

# Research programme 2020



# Research programme 2020

## Introduction

Research Programme 2020 lists all research and development projects, other than contracts and confidential consortia or company-funded work, currently being undertaken by Campden BRI.

Projects are grouped by driver of industry need. These are drawn from the Scientific and Technical Needs of the Food and Drink Supply Chain - the result of our triennial industry consultation. This emphasis on industrial relevance is reinforced by the active involvement of members in the creation, selection and steering of many of the research projects in this document. As a consequence, the results of the research programme have considerable commercial relevance.

For each project, a concise description is presented together with details of the funding source, start and end dates, collaborators, and project manager, who will be pleased to provide further information about their projects.

The commercial implications arising from each project are reported to members by a variety of routes:

- Each member funded project has its own web page
- Regular progress reports and presentations to Member Interest Groups, in our newsletter, and through podcasts, videos, blogs and trade journal articles
- At appropriate stages during a project, Research Summary Sheets are produced and made available to all members via the website
- Reports are also made in greater depth through one or more of our regular series of publications such as R&D Reports which present detailed accounts of individual projects

Further details can be found on our website ([www.campdenbri.co.uk](http://www.campdenbri.co.uk)) or from [support@campdenbri.co.uk](mailto:support@campdenbri.co.uk).

## Contents

	Page
Drivers/themes:	
Safety	1
Quality and value	2
Nutrition, health and well-being	4
Sustainability, resilience and food security	5
Skills and knowledge	8
Projects completed in 2019	8
Funding body abbreviations	9

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# Safety

[www.campdenbri.co.uk/research/safety.php](http://www.campdenbri.co.uk/research/safety.php)

## Demonstrating control of *Listeria* within ready-to-eat foods

Campden BRI project I49858 (Jan 2020 - Dec 2021)

Member funded

Approaches that demonstrate control of *Listeria monocytogenes* in ready-to-eat foods have different values in terms of the strength of evidence they provide. It can be difficult to predict how the competent authorities view the various pieces of evidence and exactly what a food business operator must do to demonstrate effective control where challenge testing, for example, suggests growth can occur. This project will evaluate the growth potential of *Listeria monocytogenes* in ready-to-eat foods with the use of challenge test and durability studies and develop a scoring system for showing effective control of this organism.

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## Better factory hygiene: microbial population dynamics in food factories

Campden BRI project I49859 (Jan 2020 - Dec 2022)

Member funded

Advanced microbial profiling allows the environmental (microbial) load of a factory (or other premises) to be easily analysed in detail - including the presence of organisms that are difficult to culture. This extra information has the potential to deliver insights into the microbial ecology of a factory, insights previously unobtainable, which should facilitate better control of microorganisms. This project will investigate the microflora of factories making different product categories including the changes in microbial populations over the course of a year during normal operation. Experiments will measure the microbial flux of the factory over a typical working day, and the impact of cleaning. This will improve our understanding of microbial populations in a variety of food production environments and improve methodology used in factory investigations.

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## Technologies for detection of foreign bodies and internal defects

Campden BRI project I49860 (Jan 2020 - Dec 2022)

Member funded

Manufacturers need technologies able to detect a wider range of foreign bodies in food and to detect other types of internal

defects such as holes. There is little consistent guidance on detection limits, and many types of materials are undetectable by current methods. As part of this project, new technologies will be reviewed, and practical trials of their capabilities will be conducted for foreign body and defect detection. This will improve food safety through better detection of foreign bodies.

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## Innovative sterile packaging using plasma technology

Campden BRI project I49143 (Jan 2020 - June 2021)

Funded by Innovate UK

Sterafill has used plasma technology to develop a sterilisation process for packaging material, which can be added to a clean packaging system for food and pharmaceutical products. The benefit of the system is that it will be a significantly smaller footprint (potentially in the order of 10% of current aseptic machines on the market), it will be more efficient, easier to use, more productive, more versatile and will greatly reduce the down time after any alteration/adjustment. The aim is to make this the only multi-lane (more than two lanes) aseptic packaging technology that satisfies the UK, EU and the American market. This project will support the development and assessment of this new aseptic packaging system.

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## Effective control of viruses in the food manufacturing industry

Campden BRI project I47082 (Jan 2019 - Dec 2021)

Member funded

The food industry needs effective control measures for viruses. It's therefore essential to assess/validate antimicrobial treatments against viruses and select the correct surrogates to validate food control measures. The project will investigate the effect of product composition, processing, fresh produce decontamination and storage on the survival and inactivation of various surrogates of human viral pathogens.

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## Next generation methods for microbiological and chemical food safety

Campden BRI project I44029 (Jan 2018 - Dec 2020)

Member funded

Advances in analytical technologies have resulted in continued development of faster, more efficient analytical methods. These allow us either to test more rapidly, with more certainty, or to test for hazards that we have previously not been able to detect. Such methods often come with little real-world

information or validation data. This project enables a very rapid response to be made to a need for new tests (when a new hazard emerges), or to quickly provide useful information on the practicality of new test systems coming onto the market. The project will assess next generation technologies in microbiological and chemical analysis, enabling access to rapid effective monitoring of food hazards and spoilage issues through novel/improved testing protocols.

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## Quality and value

[www.campdenbri.co.uk/research/quality-value.php](http://www.campdenbri.co.uk/research/quality-value.php)

### Quality and safety of cereal-based products and ingredients for the food and brewing industry

Campden BRI project I49856 (Jan 2020 - Dec 2022)

Member funded

The quality and safety of cereals is of great importance to the relevant supply chains: many cereal quality parameters have a direct influence on functionality and processing behaviour. This project will develop and maintain industry agreed methods to measure and therefore control the quality and safety of cereal-based ingredients. It will also investigate new instrumentation and testing methods to assess the physical characteristics of grains and cereals including the cereals' functionality, and will develop and/or evaluate methods to assess end-product quality.

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### Bridging the gap between objective measurements and sensory perception

Campden BRI project I49857 (Jan 2020 - Dec 2022)

Member funded

The measurements from rheological and textural methods alone can fail to fully describe in-mouth sensations (e.g. creaminess or stickiness). Tribology, which focuses on food lubrication properties, may be better suited to determine mouthfeel-related textural properties. Currently, there is no readily available instrument-based method that can quantify mouthfeel properties without having to undergo expensive and lengthy consumer trials. This project will evaluate the effectiveness of tribological measurements to characterise complex textural properties of selected drinks of varying sugar content and will compare this with evaluations performed by sensory and consumer panels.

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### Food process efficiency - optimise product quality using artificial intelligence

Campden BRI project I49840 (Dec 2020 - Dec 2022)

Innovate UK

Process efficiency and product quality are two of the most important areas for food manufacturers. Making a process more efficient can allow manufacturers to produce a greater amount of a product without it costing more. It's also important to maintain a product's quality to retain consumers and encourage others to purchase it. This project looks to harness the power of artificial intelligence and machine learning to improve the efficiency of a process common to most food and drink manufacturers, as well as improve the finished product produced from this process.

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### New technologies for food and drink manufacturing

Campden BRI project I47084 (Jan 2019 - Dec 2021)

Member funded

Manufacturers need independent data on ways to effectively validate and understand the benefits these technologies have for improving product quality. Understanding how processing or preservation technologies impact on the quality and shelf life of products remains an important area for manufacturers. The focus for this project will be emerging technologies for improving quality and value and will conduct feasibility studies on commercially relevant emerging technologies. This project will inform members about new technologies through the new technologies bulletins, feasibility studies and desk-based reviews.

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### Understanding the safe shelf-life of foods using advanced microbial profiling

Campden BRI project I47085 (Jan 2019 - Dec 2021)

Member funded

Recent work using advanced microbial profiling (AMP) has shown that our knowledge of the progression of microflora during shelf life of certain products is incomplete. AMP offers a way to confirm existing specifications, or to amend them. AMP also offers an opportunity to verify that a reduction in viable counts of selected pathogens are caused by competitive inhibition from the product's microflora. This project will reevaluate microbial specifications for a range of chilled products and analyse the effect that naturally occurring microflora has on the growth of pathogenic microflora. This will allow specifications to be set for only those organisms of concern, potentially extending shelf life. Indication of the effects that spoilage flora have on pathogens will give producers more

confidence in the ability of their products to remain safe should contamination occur.

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## The impact of sensory substantiation claims on consumers' purchase decisions

Campden BRI project 147086 (Jan 2019 - Dec 2020)

Member funded

Sensory claims give companies an opportunity to positively characterise their products in sensory terms and position them accordingly on the market. However, all claims must be technically substantiated, demonstrable and verifiable in order not to mislead consumers. Despite this, there is minimal guidance available to industry practitioners. This study proposes to investigate: the perceived credibility and meaningfulness of different types of claims to consumers for food, beverage and non-food product categories; the perceived value and impact these claims have on consumers pre-purchase decision making; how to communicate claims to consumers to optimise product standout during pre-purchase selection; how to make a claim for a global product. The project will provide members with insights into if/why sensory substantiation claims are seen to be credible, meaningful and valuable and their impact on consumer behaviour.

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## Functionality of novel ingredients from natural sources

Campden BRI project 144034 (Jan 2018 - Dec 2020)

Member funded

Many functions in processed foods are performed by chemically synthesised materials. However, there are numerous cereals and plants that are known to contain elevated levels of active components that may well show specific functionality in the processing of foods. Applications could include foaming, emulsifying, rheology modifiers and water-binding agents. This project will assess the performance of selected food ingredients. Potential functions of interest will be examined in the processing of specific products and evaluated against existing additives with similar functional properties, providing practical information on the functionality and application to food systems of the most promising natural materials.

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## Design and modelling of the impact of food structure on food texture

Campden BRI project 144032 (Jan 2018 - Dec 2020)

Member funded

Texture is an important sensory characteristic of many food products. Developing or reformulating products typically requires production and evaluation of many process and recipe variations to identify those that have the required structure and texture. This can be time consuming, involving use of costly pilot production facilities and sensory panels. This project will develop an improved capability to design products with the required texture by modelling the effects of differences in structure and understand how process conditions can be used to create the required structure for a range of product types. It will demonstrate these capabilities through case studies, evaluate the effect of reformulation on texture and establish computer modelling facilities and expertise.

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## Microbiological shelf-life testing - new approaches

Campden BRI project 144031 (Jan 2018 - Dec 2020)

Member funded

Establishing an accurate shelf-life is key to a product's success. The shelf-life should be sufficient enough to allow the product to be economically viable and minimise waste whilst maintaining key sensory, chemical and microbiological characteristics. It is therefore vital that the correct procedure is used when assessing shelf-life. This project aims to reconsider the methods and procedures used to define microbiological shelf-life (through setting up a working group comprising of members from producers, retailers and government bodies), by conducting practical studies to define the best practice approaches and recommendations, and then update Campden BRI's guideline 46 on the evaluation of product shelf-life for chilled foods.

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## Inactivation of bacterial biofilms - new approaches

Campden BRI project 144030 (Jan 2018 - Dec 2020)

Member funded

Bacterial biofilms pose a constant threat to the quality of a wide variety of foods. Organisms existing in a biofilm state are able to resist a number of microbiological measures to a greater degree than planktonic cells, leading to persistent challenge to cleaning and CIP systems. The aim of this project is to define the resistance of key spoilage organisms in their biofilm state in order to establish and optimise procedures for decontamination and / or removal of biofilms in food industry settings.

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## Innovatively improving the food safety and quality of sprouted grain bakery products

Campden BRI project I42872 (April 2018 - Dec 2020)  
Funded by Innovate UK

Everfresh is a market leader in the emerging market for long-life sprouted grain bread and cakes. In the proposed project, it will work with its consortium of industry and research partners to develop an industry-leading approach for the production of sprouted grain bakery products.

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## Cold plasma technology

Campden BRI project I44858 (Oct 2017 - Sept 2021)  
Studentship at the University of Liverpool

New technologies hold potential in improving equipment hygiene. During processing of food and drink products, periodic cleaning and sanitation of equipment throughout a shift can allow bacteria to establish (forming biofilms) or potentially grow. Once established, biofilms are difficult to remove from a processing environment and equipment. This project is exploring different cold plasma systems for rapid and effective decontamination of equipment surfaces to continuously reduce the microbial loading on the equipment surface during production. The impact on the surface properties will be considered and the most optimum system will be selected for testing on a lab scale conveyor model system.

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## Extraction and purification of calystegines and iminosugars for use as natural preservatives

Campden BRI project I45830 (Nov 2017 - Jan 2020)  
Funded by Innovate UK

Natural food preservatives to extend the shelf life of processed foods are increasingly important in the provision of food safety in sugar and salt limited recipes. Calystegines and iminosugars are valuable compounds which have been shown to provide a natural preservative function in chilled foods. These occur naturally in the Solanaceae family, which includes potatoes, and offer a new source of natural preservatives.

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## Developing an understanding and improved sensory quality of low alcohol beer

Campden BRI project I40573 (Oct 2016 -Sept 2020)  
Studentship at the University of Nottingham

This project aims to create the framework of knowledge that might enable the production of a 5% beer and 0.1% beer in which consumers cannot perceive a difference. This will be

done through; gaining an understand drivers of liking and disliking for consumers in terms of low/non-alcoholic beer; explaining the consequence of dialysis for dealcoholisation on the chemical profile (aroma and taste) of low alcohol beer/ alcohol free beer; correlating changes in flavour compounds with changes in sensory properties developing an understanding of the temporal changes in sensory perception of dialysis based low alcohol/alcohol-free beer and; correlating temporal changes in sensory perception with aroma and taste compound delivery kinetics in-mouth. The project will also seek to understand consumer's emotions and perceptions of low/non-alcoholic beer. The outcome of this project will be the proposal of routes to optimise 0.1% beer and increase parity of 0.1% beer to 5% beer.

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## Nutrition, health and well-being

[www.campdenbri.co.uk/research/nutrition-health.php](http://www.campdenbri.co.uk/research/nutrition-health.php)

### Consumer acceptance of new and emerging ingredients

Campden BRI project I49855 (Jan 2020 - Dec 2021)  
Member funded

The use of new and emerging ingredients is increasing as consumers demand products that are healthier, including 'free-from', 'allergen-free', 'meat-free' and 'sustainable'. However, consumers' attitude and perception towards 'novel' ingredients (especially their acceptance when applied to products) is not fully understood. This project aims to provide a better understanding of both industry's and consumers' perceptions of 'novel' ingredients, with a focus on consumer acceptance when these ingredients are included in products.

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### Calorie reduction and fibre enhancement

Campden BRI project I47087 (Jan 2019 - Dec 2021)  
Member funded

Better understanding of the technical functions of fibre in products, and the potential for dietary fibre to be used to reduce calorific density of a wide range of products, to help meet the PHE challenge for a 20% reduction in calories and help increase the daily intake of dietary fibre. This project will provide an understanding of the functionality of fibres, potential new sources of fibre and which fibres perform best in certain products in order to allow the development of products that appeal to consumers with reduced calorie density and increased fibre levels.

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## Pre-processing to improve natural nutrition and functionality of ingredients

Campden BRI project I47088 (Jan 2019 - Dec 2021)

Member funded

Various processing methods such as sprouting, fermentation and extrusion are known to improve functionality and nutritional value of ingredients. However, published studies indicate that these benefits very much depend on the exact processing conditions that the raw materials undergo, with huge variation seen from minor changes in processes. This project will develop knowledge on nutrient bioaccessibility and bioavailability to optimise the nutritional value and technical function of the food products. The project will also investigate the effect of processing techniques on bioavailability of nutrients and demonstrate formulations and functionality improvements that processes can offer to different product categories. It will also provide up to date knowledge of materials produced with alternative processes and their uses.

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## Potential of plant proteins for ingredient and product development

Campden BRI project I47089 (Jan 2019 - Dec 2021)

Member funded

Increased demand for plant proteins has led to significant focus and developments in the field of novel sources of plant-based proteins and their extraction, generating greater potential for improved protein fortification during product development. This project will develop techniques to produce protein rich ingredients cost and time efficiently. Processing techniques will be developed to further improve protein performance and the project will focus on novel plant protein sources. The project will look at how plant protein ingredients can be developed to optimise their nutritional value and technical performance. The project will also investigate consumers expectations and insights of plant proteins.

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## Clean label sugar reduction

Campden BRI project I44037 (Jan 2018 - Dec 2020)

Member funded

Current and impending PHE targets, the sugar levy, demands from consumers and social responsibility means there is a huge pressure for the food industry to continue carrying out wide ranging reformulation. This presents a major technical challenge to the food industry. A lot of focus in recent years has been on identifying suitable alternative ingredients for sugar reduction, however, these are not always well accepted by consumers, who are increasingly demanding clean label solutions. This project aims to take an alternative approach by understanding

how far sugar can be simply removed before product quality is compromised to an unacceptable level or functionality is lost and the need arises to intervene via the use of clean label and/or processing solutions to optimise the level of reduction that can be achieved. The project will also explore what is the smallest portion size consumers will accept before they buy two of the same product and the effectiveness of two clean label approaches in composite products.

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## Sustainability, resilience and food security

[www.campdenbri.co.uk/research/resilience-efficiency.php](http://www.campdenbri.co.uk/research/resilience-efficiency.php)

### Reuse of packaging

Campden BRI project I49854 (Jan 2020 - Dec 2022)

Member funded

Consumers are now being urged to reuse packaging to reduce the amount of material being used. However, what is the impact on the packaging material if it is being reused? Might this compromise food safety or quality? This project will investigate the effect that reuse of food and drink containers has on both the safety and longevity of the packaging, and the quality of the stored product because of this repeated use. It will improve our understanding of whether consumers should be encouraged to reuse packaging and how they should do this (from a food safety perspective).

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## S3FOOD: Smart sensor systems for food safety, quality control and resource efficiency in the food processing industry

Campden BRI Hungary project (May 2019 - April 2022)

EU funded

The main goal of the S3FOOD Project: improving the efficiency and sustainability of the European Union's food industry via modernization of small and medium-sized food processing enterprises, through appropriate industry 4.0 and digitization solutions. S3FOOD will stimulate the integration of internet of things (IoT) and related technologies via the implementation of smart sensor systems in the food production processes to improve quality control, resource efficiency and the follow-up of food safety in the food production process. S3FOOD brings together experts with a background in food processing industry, IoT, ICT and sensor technology. This project will help with facilitating the modernisation and digitisation of the food processing industry.

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## Technical challenges associated with reducing or replacing single-use plastic packaging within the food and drink industry

Campden BRI project 147091 (Jan 2019 - Dec 2021)

Member funded

The usage of single use plastic packaging is widespread across many food and beverage categories including plastic bottles for juice/milk, trays and pots for goods such as meats and combination meals and multilayer plastics for snacks and packaging to cook products within satisfying consumer convenience and prevent cross contamination. Consumers have become aware of the negative effect single use plastic packaging is having when discarded irresponsibly and wish to see less single use plastics. This project will provide members with a better understanding of the UK's recycling infrastructure for single use plastic packaging and exploring alternative materials and the technical challenges faced by packaging/ food companies in reducing or removing single use plastics so they can make tactical, immediate changes. Testing looking at alternative materials for a range of food/drink applications will be carried out and practical case studies will be produced. Consumer understanding of recycling and their acceptance of alternative materials will also be explored. This will allow members to make longer term strategic choices.

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## Connsensys: Connecting smart sensor systems for the food industry

Campden BRI Hungary project (Nov 2018 - Oct 2020)

EU funded

The food industry is taking its first steps towards Industry 4.0 and the 'factory of the future'. The overall objective of the project is to set up a platform, with a joint cluster partnership strategy, implementation roadmap and interregional investment projects, between food and electronic/ICT cluster organisations and relevant research and technology organisations, to lower the barriers for food companies to access the newest smart sensor systems, to enable the internet of things (IoT) transition of the food industry. The food industry has specific requirements for sensors and the related IT challenges and expects machine manufacturers to integrate these sensors in the equipment/machines they produce. By creating this European smart sensor systems platform, stakeholders will get a better understanding of the possibilities and requirements for these technologies. The project will facilitate the implementation of the smart sensor systems technologies by setting up living labs, where the technologies can be demonstrated. The aim of the model is to increase the awareness and explore the application of existing, upcoming smart sensor systems for the food industry followed by implementation.

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## FutureEUAqua: Future growth in sustainable, resilient and climate friendly organic and conventional European aquaculture

Campden BRI Hungary project (Nov 2018 - Oct 2022)

EU funded

FutureEUAqua promotes the sustainable growth of climate-change resilient, environmentally-friendly organic and conventional aquaculture of major fish species and low trophic level organisms in Europe, to meet future challenges with respect to the growing consumer demand for high quality, nutritious and responsibly produced food. The main priorities of FutureEUAqua include the:

- genetic selection of certain fish species
- developing innovative ingredients and feeds
- applying non-invasive monitoring technologies
- developing innovative fish products and packaging methods, and
- developing optimal production systems

This project operates a stakeholder platform to create a common platform for relevant experts to discuss the latest developments of sustainable aquaculture.

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## SMARTCHAIN: Towards innovation-driven and smart solutions in short food supply chains

Campden BRI Hungary project (Sep 2018 - Sep 2021)

EU funded

SMARTCHAIN is an initiative of 43 partners in seven EU and two associated countries in the area of short food supply chains (SFSCs). The central objectives of the project are to foster and accelerate the shift towards collaborative short food supply chains and, through specific actions and recommendations, to introduce new robust business models and innovative practical solutions that enhance the competitiveness and sustainability of the European agri-food system. SMARTCHAIN partners will identify the main needs or instruments required to implement collaborative short food supply chains, which can increase farm incomes, provide an exhaustive inventory of practical solutions, develop robust new business models and make policy recommendations. To strengthen co-creation and collaboration between partners and ensure double-directional flow of information between research and practice within the SMARTCHAIN consortium, nine innovation and collaboration hubs will be established from the very beginning of the project. SMARTCHAIN will generate concrete actions for knowledge transfer, through the organisation of at least 18 innovation workshops and training activities for farmers and short food supply chain entrepreneurs. Within this project, 18 short food supply chains will be analysed as case studies in seven EU and two associated countries.

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## **GLOPACK: Granting society with LOW environmental impact innovative PACKaging**

Campden BRI Hungary project (Jun 2018 - Jun 2021)  
EU funded

GLOPACK is aiming to develop food packaging without any environmental footprint that would allow to extend the shelf life of the food products. GLOPACK focuses on the practical applicability of the three most promising advances in the food packaging area by building them from existing key enabling but simply applicable technologies through the development of:

- new, innovative bio-circular packaging by the conversion of agri-food residues (PHA and ligno-cellulosic fibers) into food packaging applications (e.g. bio-composite films and rigid/semi-rigid trays)
- active packaging with O<sub>2</sub> scavengers and volatiles anti-microbial emitters with RH triggered release mechanism to improve food preservation and shelf-life without additives
- RFID enabled wireless food spoilage indicators as new generation of self-adjusting food date label to track food quality during the storage

A multi-criteria decision support system (DSS) will be developed to provide unique and specific guidance to food and packaging SMEs in terms of technical assistance for selection among eco-innovative packaging alternatives. Within the framework of GLOPACK, the efficiency of the packaging concept will be demonstrated with three types of food product (ready to eat organic vegetarian burger, fresh cheese as a dairy product and a meat product).

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## **SEAFOODTOMORROW: Nutritious, safe and sustainable seafood for consumers of tomorrow**

Campden BRI Hungary project (Nov 2017 - Oct 2020)  
EU funded

This project aims to validate and optimise commercial solutions for improving the socioeconomic and environmental sustainability of the seafood production and processing industry, while contributing to product quality and safety. Activities will focus on the sustainable production and processing of nutritious and safe seafood products through the demonstration and first application in the market of eco-innovative, sustainable solutions of marine and aquaculture-derived food products and nutrients. The project will take into account impacts across different regions and population segments, as well as the specificities of different types of seafood. Activities will include utilisation of agro and seafood by-products to develop sustainable feeds for aquaculture enabling the production of tailor made products fortified with specific essential nutrients for consumers, assess the feasibility of salt replacers in seafood, validate digestible, attractive, functional and nutritionally adapted seafood for senior people and youths, validate strategies to prevent/remove

contaminants from seafood, and optimise sensors and biosensors for the assessment of safety.

The consortium expects strengthening the wider utilisation of eco-innovative solutions, as a result of greater user acceptance, higher visibility of these innovative solutions and creation of scalable markets and increasing the availability of healthier seafood to improve consumers' diet and health. The consortium is built on interdisciplinary research teams of 19 RTDs involved, renowned by its top-quality applied technological development and with strong and cohesive links gathered in previous funded activities (e.g. FP7 ECsafeSEAFOOD), thus anticipating successful outcomes. In addition, 4 IAGs and 13 SMEs with diverse and complementary interests in the solutions under validation and optimisation will also integrate the consortium.

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## **No Agro-Waste: Innovative approaches to turn agricultural waste into ecological and economic assets**

Campden BRI Hungary project (Jan 2016 - Sept 2020)  
EU funded

Agro-waste represents a huge biomass resource that can be converted into sustainable bio-products. Driven by a "zero-waste" society requirement, NoAW aims to develop a circular economy approach applicable to agricultural waste on a territorial and seasonal basis. NoAW will establish new innovative eco-design and assessment tools for circular agro-waste management. Agro-waste resource use efficiency will be improved by upgrading the most widespread technology, anaerobic digestion, and by eco-design of innovative bio-processes and products (biomaterials, bio-molecules, bio-fertilisers and bio-energy). NoAW will involve all in the agriculture chain in order to ensure and accelerate the development of new business concepts.

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## **Using spent brewery grain to create a high fibre food ingredient**

Campden BRI project 141268 (Oct 2016 - Mar 2020)  
Funded by Innovate UK

A collaboration between Mondelez International, Molson Coors, Campden BRI, Naturis and Atritor will develop and evaluate applications for a high fibre value-added ingredient generated from spent brewery grain. This project will call on the combined knowledge of these companies, whose expertise spans the full food chain from raw material generation and ingredient manufacture, through engineering, analytical and consumer science testing, product development and application to commercialisation of the new ingredient.

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# Skills and knowledge

[www.campdenbri.co.uk/research/skills-knowledge.php](http://www.campdenbri.co.uk/research/skills-knowledge.php)

## Vegan/vegetarian foods - help with the challenges

Campden BRI project 149861 (Jan 2020 - Dec 2021)

Member funded

The challenges for industry in relation to veganism and vegetarianism have become apparent with a lack of consistency in definitions (e.g. of vegan), what to test products for and when testing is/is not required. Beyond food and drink itself, there is also little information about the identification and extent of the use of animal-based products in the manufacture of the packaging. This project will assist the industry with the various challenges posed by the growing trend for vegan/vegetarian foods and drinks, including a focus on the associated packaging.

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## Practical control of *Listeria* during food production

Campden BRI project 147092 (Jan 2019 - Dec 2020)

Member funded

Over the years a number of reports/guidance documents have been written (e.g. FSA, EFSA, FDA) offering advice on how to control *L. monocytogenes* in the food production environment. But there is a need to summarise and consolidate key approaches and tools to controlling *Listeria*. This project sets out to produce an up to date one-stop-shop guideline document on controlling *Listeria* during food production.

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## Food Law Alert

Campden BRI project 138229

Member funded

Food Law Alert is a free fortnightly Campden BRI member service providing prompt and succinct news of developments in UK and EU food law, including details of new and proposed legislation and Codex and other expert committee meetings. Links are given to relevant websites from where further information is available.

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## Food safety and regulatory information and research for the brewing and malting industries

Campden BRI project

Member funded

Rapid access to information on food safety and regulatory issues is an essential part of controlling risk and keeping up to date with emerging issues. This project provides a regular update on food safety and regulatory issues for the brewing industry. It also includes a programme of food safety research including analytical surveys on key issues, and briefing notes on key safety topics alongside a database of legal limits.

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## Projects completed in 2019

### Starch structure and cell wall digestion

Campden BRI project 132138 (Jan 2014 - Jan 2019)

BBSRC Studentship at King's College, London

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### Low protein wheat

Campden BRI project 139362 (Jan 2016 - Dec 2019)

Funded by BBSRC

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### PouLLS: environmental indicator and animal welfare monitoring sensory system

Campden BRI project (March 2016 - March 2019)

A collaborative project funded by Innovate UK

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### I-CON - Improving COmpetences and skills through food sector inNOvations

Interreg Central Europe Programme project CE393 (June 2016 - May 2019)

Funded by Interreg CENTRAL EUROPE

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### SWEETVEG: Improving the yield of sweet corn and tomato and their compliance to food manufacturers' requirements using by Precision Agriculture applications

Campden BRI Hungary project (Aug 2016 - July 2019)

EU funded

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## Process manufacturing of functional food particles from lignin-rich feed

Campden BRI project 140134 (Oct 16 - Sept 19)

EPSRC Studentship at the University of Nottingham

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## SKIN - Short supply chain knowledge and innovation network

Campden BRI Hungary project (Dec 2016 - Dec 2019)

EU funded

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## Food safety and traceability using protein profiling

Campden BRI project 140913 (Jan 2017 - Dec 2019)

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## Ingredient selection to meet compositional and nutritional targets

Campden BRI project 140908 (Jan 2017 - Dec 2019)

Member funded

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## Quality and safety of cereal-based products and ingredients for the food and brewing industry

Campden BRI Project 144856 (Jan 2017 - Dec 2019)

Member funded

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## Profitable industrial manufacturing of bread for the retail mainstream with enhanced nutritional composition

Campden BRI Hungary project (Oct 2017 - 2019)

Government funded

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## Iron and zinc bioavailability

Campden BRI project (Dec 2017 - Dec 2019)

Funded by BBSRC

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## INCluSilver - Personalised nutrition for the future

Campden BRI Hungary (an INNOSKART ICT cluster member) project (2018 - 2019)

EU funded

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## Mitigating food fraud - best use of analytical screening tools

Campden BRI project 144035 (Jan 2018 - Dec 2019)

Member funded

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## Novel natural preservative systems for use in drinks, sauces and other high a<sub>w</sub> foods

Campden BRI project 144033 (Jan 2018 - Dec 2019)

Member funded

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## Rapid methods for hygiene determination

Campden BRI project 144027 (Jan 2018 - Dec 2019)

Member funded

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## BirdEase: an integrated diagnostic system for bacterial detection in poultry farms

Campden BRI project 140724 (March 2018 - Sept 2019)

A collaborative project funded by Innovate UK

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## 3D printing of food

Campden BRI project 146283 (Sept 2018 - Sept 2019)

Member funded

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## Intelligent dough mixer project

Campden BRI project (Dec 2018 - Aug 2019)

Funded by Innovate UK

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## Blockchain and emerging approaches supporting food safety management systems

Campden BRI project 147093 (Jan 2019 - Dec 2019)

Member funded

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## Cleaning and disinfection of food factories: a revised practical guide

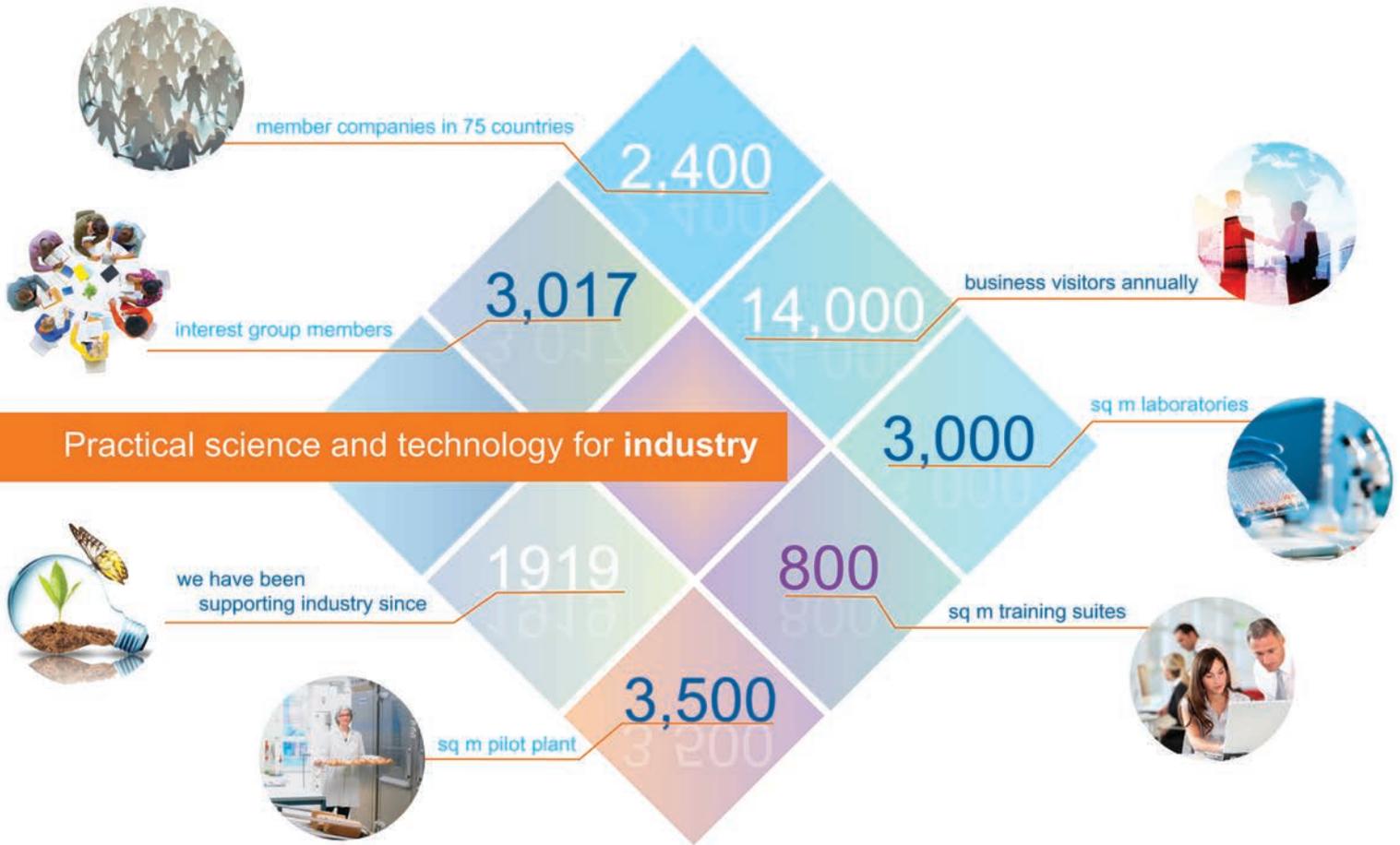
Campden BRI project 147083 (Jan 2019 - Dec 2019)

Member funded

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## Funding body abbreviations

BBSRC	Biotechnology and Biological Sciences Research Council
EU	European Union
EPSRC	Engineering and Physical Sciences Research Council
Innovate UK	Non-departmental public body, sponsored by the Department for Business, Innovation and Skills
Member funded	Projects funded, chosen and steered by Campden BRI members



## Mission

Practical application of technical excellence for the food and drink supply chain

## Vision

To be the partner of choice for the development and application of technical knowledge and commercially relevant solutions for the food and drink supply chain

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For other sites, see [www.campdenbri.co.uk/campdenbri/contact.php](http://www.campdenbri.co.uk/campdenbri/contact.php)