

Research programme 2019



Strawberry Flavoured Fresh Milk
 1 litre e

Ingredients
 Milk (95%), Sugar, Dried skimmed milk, Strawberry juice from concentrate (0.2%), Stabilisers (carrageenan, xanthan gum), Flavouring, Colour (beetroot red).

ALLERGY ADVICE
 For allergens, see ingredients in bold.

Nutrition

Typical values	per 100ml
Energy	303kJ 72kcal
Fat	1.5g
of which saturates	1g
Carbohydrate	10.1g
of which sugars	8.7g
Fibre	0.5g
Protein	3.5g
Salt	0.1g

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 100 years
 with industry for industry

Research programme 2019

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Introduction

Research Programme 2019 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 website
- 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) or from support@campdenbri.co.uk.

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

Effective control of viruses in the food manufacturing industry

Campden BRI project 147082 (Jan 2019 - Dec 2021)
Member funded

There is a requirement for the food industry to have effective control measures for viruses. Of importance is the assessment/validation of antimicrobial treatments against viruses. Selection of the correct surrogates for validation of food control measures is also important. The project will investigate the effect of product composition on survival and inactivation of various surrogates. The effects of processing and fresh produce decontamination technologies combined with ongoing storage will also be assessed. This project will provide members with data on the effect of product composition, processing and storage on the survival and inactivation of various surrogates.

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Cleaning and disinfection of food factories: a revised practical guide

Campden BRI project 147083 (Jan 2019 - Dec 2019)
Member funded

Since Guideline 55 was published by Campden BRI in 2008 a number of changes have been made in the management of hygiene in food production. For example, in the US (under the Food Safety Modernization Act), new controls have been introduced concerning sanitation; BRC v8 has requirements concerning cleaning (both microbiological and allergens); and cleaning is included as an integral part of the food safety management system in the Codex Alimentarius. In addition, new cleaning chemicals and techniques have become available. This has also been coupled with the production of different product types, equipment and methods. This project will provide members with updated guidance on cleaning and disinfection in the manufacturing process based on practical case studies.

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Next generation methods for microbiological and chemical food safety

Campden BRI project 144029 (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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Rapid methods for hygiene determination

Campden BRI project 144027 (Jan 2018 - Dec 2019)
Member funded

Many rapid hygiene test systems are already on the market but limited independent assessment has been carried out to understand their capability and suitability to different environments, contaminant types and production technologies. Systems with the potential for providing an array of real-time information are also starting to appear, some of them not fully explored yet. Examples include rapid microbial indication, allergen surface residue, DNA detection methods and sensor technologies as ways to indicate or control contamination.

The research will look mostly at microbiological and non-microbiological methodology for identifying hazards present and compare these with known and validated methods that are currently used but take longer. The project will provide members with factual information on how well different rapid methods for testing cleanliness work in real industrial situations.

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Food safety and traceability using protein profiling

Campden BRI project 140913 (Jan 2017 - Dec 2019)

Member funded

Mass spectrometry is widely used in pharmaceutical and food applications, the latter including complex matrices. Proteins and their peptide derivatives are responsible for food allergy, food functionality, nutritional properties (e.g. satiety) and food structure. They can also be used for 'fingerprinting' of foods. The approach could lead to reliable food safety applications, food fraud control, enhanced product development and efficient nutritional applications. This project will develop confirmatory methods for food allergen testing and the detection of the allergen source, multi-allergen testing methods, and protocols for handling difficult matrices in allergen testing and for the detection and the quantification of selected peptides/proteins.

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

Campden BRI project 140724

A collaborative project funded by Innovate UK

The BirdEase Project is developing an acousto-optic sensor system for use on farm to detect bacterial activity. Early indications are that the system can successfully discriminate between the important species of concern. However, it remains to be seen if different strains can be detected and identified. A prototype machine is being designed to accept contaminated boot covers on farm and output a report on the level and type of bacteria found in the sample. The system will include remote access for data collection, software upgrades and technical support.

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PouLLS: environmental indicator and animal welfare monitoring sensory system

Campden BRI project 137937

A collaborative project funded by Innovate UK

Poultry Livestock Sensor System (PouLSS) is a collaborative research and development project with the ambitious aim of creating an integrated platform that measures the environmental and welfare parameters in

real-time and provides predictive algorithms that enable global broiler producers to: improve productivity by identifying early warning signs and possible farm management intervention; demonstrate welfare standards have been satisfied; and benchmark houses, farms and sites globally identifying improvements and best practice.

The research is showing very positive results in relating distressed calls to both individual growth rate and the impact on neighbouring birds in a flock.

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Quality and value

New technologies for food and drink manufacturing

Campden BRI project 147084 (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 147085 (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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Intelligent dough mixer project

Campden BRI project (Dec 2018 - Aug 2019)

Funded by Innovate UK

Bakeries are sophisticated manufacturing environments that use raw materials to produce a wide range of goods in a short time. Getting dough mixes right is critical to

operational success but difficult to achieve. This is because of unpredictable reactions between biology (yeast), chemistry (enzyme reactions, oxidation/reduction) and physics (water movement) that take place during the 3-12 minutes that it takes to mix dough. Even slightly differing flour qualities have a big effect on the end product quality. The project's aim is to exploit recent developments in machine learning and artificial intelligence (AI) to create an entirely automated system that accurately tests and predicts optimal dough quality and consistency for commercial bakers. It will be capable of taking data from many sources and learning from it.

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3D printing of food

Campden BRI project 146283 (Sept 2018 - Sept 2019)

Member funded

3D printing/additive manufacturing is a rapidly growing technology, already widespread for customised, small scale manufacturing and prototyping of engineering components. New printers are now becoming available and can be used for various types of food materials. These food materials are typically paste-type materials which include chocolate, vegetable and meat purees, pancake batter, cream, cakes, and biscuits. The technology is capable of manufacturing product structures not achievable with conventional technology. This project will evaluate 3D printing to assess its potential, and limitations, for the food industry. It will also explore potential new capabilities of the technology.

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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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Novel natural preservative systems for use in drinks, sauces and other high a_w foods

Campden BRI project 144033 (Jan 2018 - Dec 2020)
Member funded

The food and drinks industry is under pressure to use clean label preservatives as an alternative to traditional preservatives. At present very few effective natural preservatives are permitted for use. In addition, many manufacturers of products currently stabilised by high levels of thermal processing are looking for natural preservation systems that will reduce energy costs, avoid flavour deterioration, help maintain heat labile nutrients, and permit a wider range of packaging options. This project will practically assess potential novel preservatives to understand efficacy and whether other processing steps are needed to ensure their effectiveness in extending shelf-life.

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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 142872
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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Extraction and purification of calystegines and iminosugars for use as natural preservatives

Campden BRI Project 145830

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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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

The quality and safety of cereal-based raw materials, ingredients and products is crucial to the cereal, baking and brewing sectors as well as many others. Analytical methods are a critical component of assuring quality and safety, and their development, trialling, standardisation and validation is a vital part of this. Cereals such as barley, oats and wheat are used in a wide range of products. They may be processed into the main ingredient (e.g. as malt, flour) in products such as beer, breads, biscuits, tortillas and many others or as a more minor ingredient in products such as soups, drinks, batter, and crumb coated foods. The quality and safety of cereals is of great importance to the relevant supply chains in particular since some of the cereal quality parameters have a direct influence on functionality and processing. This project will evaluate and make available a range of core analytical methods for cereals-based materials.

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Process manufacturing of functional food particles from lignin-rich feed

Campden BRI project 140673 (Aug 2016 - July 2019)

EPSRC Studentship at the University of Nottingham

By-products of various manufacturing processes are a wide-scale problem facing the food sector. Lignin as a material is a major constituent of plant cell walls and previous research at the University of Nottingham has highlighted the role of lignin as a surface active constituent to stabilise food emulsions and foams. This research will investigate process-based modification of lignin-rich feed material into functional food particles through the use of thermal processing and microwave processing as key modification processes. Different lignin-rich waste materials will be utilised and the impact of the process parameters linked with the material on the functionality of the product will be quantified for use as an emulsifier.

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Developing an understanding and improved sensory quality of low alcohol beer

Campden BRI project 140573

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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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

The objective of the project is to develop a model and solution application of precision agriculture for two crops (sweet corn in Hungary and tomato in Portugal) in two countries. SweetVeg aims to develop a solution for improving the yield, quality and compliance to food manufacturers' requirements of sweet corn and tomato through optimisation of the nutrient uptake irrigation, yield, harvesting time, with particular focus to the key quality attributes of sweet corn (for IQF cut corn defects, texture, colour, flavour for canned whole kernels defects, texture, appearance, flavour) and tomato (water content, nutritional properties, size, flavour, colour, defects and brix values). The integrated system targets farmers and manufacturers - helping farmers to use their resources (water, chemical, resources) in an efficient way with decreased costs, and provides manufacturers with optimised harvesting times and high quality raw material.

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Low protein wheat

Campden BRI project 139362
Funded by BBSRC

This project will facilitate the development of new types of wheat, with good breadmaking properties, at low grain protein (with fertilisation at the level required for the optimum yield). The project will also develop the use of selected current cultivars at lower protein contents than are currently required. This will be achieved by evaluating the performance of wheat lines selected for dough strength and stability at low protein content, developing new methods to determine quality at lower grain protein contents, establishing genetic markers for breeding for 'low protein' breadmaking wheat and providing new material to millers and bakers to enable them to optimise their processing conditions

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Nutrition, health and well-being

Calorie reduction and fibre enhancement

Campden BRI project 147087 (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 147088 (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 147089 (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 144037 (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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INCluSilver - Personalised nutrition for the future

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

The INCluSilver project aims to support collaboration between actors in different sectors to bring innovative ideas in the field of personalised nutrition for the 'silver economy' - the economic activity and consumer expenditure related to the specific population group of citizens over 50 years of age. The project approach is looking at consumers' needs in order to respond to the series of major challenges that affect the silver population. The food products selected for the demonstration include: an easy-to-chew texture, pre-sliced portionable baguette in re-sealable packaging, and a vegetable-based oven bake burger with added minerals and optional bio-active compounds offering health benefits for the silver generation. The project industrialisation relies on the use of advanced ICT technologies, in co-operation with other members of the INNOSKART ICT cluster.

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Iron and zinc bioavailability

Campden BRI project
Funded by BBSRC

Nutritional deficiency in essential dietary metals such as iron and zinc is a public health concern in the UK, particularly for girls and young women. Approximately 30 - 50% of the iron and zinc in the UK diet is provided by cereals and cereal. In wholegrain wheat, most of the iron and zinc is contained within a single layer of cells called the aleurone layer. However, recent work shows that aleurone cells are resistant to physical disruption and digestion. Additionally, the aleurone layer is removed during processing of wheat into white flour and hence much of the iron and zinc is lost.

This project aims to use novel food processing techniques to increase the bioavailability of the naturally-occurring iron and zinc in wheat. This process, called micro-milling, ruptures the aleurone cell walls and potentially makes the iron and zinc more available for absorption. Recently published work shows that micro-milling increases the solubility of iron and enhances iron absorption by intestinal epithelial cells. We will test the

bioavailability of zinc and iron in micro-milled wheat and analyse the structure of breads produced to assess the consumer acceptability of these products.

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Protein for life

Campden BRI project 142782

Funded by BBSRC

People in western society are living a lot longer, and 'ageing well' is now becoming a very important priority for public health. Ageing goes hand in hand with a loss of muscle size and strength (known as sarcopenia). Physical inactivity and poor nutrition are known to speed up the loss of muscle size and strength. A lack of protein is a key dietary deficiency for the ageing population. Food intake is known to decline with age. This is due to a range of factors including loss of appetite, changes in perceptions and taste, living conditions and financial reasons. There is currently a lack of mainstream food products that can help meet the protein needs of an ageing population.

This project will attempt to identify and develop guidelines for protein products for healthy ageing that are sustainable, cost effective and enjoyable. This information will then inform the food industry for new product development and reformulation of existing products that are appropriate.

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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

Varieties of semi-white and wholemeal breads with focus on improved nutritional profile for a healthy diet have been developed and screened for consumer acceptability. The cost premium associated with the use of more expensive ingredients is to be negated through the savings on the manufacturing cost. Improvements in line performance and energy use are to be achieved with better process control on the critical equipment. A network of sensors has been installed in the plant with continuous measurements and adjustments taken to monitor and quantify improvement. Higher added value

and bakery products aren't necessarily more expensive on the shelves if produced in high volume, on an efficient line, making the benefits widely available to those wanting the health conscious choice.

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Ingredient selection to meet compositional and nutritional targets

Campden BRI project 140908 (Jan 2017 - Dec 2019)

Member funded

Food and beverage product formulation / ingredient selection is being driven to meet an increasing number of compositional (and hence nutritional) goals by a range of factors, including consumer demand. This process is often technically complex due to the large and increasing number of variables involved - but necessary in the context of nutrition claims and wider corporate social responsibilities. Food retailers and manufacturers are driven to improve the nutritional composition of their products by the need to acknowledge consumer perception of nutritional requirements, the potential to make nutrition and health claims, and increasingly by corporate social responsibility. The final point is becoming increasingly relevant, as UK and European food supply is not fully meeting the nutritional requirements of the public. This project will develop a database tool to guide ingredient selection during formulation against compositional and nutritional targets.

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Starch structure and cell wall digestion

Campden BRI project 132138 (Jan 2014 - Jan 2019)

BBSRC Studentship at King's College, London

This project will elucidate the fundamental mechanisms by which the benefits of from the consumption of cereal-derived beta-glucan are delivered. In particular, it will focus on the impact of beta-glucan on moderating post-prandial glycaemia and insulinaemia. The working hypothesis is that the mechanism is driven by the reduced rate of absorption resulting from a combination of slowed transit through the gastrointestinal tract (mediated by increased bolus viscosity) and the reduced rate of starch digestion (mediated by inhibition of alpha-amylase activity).

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Sustainability, resilience and food security

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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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 O₂ 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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Mitigating food fraud - best use of analytical screening tools

Campden BRI project 144035 (Jan 2018 - Dec 2019)

Member funded

There is a requirement for companies to comply with BRC Global Food Safety Standard 7 (Chapter 5.4) by minimising the risk of purchasing fraudulent or adulterated food raw materials and to ensure that all product descriptions and claims are legal, accurate and verified. In some situations, testing of high risk raw materials and ingredients by using suitable tests will be needed. This project will demonstrate use of a simple

handheld spectroscopy device for rapid raw material screening and provide information on best practise for generation of a spectral data used for calibrations. The project will also demonstrate alternate high-end tests used to investigate non-conforming materials identified by spectroscopy.

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Using spent brewery grain to create a high fibre food ingredient

Campden BRI project 141268

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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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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Identification and monitoring activity on emerging issues in alcohol safety and legislation

Campden BRI project 142517

Member funded

Early warning of emerging issues and legislative changes is essential to reduce the impact of food safety and compliance issues in alcoholic beverages. This project involves horizon scanning using various sources on information including both technical and government information and is international in scope. The work is collated into a monthly bulletin which is circulated electronically to members.

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Skills and knowledge

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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Blockchain and emerging approaches supporting food safety management systems

Campden BRI project 147093 (Jan 2019 - Dec 2019)

Member funded

Blockchain is a continuously growing list of records, called blocks, which are linked and secured using cryptography. Each block typically contains a cryptographic hash of the previous block, a timestamp and transaction data. This project will investigate different tools, including blockchain,

to decide if they are applicable to food safety management and how they can be used. In addition, the project will assess other emerging approaches to hazard and risk analysis. Techniques such as “Bow-tie” enable visualisation of the evaluation and enhance risk communication. This will be done through interviews and discussions with industry colleagues, by participating in the Global Food Blockchain Initiative and through partnering with selected companies to test and challenge potential systems.

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SKIN - Short supply chain knowledge and innovation network

Campden BRI Hungary project (Dec 2016 - Dec 2019)
EU funded

SKIN is an initiative of 20 partners in 14 countries in the area of Short Food Supply Chains (SFSCs). The goals of the project are to systematise and bring knowledge to practitioners, promote collaboration within a demand-driven innovation logic and provide inputs to policymaking through links to the EIP-AGRI. One of main aims is to build and animate a community of about 500 stakeholders, around the identification of good practices in short supply chains across Europe. Partners will scout, analyse and classify a significant number of cases in different countries. Best practices will be systematised, processed into highly usable formats (including video and page-flows) and made accessible to stakeholders via the web (following the EIP AGRI formats) and through the set-up of regional nodes. The work on good practices will also allow identification of key issues (hindrances or opportunities) around SFSCs. Such issues will be the main themes of six innovation challenges workshops, the purpose of which is to stimulate stakeholders to propose new ideas for innovation based research or innovation uptake.

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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

Slovenia, Hungary, Poland and Slovakia are facing declining employment opportunities in traditional industries as a

result of structural change. This emphasises the need to take steps to stimulate economic activity with employment generating potential in regions that are facing difficulties in maintaining a critical mass of facilities to support economic development. Analysis shows that the food sector is potentially one of the most important fields in which to leverage improvements in the socio-economic situation in remote areas. Within this framework, those Central Europe Countries, together with Austria, Italy and Germany, will design and implement a sustainable transnational action plan to generate competitive advantages for SMEs and proactive hints for intermediaries and institutional representative levels. Ten competent partners, bringing knowledge competences and reliable and strong relationships with their local environments, will collaborate to improve entrepreneurial competences and skills in remote areas through food innovation potentials. Outputs of I-CON www.interreg-central.eu/Content.Node/I-CON.html will be a joint transnational food mentor scheme and a food crowd design platform usability.

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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 issues: contaminants applicable to brewing industry

Campden BRI project 132110
Member funded

Rapid access to information on food safety and regulatory issues is an essential part of controlling risk. In this project, information relating to maximum level for certain contaminants gathered from a variety of international regulatory sources is collated into searchable databases. In addition, briefing notes on key topics are generated and are made accessible to brewing members.

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Projects completed in 2018

Using crop genetics to understand the importance of dietary resistant starches for maintaining healthy glucose homeostasis
Campden BRI project 134915 (Sep 2014 - Aug 2018)

BBSRC DRINC Initiative at Imperial College, London
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In-pack ohmic food processing
Campden BRI project 136191 (Jan 2015 - Dec 2018)

Funded by Innovate UK
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Radio frequency assisted proving and baking (RF-ProBake)
Campden BRI project 136210 (Oct 2015 - Mar 2018)

Funded by Innovate UK
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To develop sustainable approaches to improve grain quality and help end users of soft wheat to mitigate challenges in downstream processing
Campden BRI project 136396

Funded by Innovate UK
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Risk reduction strategies for chemical contaminants in primary production
Campden BRI project 138054 (Jan 2016 - Dec 2018)

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Ensuring the chemical safety of food and drink using non-targeted screening methods
Campden BRI project 138056 (Jan 2016 - Dec 2018)

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New technologies for food and drink manufacturing
Campden BRI Project 138057 (Jan 2016 - Dec 2018)

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Emerging ingredients - considerations for use in products
Campden BRI Project 138058 (Jan 2016 - Dec 2018)

Member funded
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Improving the nutritional status of crops for the agri-food chain
Campden BRI project 138060 (Jan 2016 - Dec 2018)

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Designing food and drinks for personalisation of diets for different life stages
Campden BRI project 138061 (Jan 2016 - Dec 2018)

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Extension of product shelf life through superchilling
Campden BRI Project 138069 (Jan 2016 - Dec 2018)

Member funded
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Reducing waste and improving quality in the food supply chain using cold plasma technology as a last decontamination hurdle on the food production line
Campden BRI project 138773 (Aug 2015 - Jul 2018)

Funded by Innovate UK
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Innovative salt reduction and fibre enhancement of artisanal sourdough bread products (Optimise)
Campden BRI project 140113 (Sep 2016 - Aug 2018)

Funded by Innovate UK
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Improving the nutritional profile of baked gluten and wheat free products by reducing fat, sugar and salt and improving fibre content
Campden BRI project 140160 (Sep 2016 - Aug 2018)

Funded by Innovate UK
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“Shelf-Life Plus”: enhanced shelf-life evaluation using microbial profiling

Campden BRI Project 140910 (Jan 2017 - Dec 2018)

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Hygienic design: retrospective modification of existing plant

Campden BRI project 140912 (Jan 2017 - Dec 2018)

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A reference source: the microbiological effects of food processes

Campden BRI project 140914 (Jan 2017 - Dec 2018)

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Thermal processing of bakery products in baby and children’s food

Campden BRI project 142715

Funded by Innovate UK

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Feasibility of a novel food preservation system

Campden BRI project 142817

Funded by Innovate UK

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Sampling for hazards: a practical guide

Campden BRI project 144036 (Jan 2018 - Dec 2018)

Member funded

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FOODLAB: Sharing of knowledge between the academic and business worlds

Campden BRI Hungary project (Jan 2015 - March 2018)

Co-funded by the EU Erasmus+ Programme

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NutriSEA-Network of Universities and Enterprises for Food Training in Southeast Asia

Campden BRI Hungary project (Oct 2015 - Oct 2018)

Co-funded by the EU Erasmus+ Programme

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Useful web addresses

Project websites

www.campdenbri.co.uk/research/projects.php

Project drivers/themes

Safety

www.campdenbri.co.uk/research/safety.php

Quality and value

www.campdenbri.co.uk/research/quality-value.php

Nutrition, health and well-being

www.campdenbri.co.uk/research/nutrition-health.php

Sustainability, resilience and food security

www.campdenbri.co.uk/research/resilience-efficiency.php

Skills and knowledge

www.campdenbri.co.uk/research/skills-knowledge.php

R&D reports

www.campdenbri.co.uk/research/reports.php

Research summary sheets

www.campdenbri.co.uk/research/summary.php

MIGs (Member Interest Groups)

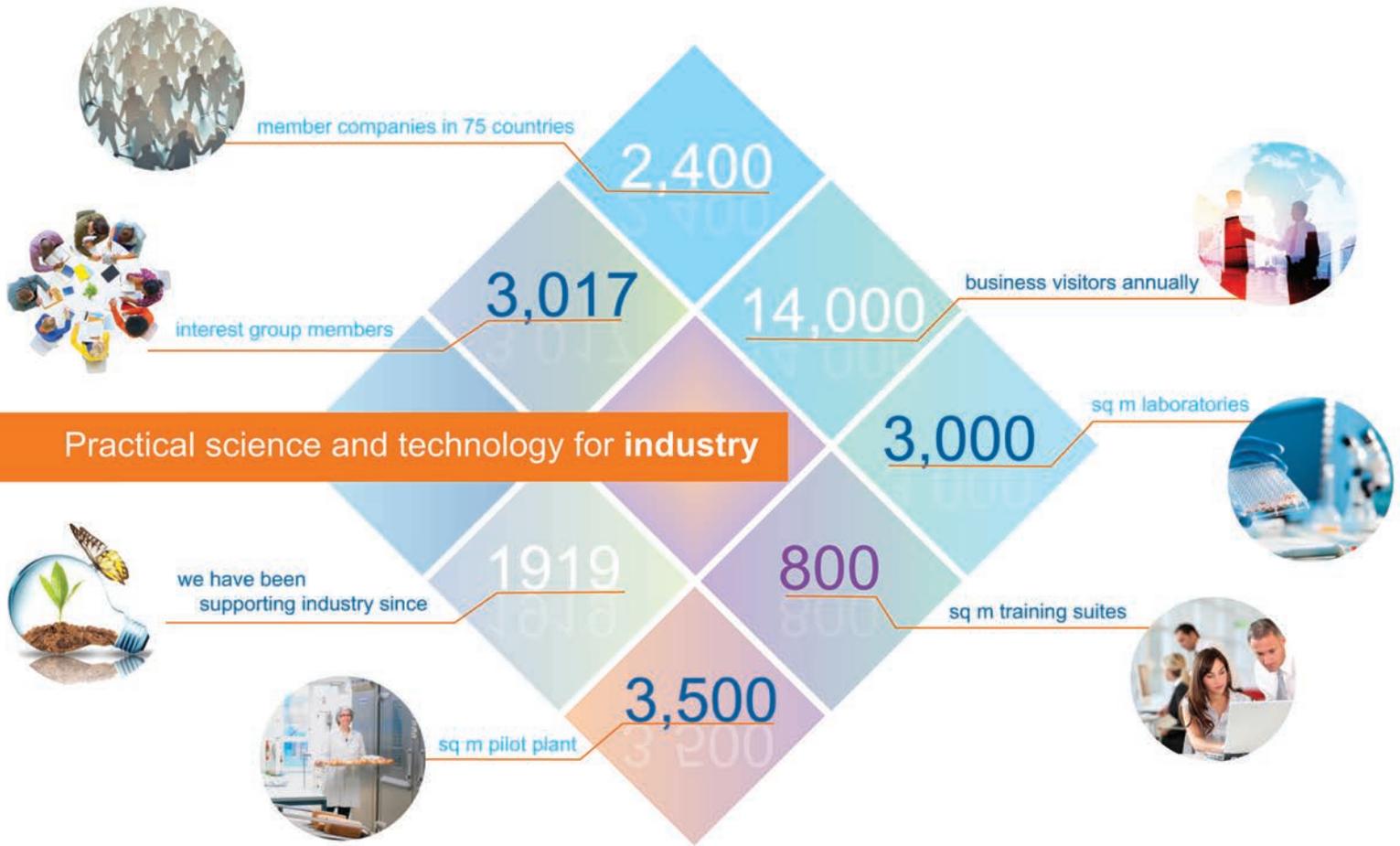
www.campdenbri.co.uk/research/migs.php

Through the MIGs you can:

- discuss topical industrial issues
- meet with industry peers
- consider the impact of emerging legislation
- select and steer research
- enjoy early access to research results

MIG dates for 2019

www.campdenbri.co.uk/research/paneldates.php



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