractor	Collaborators	End
01-RESR-123	Acute Gastroenteritis in Ireland, North and South – a telephone survey	FSA NI, CDSC-NI, DHSSPS, FSAI, HPSC	–	Apr 03
03-RESR-018	Gastrointestinal symptoms in Ireland, North and South – A survey of general practitioners	FSAI	HPSC, CDSC-NI, FSA-NI, UCD	Jun 03
04-RESR-04	Economic impact of gastroenteritis in Ireland	LSHTM	UCD	Apr 06
04-RESR-12	Sentinel surveillance of <i>Campylobacter</i> in Ireland	Teagasc	UCD, HSE	Mar 08
03-RESR-002	Development of a training pack to allow GPs to develop their role in the prevention and control of food-related disease outbreaks.	RCGP	ICGP	Mar 07
03-RESR-013	Epidemiology and molecular analysis of Norovirus outbreaks in Ireland	Mater Hospital Dublin	HPSC, HSE-Eastern Region, NVRL, UCD, CDSC-NI, RVRL	Dec 05
03-RESR-013	Persistence and dissemination of <i>Salmonella</i> and <i>Campylobacter</i> in domestic kitchen environments	UU	–	Dec 07

Acronyms and Abbreviations

AMD	Age-related macular degeneration	HACCP	Hazard Analysis, Critical Control Point
ANU	Australian National University	HAZ	Health Action Zone
BCH	Belfast City Hospital	HPP	High Pressure Processing
CCC	Cork County Council	HPSC	Health Protection Surveillance Centre
CDSC-NI	Communicable Disease Surveillance Centre – Northern Ireland	HPLC	High Performance Liquid Chromatography
CFML	Cork Food Microbiology Laboratory	HSC	
CHR	Community Health research project	ICGP	Irish College of General Practitioners
CIEH	Chartered Institute of Environmental Health	INAB	Irish National Accreditation Board
CIT	Cork Institute of Technology	INDI	Irish Dietetic Institute
COH	Cherry Orchard Hospital	IPH	Institute of Public Health in Ireland
CPAL	Cork Public Analyst Laboratory	LC	Liquid Chromatography
CVRL	Central Veterinary Research Laboratory, Abbotstown	LSHTM	London School of Hygiene and Tropical Medicine
DAF	Department of Agriculture and Food (ROI)	MAP	<i>Mycobacterium avium</i> subsp. <i>paratuberculosis</i>
DARDNI	Department of Agriculture and Rural Development for (NI)	MS	Mass Spectrometry
DCU	Dublin City University	NASBA	Nucleic Acid Sequence Based Amplification
DFFA	Decent Food for All	NIFLG	Northern Island Food Liason Group
DHSSPS	Department of Health, Social Services and Public Safety (NI)	NI PAL	Northern Ireland Public Analyst's Laboratory
DIT	Dublin Institute of Technology	NIHCC	Northern Ireland Hotel and Catering College
ELISA	Enzyme-Linked Immuno-Sorbent Assay	NIPHL	Northern Ireland Public Health Laboratory
FIRM	Food Institutional Research Measure, DAF	NUIG	National University of Ireland, Galway
FML	Food Microbiology Laboratory	NVRL	National Virus Reference Laboratory (ROI)
FSAI	Food Safety Authority of Ireland	PAL	Public Analyst's Laboratory
FSPB	Food Safety Promotion Board	PCR	Polymerase Chain Reaction
GM	Genetically Modified	PG	Postgraduate Fellowship

PHL	Public Health Laboratory
QA	Quality Assurance
QUB	Queen's University Belfast
RCGP	Royal College of General Practitioners
RESR	Research Project
RNA	Ribonucleic Acid
RT-PCR	Reverse Transcriptase Polymerase Chain Reaction
RVRL	Regional Virus Reference Laboratory, Belfast
SPHL	Sligo Public Health Laboratory
SPRS	Student Placement Research Scheme
TCD	Trinity College Dublin
UCC	University College Cork
UCD	University College Dublin
UCHG	University College Hospital Galway
UL	University of Limerick
UU	University of Ulster
VSD	Veterinary Science Division
VTEC	Verotoxigenic <i>Escherichia coli</i>
WHO/FAO	World Health Organisation/Food and Agricultural Organisation
WPHL	Waterford Public Health Laboratory
WRPAL	Western Region Public Analyst's Laboratory

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