Monitor Lart and Ivan Bartolo explore the uptake of microplastics by fish, crustaceans and shellfish and consider the implications of this for the food and drink sector.

Mark Swainson, Richard Marshall and Tom Hollands discuss the need to combine healthy choices with reducing carbon footprint in the convenience foods sector.

Tim Lobstein, looks at the increasing trends to regulate the food market to help address obesity.

Antimicrobial resistance in the agri-food chain: J Andrew Hudson examines the development of antimicrobial resistant (AMR) bacteria from the food production perspective.

Obesity: the challenge for the food industry: Tim Lobstein looks at the increasing trends to regulate the food market to help address obesity.

Microplastics in seafood: Ivan Bartolo and William Bax explore the uptake of microplastics by fish, crustaceans and shellfish and consider the implications of this for the environment and human health.

John Points, Mind the gap: John Points, Michael Walther and Natasha Mehlwood review the highlights of a meeting held in Reading in May 2018 on the regulatory implications of the UK exit from the EU.

Personalising nutrition for older adults: Helen R Griffiths explains why a personalised strategy for nutrition is a sustainable way to improve health in the elderly population.

Obesity: the challenge for the food industry: Tim Lobstein looks at the increasing trends to regulate the food market to help address obesity.

Brexit viewpoints: Evolving risk management systems: Louise Manning and Peter Wareing consider evolving challenges to risk management systems in the food industry.

Hygienic engineering design Debra Smith describes the aims and activities of the European Hygienic Engineering and Design Group (EHEDG) and explains its links with IFST.
Childhood obesity change4life

Levels of severe obesity in children aged 10 to 11 years have reached the highest point since records began, according to new figures published in July 2018 by Public Health England (PHE) [1]. This trend has been decades in the making – reflecting it will not happen overnight.

Analysis of the National Child Measurement Programme (NCMP) between 2006 to 2017 and 2016 to 2017 details trends in severe obesity for the first time. The programme captures the height and weight of over 1m children in Reception (aged 4 to 5 years) and Year 6 (aged 10 to 11 years) in school each year.

The findings also show stark health inequalities continue to widen. The prevalence of excess weight, obesity, overweight and severe obesity are higher in the most deprived areas compared to the least deprived – this is happening at a faster rate in Year 6 than Reception.

Other observations include:

- an upward trend of excess weight, overweight, severe obesity in Reception and severe obesity in Year 6 children
- a downward trend of excess weight, overweight, obesity and severe obesity in Reception age boys
- a downward trend of overweight in Reception age boys and girls, and Year 6 girls.

The rise in severe obesity and widening health inequalities highlight why bold measures are needed to tackle this threat to children’s health. The Department of Health and Social Care recently announced the second chapter of its Childhood Obesity Plan to help halve childhood obesity by 2030. Main actions include:

- mandatory calorie labelling on menus and restrictions on price promotions on food high in salt, sugar or fat. These measures will go out for consultation later this year. PHE is also working with the food industry to cut 20% of sugar from everyday products by 2020, and 20% of calories by 2024. It aims to help families to make healthier choices through its Changed Life campaigns – the free Food Scanner app reveals the sugar, fat, salt and calories in popular foods and drinks.

- unhealthy weight in childhood can result in stigmatisation, illness and low self-esteem. It is also likely to continue into adulthood, increasing the risk of preventable illnesses including type 2 diabetes, heart disease and some cancers.

New network supports smart tech for food

A new project has been launched to examine the potential of the Internet of Things (IoT) to transform the food industry through innovations such as ‘smart’ cooking appliances, data-driven supermarket refrigeration networks and automated food traceability systems [2]. The project is funded by a £1.14m grant from the Engineering and Physical Sciences Research Council (EPSRC) to nurture and grow the UK’s food manufacturing digital economy.

The Internet of Food Things (IoTF) Network Plus will bring together data and IT scientists, chemists and economists to investigate how advanced technologies can enhance the digitalisation of the UK food supply chain.

The network, led by the University of Lincoln in partnership with the universities of Southampton, Surrey, East Anglia, and the Open University, will examine the application of the IoT in connected homes of the future – for example smart refrigerators that trigger a grocery order when food items run low, or cooking devices that could help us live healthier lives. The network will also examine the traceability of food and how machine learning and artificial intelligence could be utilised to personalise food production, data-driven from the vast amounts of data available across the whole food industry supply chain, improving efficiency and reducing food waste.

Businesses and researchers nationally will be able to participate in workshops, run annual conferences to share best practice across the sector and bid for funding for pilot studies, projects and reviews. Collectively these initiatives, which will run until May 2021, will contribute to progressing the digitisation of food manufacturing in the UK.

The aim is to specifically engage with the whole of the food and digital innovation chain. The project will combine interdisciplinarity from the food science and technology practitioners, policy makers, engineers, management specialists and colleagues in social and behavioural sciences. The inclusion of food retailers like Tesco within the consortium provides access to data sets demonstrating consumer behaviours.

Altogether academic expertise, the project will involve industry specialists from a range of areas, such as the global engineering company Siemens, IoT and machine management solutions’ firm IMS Evolve, supermarket chain Tesco, the rural agricultural consultancy Collision and Associates and the High Value Manufacturing Catapult Regulators, such as the Food Standards Agency and GS1, an international agency that sets data standards for bar codes, will also have input and consumers will be engaged through representative bodies.

Vitamin B12 boost for vegetarians

Scientists at the University of Kent have discovered that the vitamin content of some plants can be improved to make vegetarian and vegan diets more complete. Vitamin B12 (known as cobalamin) is an essential dietary component but vegetarians are more prone to B12 deficiency as plants neither make nor require this nutrient. A team, led by Professor Martin Warren at the University’s School of Bioscience, has proved that common garden cress can take up cobalamin. The amount of B12 absorbed by garden cress is dependent on the amount present in the growth medium. Further work is planned to replicate this in other plants and ensure that all those across the spectrum get the full benefit of the new way data is managed and accessed. The food scanner data to the FSA, slaughtermen and farmers.

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New method measures chilli heat of food

Camden BRI has developed a new method to rate the chilli heat of complex products, such as ready meals and cooking sauces[1]. The calibrated method uses the BRI's highly-tuned panel of taste testers to provide retailers and manufacturers with a consistent way to rate their products as mild, medium, hot or very hot.

Ingredients and even the colour and texture of a product can influence the perception of hotness. Camden BRI's method takes these factors into account and is reported to provide a consistent and reliable heat rating for food products. Samples are evaluated individually in sensory booths under coloured light to mask any differences in the colour of the products. While the heat of whole chilli is measured using the HPLC and given a Scoville rating, when complex products are tested in this way, the results may not correlate with the perceived spiciness when the product is consumed. This would mean that manufacturers are inadvertently providing misleading information to consumers.

Antibiotic stewardship

The British Poultry Council (BPC) has released its 2018 Antibiotic Stewardship Report[2], which highlights the achievements made by the British poultry meat sector’s drive to deliver responsible use of antibiotics to safeguard the efficacy of antibiotics across the supply chain.

The poultry meat sector became the first UK live-stock sector to pioneer a data collection mechanism and support antibiotic stewardship training in the Government’s Veterinary Medicines Directorate (VMD). Data collected by the BPC is published every year as part of the UK Veterinary Antimicrobial Resistance and Sales Surveillance (UK-VARS) Report. The BPC collects and monitors usage of all antibiotic classes in the UK poultry meat industry aiming to promote and apply best practice throughout the supply chain. It has facilitated sharing of best practice on responsible use of antibiotics with other livestock sectors in the UK and across the world.

The BPC is working with animal and human health experts to develop a methodology for rapid on-farm diagnostics to increase speed of antibiotic sensitivity testing and to ensure early diagnosis. The aim is to use the diagnostic and sensitivity testing tools used in human medicine to better map bird health and welfare, evaluate the impact of disease control programmes and implement robust surveillance. The BPC is also supporting scientific research into examining the link between antibiotic use and resistance in the poultry production chain, understanding patterns of transmission and tackling antimicrobial resistance.

Nearly a billion birds are reared for food every year in the country, poultry meat production has increased by 10% in the last six years (2012-2017). Since 2012, the British Poultry Council Antibiotic Stewardship programme has helped to deliver significant reductions in the overall use of antibiotics:

- 87% reduction in the total use of antibiotics in the last six years (2012-2017);
- 91% reduction in the use of Flumequinolones (a Critically Important Antimicrobial for human health) in the last six years (2012-2017);
- 39% reduction in net use of antibiotics in the last year,
- 60-44% reduction in overall antibiotic use in chickens, 59.57% in ducks and 80.90% in turkeys in the last three years.
- There has been a significant reduction across all classes of antibiotics used in the last two years, most notably, a 63.09% reduction in the use of tetracyclines and a 22.09% reduction in the use of amoxicillin.

The BPC claims that UK poultry farmers and veterinarians need antibiotics in their toolbox to preserve the health and welfare of the birds. It argues that responsible use of antibiotics is about more than reduction targets and that zero use is neither ethical nor sustainable as it goes against farmers’ duty to alleviate pain and suffering.

Test for poultry infection

A team of scientists lead by Brunel University London are developing a molecular test and a smartphone app that, when used together, can detect six key pathogens in poultry[3]. Backpacked by £65,655 from the UK government’s Newton Fund, Brunel will work with the University of Surrey and Lancaster University to develop the tests over the next three years.

The new hand-held device and smartphone app will be tested by farmers in the Philippines but could subsequently be rolled out to farmers in other developing countries. It should help farmers act fast before disease can spread and potentially infect people. It also cuts out the need to send samples away for expensive laboratory tests.

Farmers in the Philippines will collect samples from their birds using a large-microscope-sized instrument that screens the DNA and RNA. The device connects wirelessly to the app to display the results, which can also be fed into a central store to help track outbreaks across the islands. The whole process takes less than an hour.

Near-patient molecular diagnostics have been very important in improving human health, but such technology in animal health on farms is less advanced. ‘‘It’s a nightmare for farmers and hundreds of thousands of people in the Philippines and other poorer countries who make a living farming poultry, so disease outbreaks can devastate their economies. Standard molecular tests do not work well for developing countries. Equipment is expensive, mobile instruments are rare and laboratory results can take hours or days. This new test could have a real benefit to the poultry industry, especially in low and middle-income countries.”
Winning ways

A team of students from the University of Nottingham won the gold prize at Ecotrophelia UK with their spicy BBQ flavoured savoury snack. The RICHi Pickings’ team has developed ‘Furn Puffs’ – a tasty and nutritious snack made from extruded apple pomace and maize, packaged in a recyclable pouch. Each member of the gold-winning team took home a share of £2,010 and an invitation to become an IFST Young Ambassador.

In its sixth year, Ecotrophelia UK is a Dragon’s Den style competition that challenges teams of UK students to develop an innovative, eco-friendly food and drink product. From idea generation through to the final packaged product, the teams get hands-on experience of what goes into bringing an eco-friendly food or drink product to market.

The finalists pitched their products on 5 June and the winner was announced the next day at Campden BRI’s annual open day. The awards were introduced by the competition’s Chief Judge and Head of Central Technical Operations at Sainsbury’s, Alex Kyriakides, and presented by Patrick Carter of Marks and Spencer, the prize sponsors.

Lisa Williamam, a food science student at the University of Nottingham and captain of ‘RICHi Pickings’, said, ‘Ecotrophelia has been a very positive experience. We applied what we’ve learned in our studies, demonstrated our knowledge to the dragon and received great feedback as a result! We’re also grateful for the technical support that we’ve received along the way’.

Another team member added, ‘We’re overwhelmed to have won. All the hard work done alongside our degree has finally paid off. Our teamwork and incredible belief in our product are what made it a success. It is also strongly aligned to the ‘RICHi Pickings’ values – Reuse, Innovate, Community, Honesty’.

The Supreme Team from London Metropolitan University secured the silver prize and £1,500 with their luxury veggie and eco-friendly marshmallow, made from aquafaba and apples, coated in dark chocolate. Bronze and £500 was awarded to the team from University of West London for their faro based ‘tales-o-style’ savoury balls with a soft dip centre and a crunchy farro bran crust.

The teams pitched their ideas to judges from top names in the food and drink industry including Marks and Spencer, Coca-Cola, Unilever, PepsiCo, Mondelēz, Sainsbury’s, Waitrose, Tesco, Food Manufacture, Institute of Food Science and Technology and Campden BRI. Additional sponsorship was also provided by Food Matters Live.

The winners now go on to compete against 19 other European teams at the Ecotrophelia European final at SIAL in Paris on 21 and 22 October 2018.

The theme of this year’s Sensory Science Group (SSG) Conference was health and wellness, a topic of great interest and relevance to everyone across the spectrum of approximately 70 students, academics and industry representatives attending. The conference took place at University College Birmingham on 7 June.

The presentations and discussions covered areas, such as how we can feel-good and measured, which food and drink products and functional properties promote wellness, and how can products be developed to deliver benefits in this area – a very ambitious agenda.

Martin Kern from Eurofins SAM Sensory and Marketing International presented highlights from a European sensor network sponsored online survey exploring consumer awareness around the world of concept wellbeing or wellness. This ambitious survey was conducted in 24 countries, which required the data to be translated into ten different languages, and used a straightforward approach of asking consumers to write down four words that come to mind when they think of ‘feeling good’ both as a concept in itself and in relation to various product segments, including food and beverages.

Martin Yeomans from Sussex University-based Ecotrophelia brought an insight into sensory influences on food satisfaction. In relation to satiation, sensory influences are thought to modify the perception of ‘how satisfied’ in two different ways: our hedonic appreciation of food (palatability) promotes intake, while decreased liking as we consume a food (sensory specific satiety) acts to limit intake. In this presentation, Yeomans introduced a third idea, sensory hedonic contrast, which suggests that absolute liking is influenced by the degree of contrast between food items. In addition, satiety expectations and sensory anticipations can contribute to a very complex model, which was highlighted when Yeomans reminded us that it is still probably more difficult to predict what someone will choose for lunch than when a rocket will land on the moon!

Lisa Dreyfus from Biofortis introduced a new questionnaire to support well-being claims with respect to consumer products. Background work included an in-depth literature review investigating the many aspects and definitions of well-being. Using this knowledge, the questionnaire was developed incorporating 61 questions in nine well-being dimensions. This tool is designed to be used after an in-home or in-context usage period.

Carl Philpott from the University of East Anglia Medical School gave an overview of the impact of losing smell without smell. Although loss of smell is quite common, it is often not considered as difficult for the individual as losing acuity in other senses, considered as difficult for the individual as losing acuity in other senses.

The event took place at University College Birmingham and consisted of an interactive session tackling the challenges of creating healthy food that consumers can access and enjoy. The conference also featured a highly-informative, fast-paced student flash poster session.

The conference was attended by a selection of healthy and delicious food and drink from the catering team at UCB. All in all a healthy dose of learning, networking and creating. In fact, many delegates are already looking forward to the SSG conference 2019.

Carol Raitthaith, IFST Sensory Science Group
This year at the IFST Lecture 2018 we had the privilege of hearing Dr Michael Mosley, well-known British television journalist, producer and presenter. The title of the lecture was the MMR vaccine (measles, mumps and rubella) and autism and bowel cancer. A Sunday newspaper subsequently revealed there was a conflict of interest thus discrediting the research due to the fraudulent data, resulting in the physician being struck off in the UK and the cover up being declared false by a coroner.

The fact that the public are often confused by conflicting and contradictory media reports and unsure who to trust, was also considered.

Mosley talked about cholecystokinin studies [low (LDL) and high (HDL) density lipoprotein(ine)] involving volunteers from University of Cambridge with no history of diabetes or heart disease, who were asked to consume uncooked butter as well as extra-virgin olive oil and coconut oil. Although the latter was shown to be convincingly the best, more studies were deemed to be required due to limited available data.

Statistics Professor Stephen Scurr reviewed how health news is reported in the press, and how the process from the initial study, through to the generation of the published article allow distortions to creep in. Such ‘Crisis against Science’ includes:

• reporting research carried out in animals, without mentioning the absence of human studies – hence results may have no relevance to humans;
• reporting a correlation as a cause, for example an association between being wealthy and a higher rate of brain tumours;
• not distinguishing between relative and absolute risk, such as claiming consumption of processed meat (a little versus a lot) increases the risk of cancer by 17%, when the absolute risk may still be small (less than 1%);
• the lecture continued on to discuss the impact of daily activities or consumption on life expectancy. For example, smoking 20 cigarettes a day, reducing it by ten years, and 50g of processed meat, or two hours of television, by a year. On the other hand, it was explained that fruit and vegetables can add four years, two to three cups of coffee one year, and the first 20 minutes of exercise two years, but the next 40 minutes only eight months. The fact that half the population get runners’ high was described and that scientists think the effect can be attributed to chemicals other than endorphins, such as endocannabinoids, which give the effects of cannabis.

The question of whether the media are to blame for consumer confusion was raised, e.g. a university press officer may generate a dramatic headline, which a journalist could edit to maximise impact. An article given was a newspaper headline linking fasting with diabetes when the reports were based on studies with rats. To enable accurate reporting in the UK, the Science Media Centre deconstructs stories to decide if they are believable.

When Michael was diagnosed as a type 2 diabetes, he used an intermittent fasting diet, namely ‘5:2’ (involving only eating 500 calories on two days a week but eating normally the other 5), rather than medication to successfully reverse the condition. This was in line with what had been demonstrated by Professor Taylor from Nottingham University, who proved that excess fat in the liver passes into the pancreas impacting insulin production.

However, the condition can be reversed if a person loses weight. If one is prediabetic, losing fat is also important in reducing one’s risk of developing diabetes. However, the risk of developing diabetes, thousands of limbs are amputated each year because of complications of type 2 diabetes.

Consumption of a healthy Mediterranean diet (high in fruit and vegetables, legumes, olive oil and oily fish; low in meat and dairy foods), reduces the risk of heart attacks, breast cancer and cognitive issues, and wholegrains and vegetables were recommended as pasta substitutes. It was explained that fibre-rich foods feed one’s gut microbiome, the diverse community of bacteria inhabiting our intestines, which influence health but are affected by poor diet and overuse of antibiotics.

Michael specifically mentioned the FREMED study involving 7400Spaniards, encouraging to eat more fruit and vegetables, but fed either a low-fat diet (eating carbohydrates) or a Mediterranean diet (including extra-virgin olive oil, nuts, eggs, red wine, dark chocolate), which showed the latter reduced the risk of cardiovascular disease among high risk persons. There was also a positive impact on breast cancer and cognitive function. He also endorsed fermented foods (e.g. shark, dark chocolate, red wine) as being beneficial – ideally those made safely using traditional methods (e.g. sauerkraut) and containing a wide array of bacteria in acidic conditions which boost gut health. On the contrary, commercial versions are likely to be pasteurised to kill bacteria for food safety reasons and shelf life extension.

The discrepancy between fact and reporting was raised, regarding media coverage of daily foods protecting against diabetes, which is unproven. Similarly, inaccuracies in links between energy and health are also covered by NHS Choices.

To sum up, a prescription for a healthy life was described advising people to:
• keep active, especially outside;
• participate in resistance exercises;
• enjoy Mediterranean/fish rich/fermented foods;
• avoid antibiotics unless absolutely necessary, especially in the case of children;
• minimise consumption of processed foods;
• remain curious.

IFST President, David Gregory, congratulated the Lecture being exciting, informative and fun, and Michael Mosley thanked the audience for their stimulating questions.

Register of Food Safety Professionals

Those of you who have a LinkedIn account may have noticed recently that we have been actively promoting our Register of Food Safety Professionals through sponsored advertisements. This is an important step for us to gain a wider recognition and sign-ups to this important register.

The Register of Food Safety Professionals is the mark of competence and professionalism in the food sector. Registrants gain access to up-to-date food safety information and the opportunity to manage their personal career development through Continuing Professional Development (CPD) and knowledge sharing.

For more information and to join the Register, please visit https://www.ifst.org/food-safety

Not as free trade as you thought...

It is an opportunity to hear from the Department for International Trade on the potential and opportunities for free trade expansion of markets outside the EU. However, the legislative differences with these other markets must be considered before such trade can occur.

IFST Food Law Group will host an interactive seminar on 25 September 2018 to identify the practical legislative issues that must be taken into account when a company is considering expanding trade to non-EU markets, from product formulation through to packaging and labelling.

Organic Food update

As part of our commitment to provide relevant and clear science-based information about food science and technology, we have updated our Information Statement on Organic Food. It looks at current EU rules related to organic food and the associated certification system. The guide is freely available online.

For more information on organic food, please visit https://www.ifst.org/resources-information-statements/organic-food-1

We are pleased to announce that Caroline Wood has been selected as IFST’s 2018-19 POST Fellow. Caroline will take part in a fully funded 3-month placement at the Parliamentary Office of Science and Technology (POST), where she will author a POSTnote to inform Parliamentarians on a specific topic (to be decided in due course).

Caroline is a PhD student at University of Sheffield, where she is conducting research in animal and plant sciences.
Blessing Nwokocha, University of Reading

The IFT Student Association (IFTSA) organised its second annual Global Challenge at the IFT18 Conference held in Chicago themed ‘A Matter of Science + Food’. We were selected to take part in this Challenge after participating in an IFTSA competition in the UK. For this competition, we had to write on pressing global food issues that the food industry will face within the next five to ten years, stating what roles we could play in addressing them.

The Global Challenge comprised undergraduate and graduate students from universities across the globe, such as the USA, UK, Canada, Belgium, Malaysia, South Africa and China. We were a total of twenty food science students forming five teams of four. It was indeed an educational and exciting experience to work with students from these parts of the world and discovering the differences in our courses and culture was really interesting. The common point was that each team had a briefing session on Sunday evening, where each team was assigned a mentor from the food industry. The Awards ceremony and networking event followed afterwards which were great networking platforms. We were introduced to the members of IFT and the student body and were privileged to be the first set of students invited to the International Partners Reception.

Each team had a case study with a unique trend. For our team, it was the ‘clean labelling’ trend with the challenge of replacing artificial flavours and colours in a nacho cheese dip. Thousands of exhibitors from across the world created the expo floor. From eating popped brown rice. From chocolate bar (very nice!) or ready meals from various companies and samples. For instance, my group had to apply and participate in the IFT Global Challenge, I was recommended every student to apply for it. It provided invaluable skills acquisition and learning opportunities, such as improving our ability to work as a team and enhancing our problem solving and creative thinking skills. Learning directly from our mentors and gaining first-hand from their experience was invaluable. The mentors and solutions and listening to other group presentations was key in addressing some global food issues.

In general, the IFTSA Global Challenge has been a very rewarding, inspiring and fun-filled experience. I’m so glad that I participated and do encourage other students to do so.

Antonio Lonigro, Sheffield Hallam University

IFT (Institute of Food Technologists) hosted the ‘Global Challenge 2018’ in Chicago, USA, from 15 to 18 July 2018. We had the honour to participate thanks to the collaboration between IFT and IFTSA. In order to take part in the competition, we had to go through a national competition launched by IFTSA earlier in the year. The competition consisted of writing an essay (500 words) to identify, explain and propose solutions to a global food challenge.

Twenty students from the USA, the UK, China, South Africa and Puerto Rico joined us in the competition under the guidance of IFTSA (Institute of Food Technologists Student Association).

On our first day, after registration was over, we gathered together and were divided into five groups of four students. Each group had an expert mentor that guided us in finding the best solution to the challenge. We then had to randomly pick a real-world based case study. To find a solution to our case study, we were asked to use all the tools and resources from the expo (e.g. brochures and samples). For instance, my group had to develop an energy bar and find a suitable method to incorporate nutrients or other compounds to improve gut development and health.

In order to be able to come up with a suitable product, we took part in talks, presentations, scientific sessions, but above all the majority of the inspiration derived from the expo floor. Thousands of exhibitors from across the world created the perfect environment for us to understand what is new in the food industry and which products could be used to overcome the challenge. Moreover, this was a great opportunity to create networks with experts in the field.

At the end of the three-day challenge, we were required to give a brief presentation about the product and the rationale used to tackle the problem. This gave me the opportunity to show my skills in terms of team working and presentation to an audience.

Furthermore, during the three-day challenge we, as a group, also started to share previous experiences, skills and knowledge. For example, I had a constructive discussion with a US student about food labelling and the differences between the US and the UK. This exchange of opinions and knowledge was, for me, the highlight of the entire challenge.

During the three-day expo, I came across a countless number of new products that I did not even know existed, such as hemp chocolate bar (very nice)! or ready to eat popped brown rice. From this experience I have learnt that it is very important to expand one’s own knowledge, learning and researching all around the world for new ideas. This is a new skill that will allow students to be more creative and open-minded.

In conclusion, I would definitely recommend everyone to apply and participate in this competition because it is a great opportunity to expand knowledge, create new connections in the field, share the experience with other students and exchange views.

Plastic packaging in the industry

Over the past few months, plastics have been grabbing the headlines and getting a lot of public attention.

In the food context, plastic is used to protect food products from damage and spoilage. We have produced a document which highlights important technical facts to consider when choosing plastic packaging.

To download the information sheet, please go to https://www.ifst.org/resources-leaflets/plastics-packaging-food-and-drink-industry
Recent highlights from IFJST on food and health

Antioxidant and anti-inflammatory peptides obtained by simulated gastrointestinal digestion of edible insect proteins

The aim of this study was to determine the effect of heat treatment of edible insects on antioxidant and anti-inflammatory activities of peptide fractions from hydrolysates obtained by in vitro gastrointestinal digestion thereof. The highest antibacterial activity was noted for the peptide fraction from the Tenebrio molitor (mealworm) protein showed antioxidant and anti-inflammatory properties of (EC50 value 2.21 μg mL−1) and the highest reducing power ability (EC50 value 2.21 μg mL−1) respectively. The peptide fraction from the Tenebrio molitor (mealworm) protein showed antioxidant and anti-inflammatory properties of (EC50 value 2.21 μg mL−1) and the highest reducing power ability (EC50 value 2.21 μg mL−1) respectively.

The heat treatment process has a positive effect on the antioxidant and anti-inflammatory properties of peptides. All identified and synthesised peptides from insect protein showed antioxidant and anti-inflammatory activity. Zarkina et al., 2018, doi.org/10.1111/jifs.13648

Effects of Zijuan tea on blood glucose and glucosamine tolerance of hyperglycaemic mice

The effects of polysaccharides, theaflavins, thearubigins and theabrownin high- and low-dose treatments had greater glucose tolerance as well. Thus, the theaflavins and polyphenol fractions of Zijuan tea effectively modulated the complications of hyperglycaemic mice. The lower effectiveness of theaflavins and theabrownin fractions may be caused by the highly polymerised polyphenolics, which decreased their accessibility to α-glucosidase and digestibility in mice. Chen et al., 2018, doi.org/10.1111/jifs.13825

Effects of dietary advanced glycation end products and glucosamine on the gastrointestinal tract in rats

The gastrointestinal (GI) tract represents the first barrier against the penetration of organisms by dietary advanced glycation end products (AGEs), but their accumulation in tissue and AGE-induced effects on the GI tract have yet to be completely elucidated. This study aimed to investigate the tissue accumulation of AGEs and AGE-induced oxidative stress and inflammation in the GI tract of rats after long-term consumption of AGEs from bread crust. The GI tract was then removed to analyse carboxymethyllysine (CML) and malondialdehyde (MDA) contents, the activities of α-amylase diastase (α-GD) and glutathione peroxidase (GSH-Px) and the levels of tumour necrosis factor-α (TNF-α) and interleukin-6 (IL-6).

This study demonstrated that the oral intake of AGEs promotes their accumulation in the GI tract, and AGEs attenuate the first-line antioxidant defence and stimulate the inflammatory response of the GI tract by downregulating enzymatic antioxidant pathways and increasing inflammatory cytokine levels. Yuan et al., 2018, doi.org/10.1111/jifs.13187

Effects of gastrointestinal digestion models on phenolic compounds and antioxidant activity of juçara

The effects of different gastrointestinal digestion models in vitro on the bioaccessibility of phenolics and antioxidant activity in frozen pulp from juçara (Euterpe edulis), a palm species, at three different stages of maturation (vitrin - reddish fruits, maturin - orange fruits, tuíra - deep purple fruits). A final pH of 5.0 was adopted, in order to avoid interference in the assay used to determine the antioxidant activity and BHT was used to prevent excessive oxidation in the system. Seraglio et al., 2018, doi.org/10.1111/ijfs.13817

Plantation of pupunha palm tree, with specimens of juçara-palm tree.
As a professional food scientist, the first thing I need to do is set my title in context: Northern Ireland is uniquely affected by Brexit. Agri-food is Northern Ireland’s biggest industrial sector. Total employment across the ‘eating ecosystem’ (feed, farming, processing, packaging and retailing etc.) is some 100,000 or approximately one fifth of the entire private sector employment. The main sectors are chicken, beef and dairy. Turnover of the sector is £4.7bn, with GB multiple retailers the biggest customers. But this still does not explain the true differences between England and Northern Ireland.

England imports 40% of its food, Northern Ireland exports 80% of its food. I hope you will agree with me, there are starkly different contexts.

Next an inconvenient truth: the UK has a land border with the EU. It happens to be between NI and ROI, but the legislation is clear – it is a UK-EU border. It is 300 miles in length and has approximately 250 road crossings. Of all trade across it, some 55% is agri-food representing approximately £750m per year. Trade flows change direction with season. In addition, much product is transported to the south east of Great Britain via Dublin (i.e. UK-EU-UK). Our Government, the Irish Government and the European Union have stated that it must remain ‘frictionless’. Delivering frictionless will be an ‘interesting’ challenge.

Brexit challenges for Northern Ireland

Michael Bell, Executive Director of the Northern Ireland Food & Drink Association, discusses the challenges ahead in delivering ‘frictionless’ trade across the border between Northern Ireland and the Republic of Ireland.

Chlorinated chicken and hormone treated beef were mentioned on the BBC’s Andrew Marr show recently. Standards define trading and are coming under intense political scrutiny. Offline standards are less well recognised. Agro-chemicals are coming under more scrutiny and the EU-US scientific differential may well increase. There has never been a greater need for IFST’s professional objective food science voice – underpinned, as it is, by evidence.

1 Trading Tariffs
Most WTO food tariffs are in excess of 20% and are not commercially viable. The average net margin for food manufacturing in Northern Ireland is 2.8% (Department of Agriculture, Environment and Rural Affairs). Margins are too small to entertain WTO tariffs. Trading would immediately cease.

2 Logistics
Fresh food coming into the Republic of Ireland in many cases is a forward shipment from an EU country into UK supply. Rerearranging this will require considerable new stockholding facilities.

3 Country of Origin definitions
If components of a product have crossed the UK-EU border several times in its production, what shall we define it as, and why?

4 Food is the fastest traded component of a product. If components of a product have crossed the UK-EU border several times in its production, what shall we define it as, and why?

5 Timeframe(s)
As I write on 25th July 2018, Brexit is either 247 days or 578 days away (30 Mar 2019 or 29 Mar 2021). Time is very short when for example, it takes over 700 days to make a sirloin steak.

6 Common Agricultural Policy (CAP) replacements
UK farmers depend on support, especially with poor returns commercially, and weather challenges. The signals they receive from government are critical to the future of farming and current investment decisions.

7 European Maritime and Fisheries Fund (EMFF) replacements
UK fisheries require support as a result of the Cushing II－ the ones we don’t know we don’t know. And if one looks throughout the history of our country and other free countries, it is the latter category that tend to be the difficult ones.

We live in unknown times.

There has never been a greater need for IFST’s professional objective food science voice – underpinned, as it is, by evidence.

Which direction of travel will we migrate in terms of food safety and animal welfare standards? These are hugely significant questions.

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Brexit must maintain agri-food trade

Farming is changing. In all the talk of technology shaping society, some might have assumed that farming would have been untouched by this rapid pace of change. But there has been revolution and evolution in the fields of Britain: an agricultural revolution and a food evolution.

Farming as an industry is very important to this country. With Brexit looming, it is a time of enormous significance, which will be felt in our fields and farms more keenly than at any other time. Brexit is of course still the word on everyone’s lips and it remains the core part of the NFU’s work. For our organisation, there is no bigger priority than making sure food is at the forefront of the debate. We know the British public rightly expects high welfare, safe, affordable food that can be traced back to British farms. We want to keep delivering on those things. We see them as a public good – as important as anything that society can provide. But as the current hot, dry weather conditions continue and the prospect of a diminished harvest vividly demonstrates - the challenge of food production in the future is not likely to get easier for British farmers. It is also a timely reminder that the Government here should not take food production for granted. Farming is one of the most affected industries when it comes to managing volatility.

The latest Brexit White Paper outlines the Government’s detailed plans for negotiating the future relationship with the EU. It explains how that relationship would work, what benefits it would deliver for both sides, and why it would respect the sovereignty of the UK as well as the autonomy of the EU. The paper runs to over 100 pages and is laid out across a number of chapters. The NFU has long-mainained that free and frictionless trade between the EU and UK is vital for the farming sector.

It is our sector’s hope that we maintain the high levels of trade in agricultural goods between the UK and the EU, our largest market for agri-food products. It is our sector’s hope that we maintain the high levels of trade in agricultural goods between the UK and the EU, our largest market for agri-food products. It is imperative that the UK’s independent trade policy does not seek to undermine those standards and establishing a close relationship with Europe will enable those standards to be continued.

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British farmers produce food to some of the highest production and animal welfare standards in the world and we are pleased to see that the Government intends to maintain these standards as part of a deal. It is imperative that the UK’s independent trade policy does not seek to undermine those standards and establishing a close relationship with Europe will enable those standards to be continued.

NFU Deputy President Guy Smith explains why a free trade area for agri-food products between the EU and the UK is vital for the farming sector.

Guy Smith
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Guy served for eight years on the NFU Council as the Essex delegate, four years as a member of the Governance Board and six years as Chair of the NFU Communications Group. He served as NFU Vice President for two years before becoming Deputy President in 2018. Guy is a founder of the Essex Sustainable Food and Farming Day and a past Chairman of the Landskills New Entrants Committee. He is a Fellow of the Royal Agricultural Society and recipient of an Honorary Doctorate for services to agriculture from Essex University.

The new i-Series food safety analyzers care for consumer protection and product safety: They support the need for fast, high-sensitivity examinations for controlled components such as mycotoxins and synthetic antimicrobials contaminating the raw materials for food products. The food safety analyzers are based on the i-Series of integrated UPLC systems. Efficient analysis of contaminants in food including sample preparation.

High-sensitivity detection of mycotoxins and synthetic antimicrobials at maximum residue levels as regulated by EU standards

Rapid processing of large amounts of data using pre-set method, batch and report files

Results and reports available immediately as soon as each analysis is finished.

www.shimadzu.co.uk/i-care
John Points, Michael Walker and Natasha Medhurst review the highlights of a joint meeting organised by IFST, Acumenita and VitalSix in Reading on 15 May 2018 on the regulatory implications of the UK exit from the EU. The focus was on practical implications of EU exit for the UK food industry, regardless of the eventual political settlement.

The UK relies on EU27 as an export destination and sourcing market with the strongest trade links being with Ireland.

EU regulatory framework: fitness for the UK food industry

Michael Walker, Laboratory of the Government Chemist, set the scene by describing the current EU trade and regulatory framework.

Data from FoodDrinkEurope shows that the EU food and drink industry has the largest turnover of any manufacturing sector (£13.9bn, with a €30.3bn positive balance of trade) and is the global number one exporter and number two importer. EU27 exports of food and drink products from the UK (£13.3bn in 2016) were almost twice those to the US and three times the imports.

The UK relies on EU27 as an export destination and sourcing market with the strongest trade links being with Ireland.

The focus was on practical implications of EU exit for the UK food industry, regardless of the eventual political settlement.

Michael concluded that the largest global food trading bloc need continued harmonised regulations that ensure citizens’ safety, maintain trust, respect choice and stimulate growth.

Exporting to the USA

Andy Kerridge of Primory gave an overview of the US Food Safety Modernisation Act (FSMA) and its implications for UK companies desiring to export food to the US.

The FSMA puts the legal onus for food safety on to preventive controls. The US importer is accountable for ensuring that the UK exporter has a preventive control programme in place, which is overseen and subject to audit by the USDA (most meat and animal products) or FDA (most foods).

This Foreign Supplier Verification Programme (FSVP) has requirements that are similar to, but separate from, other Global Food Safety Initiative (GFSI) recognised schemes, such as BRC Global Standards. There is an emphasis on preventive controls relating to supply chain, allergies, sanitisation and process, which are considered under the same umbrella Critical Control Points (CCPs) rather than being a HACCP prerequisite programme. The UK supplier site is required to use a Preventive Controls Qualified Individual (PCQI), who can be an external consultant, and to respond within 24 hours to FDA audit requests for documentary evidence of their control systems and effectiveness verification. There is a requirement for additional certification for high risk foods, but it is unclear yet what this will mean in practice.

There is a framework in place for Third Party Certification of UK sites for the FSVP, but it has yet to roll out. There is also a framework for a blanket certification for high risk foods, but it is unclear yet what this will mean in practice.

Andy advised UK companies to deal with a US importer familiar with the new FSMA requirements, and to seek a PCQI, if they wish to export to the USA.

Food labelling within and beyond EU borders

On-pack labelling always needs careful compliance checks for the country of sale and may well need multiple label formats if sold in more than one country.

Sarah Howarth of Howarth Food Safety, gave an overview of the harmonised labelling requirements for food produced and sold within the EU. Labels must be printed in the local language and there is scope for Member States to impose additional requirements, such as public health messages or country-of-origin labelling of specific ingredients, but in general the labelling formats are highly standardised across the EU. As well as nutritional labels, this includes aspects, such as allergens, health claims and inclusion of genetically modified ingredients. The current system enables the free movement of safe and wholesome food across the EU. There are some areas not fully aligned, notably the authorisation of novel foods, botanicals and food supplements.

The harmonised labelling format is open to modification and improvements, with planned changes including greater clarity in country of origin labelling and reviews on the presentation of nutrition information and the use of expiry dates with a view to reducing food waste.

Sarah also described the potential labelling changes that would be needed for UK-produced food sold in the EU, if the UK were to be treated as a ‘third country’. Aments, such as public health messages or country of origin labelling of specific ingredients, but in general the labelling formats are highly standardised across the EU. As well as nutritional labels, this includes aspects, such as allergens, health claims and inclusion of genetically modified ingredients. The current system enables the free movement of safe and wholesome food across the EU. There are some areas not fully aligned, notably the authorisation of novel foods, botanicals and food supplements.

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general food law has a structured approach to risk assessment, risk management and risk communication underpinned by strong science and this is as much a cultural approach as a Quality Management System. As well as new procedures and local Standard Operating Procedures, the implementation of ‘EU compliant’ food safety controls also requires a significant internal communication programming, a rollout of training through train-the-trainer courses and an 18-month change management programme that still respects the existing corporate culture and brand ethos.

The overall message was to be aware of business and technical risks, implement risk analysis, assessments and mitigation plans, and ensure business continuity to protect assets, people, brands and quality.

**Trade agreements and the Codex/WTO-based Food Regulatory Framework.**

Dominic Watkins of DWF, specialising in food international trade law, spoke on Brexit: to the land of hope and glory? He explained the typical framework of a Trade Agreement. Any future Trade Agreement, e.g. between UK and EU or UK and US, would be subject to negotiation. But, in practice, they follow a standard format and the likely template is already written (excluding reduction or waiving of World Trade Organisation (WTO) tariffs that are open to negotiation, and customs cooperation to mitigate the extent of border controls). It would be similar to the US-Canada agreement and to the aborted Transatlantic Trade and Investment Partnership (TTIP) test. The UK is in a weak bargaining position and likely to prioritise negotiating concessions for industries, such as financial services or automotive manufacturing, above those for the food industry.

WTO rules only allow import restrictions to be based on scientific evidence relating to food safety, not on consumer preferences. International scientific consensus is provided by Codex. There are a few ‘cause celebres’, where the EU has previously negotiated import restrictions, despite Codex raising no scientific safety concerns and the UK insisting that the issues are purely consumer preference e.g. import of beef from cattle treated with oestradiol growth hormone or chlorine sanitised chicken.

Dominic also stressed that the UK government’s intent is to maintain continuity and mimic the current arrangements with the EU, including trading of goods and movement of labour, throughout any Brexit implementation period. There is publicly available information on the UK’s preferred outcomes and negotiating red lines, both in written statements from government departments and on the EU’s website (e.g. Figure 2). The UK’s intent is to negotiate continued inclusion within the EU’s Free Trade Agreements until such time as the UK negotiates its own. Hence any changes during the implementation period, which is likely to be protracted, can only happen very slowly. Dominic cited Greenland, which left the EU in 1984, taking nine years to discuss and agree the single issue of fishing rights.

Another potential unintended consequence highlighted was the risk of legal divergence between UK countries. In the food industry, many returned legal powers will go to devolved administrations rather than central UK government. Scotland, particularly, has signalled intent to move faster than Westminster on some aspects of food law and guidance related to public health.

Brexit presents opportunities as well as risks. Areas that seem ripe for improvement include rules about on-pack health claims and for food legislation to better support nutrition or food waste policies.

**Conclusion**

The message of the meeting was that food businesses should be planning, now, for the practical and detailed implications of different Brexit scenarios. Prepare for the worst but hope for the best. In the meantime, there are existing opportunities for international trade that can be exploited.

### References and article available online at

fstjournal.org/features/32-3/

### PERSONALISED NUTRITION

### Personalised nutrition for older adults

The UK population is getting older, with 18% of people aged 65 and over and 2.4% aged 85 and over (Table 1). This should be a cause for great celebration but the years of life in good health are not increasing at the same rate as the length of life. The older a person is, the more likely they are to suffer with chronic health conditions, such as dementia, diabetes and arthritis.

In 2017, the UK life expectancy was reported as 79.5 years for males and 83.1 years for females but healthy life expectancy is now 63.4 for males and 64.1 for females with an average of 53 years in ill health for men (red) and women (blue; see Figure 2).

**Table 1: Age distribution of the UK population, 1976 to 2016**

<table>
<thead>
<tr>
<th>Year</th>
<th>0 to 45 years (%)</th>
<th>46 to 64 years (%)</th>
<th>Aged 65 and over (%)</th>
<th>UK population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1976</td>
<td>22.4</td>
<td>61.2</td>
<td>14.2</td>
<td>56,917,121</td>
</tr>
<tr>
<td>1986</td>
<td>20.5</td>
<td>64.1</td>
<td>15.4</td>
<td>60,818,325</td>
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<tr>
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<td>20.7</td>
<td>63.6</td>
<td>15.7</td>
<td>63,154,374</td>
</tr>
<tr>
<td>2001</td>
<td>21.2</td>
<td>64.0</td>
<td>14.8</td>
<td>64,320,857</td>
</tr>
<tr>
<td>2010</td>
<td>18.5</td>
<td>63.1</td>
<td>18.0</td>
<td>62,648,054</td>
</tr>
<tr>
<td>2015</td>
<td>18.5</td>
<td>63.1</td>
<td>18.0</td>
<td>64,684,054</td>
</tr>
</tbody>
</table>

**Helen R Griffiths of the University of Surrey explains why a personalised strategy for nutrition is a sustainable way to improve health in the elderly population. She describes the EU INCluSilver project, which aims to develop and validate innovative ideas in the field of personalised nutrition for the silver economy.**

**Figure 2**

The Brexit negotiations and UK red lines

1. No EEC jurisdiction
2. No free movement
3. No substantial financial contribution
4. Regulatory autonomy
5. Independent trade policy

**Future relationship**

**NO DEAL**
There is substantial evidence in support of specific foods, dietary patterns and nutrients in the prevention of chronic diseases and mortality and in improving the quality of life with ageing. During good general health and when mobility is maintained. However, in the oldest adults and for those who have much less mobility and who are frail, it is likely that their physical activity levels will decrease and so their energy requirement will also be lower. The Scientific Advisory Committee on Nutrition in the UK has estimated energy requirements based on average age, height and mobility (Figure 2). The change in energy requirement is most striking, with reduced energy needs, in people over the age of 65 years. This is most likely because the amount of muscle and types of muscle fibre change from the mid-50s and muscle has a high energy requirement; slower metabolism is related to loss of muscle.

In the UK, total daily energy intake is estimated as 8.9 MJ/d for the average man aged 65–74 dropping to 9.6 MJ/d for a man of more than 75 years. For women, total daily energy intake is estimated as 9.9 MJ/d dropping to 9.6 MJ/d respectively. If energy intake is maintained with reducing energy expenditure, body fat accumulates around the organs of the body, with much less fat within the subcutaneous fat deposits. Deposition of visceral body fat increases the risk to diseases like type 2 diabetes and increases in prevalence with older adults. Energy intake is an important area of personalisation – too high an intake will increase the risk of metabolic disease but on the other hand, if intake is too low in older adults, malnutrition can result and predispose an older person to the development of frailty syndrome.

Personalising nutrition for older adults – protein

The dietary protein intake that is required by people of different ages to meet their nitrogen balance has been discussed extensively in the published literature. The safe limit for protein intake takes into account the possibility that renal function may be compromised by high protein intake in older adults. The World Health Organisation recommends 0.75g protein per kg body weight per day for older adults, the same as for adults under 65 years of age. An increase in protein intake, particularly of proteins rich in branched chain amino acids, can improve muscle damage in younger people but does not appear to protect against loss of skeletal muscle mass and strength (sarcopenia) in older adults. Instead, a recent pilot study has highlighted that increasing intake of the essential amino acid leucine should be investigated in greater depth. Such a personalised approach may be useful in people with sarcopenia.

Personalising nutrition for older adults – vitamins

The reference intakes for vitamins do not increase with age although for some, e.g. for niacin, there is a minor reduction in the area of personalisation – too high an intake will increase the risk of metabolic disease but on the other hand, if intake is too low in older adults, malnutrition can result and predispose an older person to the development of frailty syndrome. For those taking supplements, the mean daily intakes were 5.31g vitamin D for men and 5.29g for women. This is approximately 50% of the recommended intake for vitamin D. Older people on lower incomes and people who are living in care homes also have lower intakes of vitamin D. In care homes, mean daily vitamin D intake from all sources was for men 3.73g and for women 5.65g.

Geography and ethnicity also play an important part in the nutritional intake patterns of otherwise healthy older adults and highlight a specific calcium requirement for health. For example, Pakistani men and women living in the UK typically consume less calcium. The capacity to make vitamin D from sunlight is also affected by skin pigmentation. However, the prevalence of vitamin D deficiency in older adults living in Europe according to ethnicity is unclear, although cases of rickets were recorded in much greater frequency in children of South Asian, Middle Eastern or sub-Saharan African background. Instead, vitamin D intake is being recognised as an important public health issue. The aforementioned evidence points to ethnicity as a factor to consider in personalised nutrition.

In the near future, a risk calculation based on genotype for such long-term conditions is likely to emerge that would encourage a personalised nutrition approach to reduce disease risk.

Other factors to consider in personalising nutrition in older adults

An important consideration is foods for adults with poor oral health and dental problems is to minimise meals that require chewing while maintaining fibrous and protein content. Protein enriched foods have been successfully used in the hospital setting but cost, taste and scepticism from consumers have not helped with wider uptake. Nutritional health may be affected by drug treatments that affect appetite, absorption and metabolism. Conversely,
some foods also affect drug metabolism, most notably grapefruit that impairs the activity of cytochrome P450 metabolising enzymes and so increases blood concentrations of drugs. These factors are addressed in drug safety notes that accompany medicines.

The aforementioned data assumes that absorption of nutrients is also unaffected although if an individual has physiological changes with ageing, e.g. in gastric acid secretion, the absorption of B vitamins may be impaired hence intake requirements may be higher. In this case, the state of an individual’s health will impact on their personal dietary requirements. The clinical practitioner will assess whether this is the case on a personalised basis if an individual presents with symptoms of B vitamin deficiency. In this case, the motivation to increase a specific nutrient would be health-related via a pharmacist rather than lifestyle choice dependent.

**Personalised strategies to improve nutrition in older adults**

Overall, the success of adopting personalised nutrition in an older adult population will be the result of integrating different approaches to improve dietary intake of nutrients. These should take into account any personal monitoring devices that an individual has for existing health conditions e.g. for blood sugar and blood pressure, wearable that monitor activity and mobile apps that offer coaching. Together these could help to integrate lifestyle and medical variables to improve the perceived importance of diet and compliance with healthy nutrition.

Research has shown that nutritional strategies would be more likely to be adopted if they include a range of technologies that enable users to monitor their status. This could include wearable devices that monitor lifestyle and energy needs, self-diagnostic devices that report on nutritional requirements and app technology that includes motivational tools and encourages people to stick with the nutritional programme. Each of these technological possibilities for the silver economy is founded on the principle of understanding the requirements and benefits of particular nutrients for older adults. Food choices change with age and are influenced by many factors including changing taste, budget as well as lifestyle. Superimposed on food choice factors are nutritional requirements; these also change with age.

In moving towards a personalised nutrition strategy, dietary recommendations should be fine-tuned to an individual’s health, activity, preferences and motivations.

**Introducing InCluSilver**

In March 2017, the InCluSilver Innovation Support project was established after a successful funding award from the European Union \(^{[11]}\). Bringing together nine partners across Europe over three years, it aims to help create products, services and systems that improve the health and quality of life for older adults through innovation in personalised nutrition. InCluSilver aims to fund excellent innovations from SMEs through the award of vouchers. The two final call deadlines are 15th September 2018 and 15th February 2019. Competitive bids are reviewed by a panel of experts with funding awarded to the most innovative. SMEs are encouraged to work with users of the innovative products, services and health care systems both nationally and internationally.

**Innovation requirements for engaging with InCluSilver**

In order to help innovators to create products, services and systems that improve the quality of life for older people through innovation in personalised nutrition, we have developed the following project guide. Successful InCluSilver projects will address the following challenges and gaps:

- **Use knowledge of silver consumer behaviour to support the uptake of personalised nutrition by older adults**
- **Develop services and systems that define individual nutritional needs based on lifestyle, genotype, activity and health status**
- **Design and implement systems that enable monitoring of nutritional health status in older adults**
- **Develop new foods that meet the nutritional, taste and maximisation requirements for healthy older adults in health and those with chronic conditions associated with older age**
- **Develop meal packaging and preparation approaches that can be physically managed by older adults**
- **The adaptation and development of personal monitoring devices for reporting on the effect of meals on health indices**
- **Design and implementation of mobile apps that offer coaching on diet based user-friendly but highly detailed data.**

Innovation and details available online at http://journal.org/Features/32-3/personalised-nutrition

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Please visit the INCluSilver website or contact the author directly to find out more.

**Food choices change with age and are influenced by many factors including changing taste, budget as well as lifestyle.**

**YOUR CAREER DEVELOPMENT YOUR IFST**

Being a member of IFST provides you with a whole range of benefits to support your professional development. But, more than this, you’re part of a professional network which is working tirelessly to:

**SETTING AND RECOGNISING PROFESSIONAL STANDARDS**

The food and drink sector demands high levels of expertise and professionalism to ensure that our food is always of the highest possible standard. Our professional registers are widely recognised and valued throughout the sector as the benchmark for skills and expertise for food professionals.

**DELIVERING AN INDEPENDENT VOICE**

As a charity and professional body that is independent of government, industry and any other organisation, IFST is in a prime position to provide impartial, science-based information.

**PROVIDING AN ACCESSIBLE KNOWLEDGE BASE**

Scientific knowledge is fundamental to everything IFST delivers. We encourage the exchange of knowledge amongst food professionals. This knowledge needs to be evidence-based, yet understandable and accessible.

**SUPPORTING THE FUTURE OF FOOD**

The shortage of new talent to fill skilled roles in the food sector is a critical issue. A key focus for the Institute is therefore encouraging and supporting the future generation of food scientists and technologists. We have developed, often in collaboration with others, a wide range of activities and events.
Obesity: the challenge for the food industry

Introduction
In June this year the UK Government announced the second instalment of its childhood obesity plan, setting a target to halve obesity rates by 2030 and suggesting a range of measures it has already introduced and adding further market interventions to influence consumer choice. What does this mean for food producers, caterers and retailers?

Extending the range of sugary products subjected to a levy, restricting the promotion of products subjected to a levy, and retailers? Revisiting the fiscal policies it has already introduced and adding further market interventions to influence consumer choice. What does this mean for food producers, caterers and retailers?

The public have been urged to limit their consumption of calorie-rich foods for several decades, but the lack of effect of this message has led to a shift in focus from consumer to producer. Writing in the online trade journal in 2011, Caroline Scott-Thomas summarised the problem food manufacturers face in the emerging obesity crisis with the challenging headline ‘Eat Less’. A difficult message for industry[1]. Soon afterwards, Andrew Lansley’s Responsibility Deal was launched, including a Calorie Reduction pledge in which five billion calories (kcal) would be voluntarily removed from the UK population’s daily diet[2].

Whilst producers were not the directors of food and beverage companies, whose products are deemed too high in sugar, salt or fat, but they will surely not be surprised by these moves. The public have been urged to limit their consumption of calorie-rich foods for several decades, but the lack of effect of this message has led to a shift in focus from consumer to producer. The food industry surely had an interest in promoting over consumption, not just for the sales of the products on the day but for the continued excess consumption that arises as a consequence: the average UK adult gained just over 10kg (about 15% of their initial bodyweight) between 1984 and 2010, and this additional mass has to be supplied with nutrients and energy. Even if no further weight gain occurs, the average adult’s intake of calories must be 10-15% greater than in 1984 and 2010. The persistence of obesity from childhood through to adulthood means that an ‘early investment’ in promoting over consumption creates a lifetime of returns through increased food consumption. The results of excess calorie consumption, combined with decreased calorie expenditure, are clear to see. Worldwide obesity prevalence levels have shot up, with over 12% of all adults globally – some 670 million – now classified as obese[3].

Worldwide obesity prevalence levels have shot up, with over 12% of all adults globally – some 670 million – now classified as obese[3]. As a result of this rising epidemic and the inadequacy of health education messages, the conceptual framing and the language used to describe the causes of obesity has begun to change. Through much of the 1980s and 1990s there was a prevailing narrative of personal responsibility and lifestyle choices. Health promotion literature encouraged people to ‘look after yourself’ (the title of a UK government campaign) and this has persisted in the social marketing campaigns, such as Change4Life. However, a gradual change of emphasis has emerged with greater awareness...

Tim Lobstein, Policy Director for the World Obesity Federation, looks at the increasing trends to regulate the food market.
This includes the trends to mass production, use of additives for long-shelf life, promotional marketing in all its forms and the overall drive to increase consumption. The phrase was recently proposed in a draft declaration of the United Nations meeting on the prevention of non-communicable disease, held in Uruguay in October 2017: ‘We call on WHO to consider establishing a commission to address the commercial determinants of health that have a bearing on the prevention and control of NCDs’. The final document did not include this paragraph.

Consultation responses from the commercial stakeholders had challenged the wording, and in particular the phrase ‘obesogenic environment’ – signalling an awareness of the role of the environment in shaping behaviour. The phrase ‘obesogenic environment’ – meaning a physical, economic and social environment that promotes unhealthy lifestyle, a gain in bodyweight – became common currency.

Further changes to the conceptualisation and language of obesity have ensued. While there has long been a recognition that lower socio-economic groups tend to have higher bodyweight and shorter life expectancy, the phrase ‘social determinants’ of health has focused attention on the stark gradients in health within quite small areas and further emphasised the environmental (including social, cultural and economic environments) factors that raise the risk of obesity. The clearest illustration of this can be seen in the remarkable data collected in the National Child Measurement Programme, which finds a virtually linear increase in obesity risk in parallel with an increase in the local area deprivation index used in the surveys. This is not a small-scale sample survey. Even the evidence from the poorest and most deprived children are measured at the age two points shown (see Figure 2).

A greater challenge to the food and beverage industry, however, is an increasing reference to the ‘commercial determinants of health’[10]. This specifically identifies the prevailing drivers, which operate in the food supply chain as the primary force shaping the food environment.

Further targets have been set for 2030, for example the UK has proposed to halve the rate of child obesity. Even reaching this ambitious target will be challenging. It is a challenge which the food industry can choose to fight or ignore on the one side, or to see the market opportunities for supplying the populations’ future needs on the other. How food companies forecast their markets and how investors and investment banks judge the potential gains will be up to the industry to determine. The trends are clear enough and the UK’s plan for child obesity is now on the table. The challenge has been set.
The sustainability of convenience foods

Balancing a national diet has provided public health agencies with many difficult choices and despite dramatic improvements in what we eat, consumers routinely demand more effective action to improve diets. So what is going wrong? The impact of dietary improvement is clearly not going far enough. This article identifies where more incisive actions can deliver positive health and sustainability outcomes.

Popular convenience foods are typically targeted by media stories and consumer outcry; solutions will only be found through innovative development of healthier choices. The IFST’s recent ‘Food System Framework – a focus on food sustainability’ provides impetus for this to happen; it recognises that achieving health and sustainability while delivering accessibility, affordability and assurance is always going to be a tough call[1]. However, the food industry now has over 30 years of sustainability legacy to apply and such a platform provides an opportunity to rank sustainability requirements so that they keep step with those of consumers for positive health outcomes. This will result in actions becoming embedded into not just global but regional and national food supply chains. Our most popular and convenient food products deserve greater attention and the sandwich food category, a £3.5bn gross value-added industry, which crosses the meal, lunch and snack boundaries, is the focus of this article.

Reducing overconsumption

Case studies of innovative product development can stimulate changes in the convenience food category, where there are very clear high-level calls to lower the calorific content of meals, lunches and snacks. Sandwiches are a good example of a convenience food for which there are moves to change how consumers eat or portion foods during meal occasions. Health and increasingly sustainability are being built into business strategies and the industry has already responded to regulator calls for improved nutrition over the past two decades[2]. This has been against a background of regulatory change and the deployment of techniques, such as nutrient profiling, which have revolutionized lowering the salt and sugar content of foods. The problem of overconsumption of these nutrients remains despite all of this and it is time to consider how efforts to reduce consumption can be extended to address the financial and social responsibility risks. These are often difficult to quantify but they are a significant part of health budgets associated with treating the non-communicable disease outcomes of an unbalanced national diet[3].

There is an urgent requirement for information demonstrating efficient food utilisation, provided in a format that resonates with all food manufacturers. In some cases, this information is now openly accessible for application in New Product Development (NPD) processes. An example is provided by the Global Access to Nutrition Index that ranks the 22 largest food companies on contributions to tackling obesity and undernutrition. Accessibility to this ranking data can be transformative for SME manufacturers, which make up over 90% of the industry, because it will guide sustainability utilisation, provided in a format demonstrating efficient food utilisation, provided in a format that resonates with all food manufacturers.

Wayne Martindale, Mark Swainson, Tom Hollands and Richard Marshall discuss the need to combine healthy choices with reducing carbon footprint in the convenience foods sector.

There is an urgent requirement for information demonstrating efficient food utilisation, provided in a format that resonates with all food manufacturers.

Figure 1 Training food professionals in sustainability is essential; more important is that this sustainability know-how is part of a curriculum for all stages of food supply so that technologists, developers and engineers are conversant with building sustainability into food products.

Building sustainability

Even the public health community is admitting ‘our current approaches don’t work’ and so it is seeking new solutions[4]. Salt, sugar and five-a-day targets have all proven difficult to meet, raising the question as to why this is the case. Investigations within the sandwich category show how significant insights can be obtained from interpreting health, consumer demand and sustainability data. In starting this process, there is always an initial requirement to understand why there is a demand for a product, in this case sandwiches and convenience foods. The role of lifestyle and consumer experience must be put in the centre of the plate for improvements to take place. Such a re-thinking is far from unusual, it has already revolutionised fat consumption in the last decade with the emergence of low carbohydrate diets and low-fat or diversified fat diets (e.g. the Ornish and Mediterranean diets). Placing sustainability metrics into consumer choices offers a
Making the carbon footprint of sandwiches relevant to consumers

One of the reasons we have not put both health and sustainability metrics at the heart of NPD in food is that information required is still very fragmented and rarely made relevant for consumers. A recent Life Cycle Assessment (LCA) of the UK sandwich sector has provided the carbon footprint of sandwiches and has highlighted where gaps in NPD and sustainability reporting exist[7]. The study re-establishes that sandwiches using livestock product ingredients have a greater carbon footprint than those using only plant product ingredients. The straightforward solution to reducing the carbon footprint of all sandwiches would be to substitute plant products in place of animal products. If it were not the case that most popular sandwiches contain meat or dairy products, this would be a very good strategy for sustainability but, practically speaking, it would be a disaster for a sandwich business and the consumer. Nevertheless, there are some recent innovations in the development of plant-based meat analogues that are getting close to being acceptable substitutes for ‘real’ meat. The economics of the supply chain is now such that those of the meat and this will continue to be highly profitable if demand continues to support meat free.

LCA methods often demonstrate such plant protein substitution scenarios as success, but this is not the case for most businesses and consumers if they exclude the loss of profit. After all, manufacturers will want to encourage consumer choice because they invest in and wish to develop the ‘Goldilocks Product’ that is ‘just right’ for the marketplace. So, sustainability and business goals are going to be in conflict but perhaps not quite: the weighting of ingredient impact to the popularity of different types of sandwich introduces an important opportunity. The carbon footprint analysis of refrigeration can be more straightforward than much greenhouse gas emissions as some of the ingredients involved. This is crucially important to manufacturers who have no control over how long products stay in the supply chain before consumption. This defines truly agile manufacturing when shelf life and availability of sale are perfectly matched; the LCA shows how this makes it possible to dramatically reduce the carbon footprint of sandwiches and chilled foods. If the supply chain inventory meets demand perfectly, the carbon footprint drops, meaning the most popular meat and dairy sandwiches have a disproportionately large supply chain transaction for refrigeration is reduced.

If we can project which products are actually in the supply chain and being sold at any one time, instantaneously, then we should be able to implement more inclusive waste reduction strategies to match supply to demand more accurately. This will allow Distributed Ledger Technologies to be applied to needs within the food industry and ensure that waste reduction is essential. Convenience and sustainability are important of foods that focus on meals and, as such, provide many opportunities to improve health and sustainability.

An NPD model that improves sustainability

NPD is aimed to the information derived from supply chains; the new methods of understanding food in such as sandwiches, where seasonal trees and patterns in purchasing activity will often throw a few surprises for the even most experienced manufacturers and retailers. The scale of food waste produced in supply is uncertain, but sandwiches can account for a large part of the sector. Thus, it is important to know exactly where the problems are so that companies obtain accurate information about availability of product on service or retail shelves.

Accurate data on how long products remain on shelf is available and these are too often treated as unimportant by LCA techniques so that carbon footprints can be in danger of providing a poor relationship with consumer behaviour. There is currently no routine product carbon allowance or understanding of it and the sandwich industry could make an important contribution to understanding of carbon possible in the context of a healthy diet.

The sandwich industry has a critical role to play in ensuring that food waste is brought to an end as soon as possible. The sandwich industry is in a position to identify and act on sources of waste, if it wants to. It can provide leadership in this area, and in so doing, it could also improve the health and nutrition of the population. A recent report by the UK’s Department of Health and Social Care and the Food and Drink Federation highlighted the importance of food waste reduction in achieving the Sustainable Development Goals (SDGs), which are a set of 17 global goals to end poverty, protect the planet, and ensure prosperity for all by 2030. The sandwich industry is well placed to contribute to these goals by reducing food waste and improving consumer awareness of the issue.

If the supply chain inventory meets demand perfectly, the carbon footprint drops, meaning the most popular meat and dairy sandwiches need not be changed if the supply chain transaction for refrigeration is reduced.

The supply of sandwiches - a case study identifying where to improve the carbon footprint of foods

Poor forecasting is typically identified as a cause of waste. Sales figures often understate demand or sales made. Asking staff have a two- to four-day shelf life. The sandwich supply chain is in a position to identify and act on sources of waste, if it wants to. It can provide leadership in this area, and in so doing, it could also improve the health and nutrition of the population.

References and article available online at fstjournal.org/features/32-3/sandwich-sustainability

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Figure 2: The use of plant proteins in a balanced diet offers sustainability and providing fruit and vegetables is in the current target for the sector. Pulses, such as chickpeas, offer plant proteins and there are important nutritional advantages to making pulses part of the balanced diet.

Figure 3: Consumer trends for food-to-go are changing and there is demand for high nutritional and sustainability value. These are becoming important differentiators in this market place. Bread is not a straightforward offer with numerous different formats, including flatbread and breads, that can bring new nutritional offers to consumers.

Figure 4: How methods of integrating supply chains include innovative processes, such as vertical farming systems that provide fresh ingredients for food to go items on existing manufacturing sites, that is food manufacturing facilities are also producing ingredients as well as manufacturing food products.
Microplastics

In

Seafood

Introduction
Plastic waste is very much under the spotlight. We are all becoming more aware of the vast amounts of plastic litter in the marine environment and more conscious of the need to be more responsible in the way we use and dispose of plastics. We are learning that plastic pollution is not just the plastic litter that we see but also the less visible plastic microparticles. Microplastics have been found in marine and aquatic habitats, in the air, in sludge fertilizer applied to agricultural land and in house dust. As evidence mounts that microplastics are ubiquitous, there is growing concern about how they are taken up by wildlife, how they become incorporated into food chains and what health effects they may be having on us.

What are microplastics?
Microplastics are particles made from synthetic polymers with an upper size limit of 5 mm. Their shapes are variable, with microplastic fragments and fibres being the most commonly reported forms. Other characteristics, such as density, colour and chemical composition, are also variable and reflect the range of plastics that have been produced over time. Table 1 gives a list of some of the types of plastics that are commonly encountered in the marine environment. Nanoplastics form a subset of the microplastics. The European Food Safety Authority (EFSAs) defines particles as nanoparticles when 50% or more of the particles have one or more external dimensions in the 1–100 nm size range.

The majority of studies on microplastics have so far focused on the marine environment and seafood. Scientific techniques for assessing microplastics in these substances are available. Comparing the findings of different studies can be difficult, however, because sampling, extraction, purification and analytical methods for enumerating and characterising microplastics are not yet fully standardised. Compounded with this, contamination from airborne fibres during sample handling is a serious problem and not all studies incorporate adequate measures to protect samples from airborne microfibre contamination. Standardisation of the approaches is underway, for example as part of the Joint Programming Initiative (JPI) Oceans project.

Once extracted, microplastics can be examined by a variety of techniques (summarised in Table 2). Optical microscopy can aid sorting in order to separate microplastics from non-plastic particulate matter of similar size. Spectroscopic techniques using the infrared (IR) part of the spectrum have proved reliable for identifying plastic fragments. Fourier transform (FT)-IR analysis has been successfully used for identifying microplastics in environmental and biological samples. Another useful method is pyrolysis followed by gas chromatography–mass spectrometry (Py-GC-MS). No single technique is suitable for all plastic types and for all particle sizes, with the choice of techniques becoming more restricted at the nanolevel. Using a suite of analytical methods rather than a single method may be necessary.

Sources of microplastics
Plastic production has risen steadily since the emergence of the approaches is underway, for example as part of the Joint Programming Initiative (JPI) Oceans project.
In all cases the microplastics were detected in the stomach and gut of the animals, which tend to be removed and discarded, and not eaten by humans.

Environmental impact
Microplastics are known to be ingested by marine species at all trophic levels, from plankton to macro-fauna. They have been found in the stomachs of fish and seabirds. Laboratory-based investigations on marine organisms from lower trophic levels have identified sub-lethal microplastic effects on health, feeding, growth and survival. The effects were seen only in the laboratory and only when the levels of microplastic exposure were far higher than would be encountered normally. There is very little evidence of any effects, however, in various locations of microplastics in nature. Further study is necessary in order to understand the real-life impacts on marine wildlife.

While there is no ecotoxicological threat identified so far from the physical and chemical composition of microplastics, there are also indirect threats to environmental quality. The hydrophobic nature of microplastics allows them to sorb harmful organic compounds, such as polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs) and organochlorine pesticides, for example dichloro-diphenyl-trichloroethane (DDT). The microplastic particles also contain endogenous chemical additives, incorporated during the manufacture of the plastic, as well as some additives incorporated to inhibit photo-degradation, to impart flexibility or rigidity, or to retard microbial degradation. They include heavy metals and potential endocrine disruptors.

In ecological terms, the plastic microparticles would be able to, in principle, exert an effect following ingestion by an organism or if they are washed into the water and then incorporated into the food chain through bioaccumulation. There is still much to understand here, as these processes occur in nature and significant research is being carried out to add to this knowledge.

Also, within the ‘uncertain’ category are the effects of nanoplastics. Nanoplastics interact with biological systems in different ways, for example, they are more likely to internalise into tissues and cells and participate in biochemical processes; these effects have been demonstrated in the laboratory.

Human exposure to microplastics through seafood
Microplastics have been detected in fish, crustaceans and bivalve molluscs. Fish found to contain microplastics include pelagic and demersal fish from the English Channel, North Sea, Baltic Sea, Mediterranean Sea, Portugal, Indonesia, California (USA) and the North Pacific Central Gyre. Microplastics (predominantly fibres) were detected in brown shrimps (Crangon crangon) caught in various locations in the English Channel and Norwegian lobster (Nephrops norvegicus) caught in the Clyde Sea. In all cases the microplastics were detected in the stomach and gut of the animals, which tend to be removed and discarded, and not eaten by humans.

The extent to which microplastics can migrate from the digestive tract to the flesh is still being elucidated, and some investigations have shown that microplastics can translocate to fish in less than 1.5–15μm are absorbed at a rate of 0.3%. Microplastics in this range have not been shown to exert any adverse effect in humans, but abnormal inflammatory reactions and immunological effects have been observed in rodents. Though not reported in humans, these effects remain a possibility and may be more relevant in individuals with gastrointestinal affections. Nanoplastics smaller than 0.2μm may penetrate the gut wall and are not absorbed. These ranges of 1.5–15μm are absorbed at a rate of 0.3%.
of the compounds. There is an information gap in this area: no data is available on nanoparticles in foods and analytical methods for nanoparticles are in their infancy.

Microorganisms are known to colonise microplastics and in the marine environment the microbiome on the microplastic is known to be distinct from microbial communities in surrounding water. However, the relevance to seafood and the consequences to human health are unknown.

In conclusion, microplastics are ubiquitous. We have been unwittingly exposed to them and we are unknowingly consuming them as part of our diet. Awareness of this problem needs to be raised so that society can act before the point of no return is reached.

References and article are available online at https://fstjournal.org/features/32-3/

Table 3 Comparison of the calculated intake of contaminants and additives (worst case scenario) directly from microplastics in seafood and the total dietary intake of these compounds.

<table>
<thead>
<tr>
<th>CONTAMINANT</th>
<th>COMPOUND</th>
<th>HIGHEST CONCENTRATION IN MICRO-PLASTICS (NG/KG)</th>
<th>CALCULATED INTAKE FROM MICRO-PLASTICS (BW/DAY)</th>
<th>TOTAL INTAKE FROM THE DIET (BW/DAY)</th>
<th>RATIO INTAKE MICRO-PLASTIC/TOTAL INTAKE</th>
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<tr>
<td>Contaminants</td>
<td>Bisphenol A</td>
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<td>PCBs</td>
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<td>PAHs</td>
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<td>EFSA, 2006</td>
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<td>PBDEs</td>
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<td>4 300</td>
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<td>EFSA, 2010</td>
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J Andrew Hudson of Jorvik Food and Environmental Microbiology summarises a review paper, published in 2017 in Trends in Food Science and Technology, which examines the development of antimicrobial resistant (AMR) bacteria from the food production perspective.

Antimicrobial resistant (AMR) bacteria are an obvious concern, with predictions that 10m people a year will be dying from AMR infections by 2050. However, how (or how much) is the use of antimicrobials in the food chain contributing to the problem?

The mechanism responsible for the development of AMR involves the antimicrobial exerting a selective pressure that selects for a resistant sub-population of the target species. This resistance may have been gained through a simple mutation, or the acquisition of resistance genes on mobile genetic elements from other bacteria in the environment. Such resistance traits, and resistance to other bactericidal substances, such as heavy metals, can become co-located on the same genetic element so providing the bacterium with resistance to a suite of antimicrobial agents, a phenomenon known as co-resistance. The transfer of genetic material occurs between different species and so foodborne commensals need to be considered as part of the picture as well as the pathogens themselves. The Gram-positive pathogen/ lactic acid bacterium/ enterococcal system found in fermented foods, provides a complex example of a situation where genes might flow between multiple taxa. This flow of genes can occur in the animal, environment, food or the human gut.

Use of antimicrobials

The use of an antimicrobial agent in food production may result in resistance emerging to a structurally similar, but different, antimicrobial used for human clinical purposes. For example, chlorotetracycline used to treat...
calves was reported to result in the appearance of tetracycline-resistant Campylobacter. The overall use of antimicrobials within the EU seems to be quite dynamic. For example, in the Netherlands their use increased after the Antimicrobial Growth Promoter (AGP) ban, which came into force in 2006, but has reduced markedly since then according to data for 2014-2015. There are also big differences (up to ten-fold) in use in a like-for-like basis between Member States for reasons which are not obvious. For the rest of the world, an upward trajectory is predicted, with some countries almost doubling usage by 2030 as a result of increased intensification.

Antimicrobials are used in livestock production for a number of reasons: the treatment of diseased animals, treatment of part of a group (metaphylaxis) or use during high periods of susceptibility (prophylaxis). Although the use of antimicrobials as AGPs is no longer permitted, it is not clear whether the ban has had much of an effect on clinical AMR infections, but it may have saved a number of reasons: the appearance of antimicrobial-resistant Campylobacter, which is to be expected in animals largely pass through the environment at around the same time that antibiotic use is reduced in human and veterinary medicine. The emergence of AMR microbes in the environment is related to the reduction of antimicrobials in human and veterinary medicine, although this could be the result of co-selection. Antimicrobials in the environment at around the same time that antibiotic use is reduced in human and veterinary medicine. The emergence of AMR microbes in the environment is related to the reduction of antimicrobials in human and veterinary medicine, although this could be the result of co-selection. Antimicrobials in animal products. However, antimicrobials may be used in cultivation of fruit and vegetables, as may manures from animals treated with antimicrobials that may contain the antimicrobials themselves or their residues. Finnish data suggested that the AMR profiles of Enterobacteriaceae in vegetables were different from those in the human faecal flora. In America, one study found that vegetarians were more frequently infected by AMR E. coli than newly hospitalised patients and so we should keep an open mind about which food exposures may be of most concern.

The role of the issue lies in whether the use of antimicrobials results in human and veterinary infections. To date, it is not clear whether the ban has had much of an effect on clinical AMR infections, but it may have saved a number of reasons: the appearance of antimicrobial-resistant Campylobacter, which is to be expected in animals largely pass through the environment at around the same time that antibiotic use is reduced in human and veterinary medicine. The emergence of AMR microbes in the environment is related to the reduction of antimicrobials in human and veterinary medicine, although this could be the result of co-selection. Antimicrobials in the environment are not necessarily happen in one system might not necessarily happen in another seemingly similar system.

Another plausible link between agricultural use of antimicrobials and AMR bacterial infections in humans is through the environment. Antimicrobials administered to farm animals largely pass through unmetabolised so that they are excreted into the environment and, as well as resulting in AMR bacteria, may end up in water, faces, compost and other sources. In China, studies have readily detected antimicrobials in farmland environments, effluents and rivers. An examination of AMR genes themselves demonstrated an appearance in the environment at around the same time that antibiotic use is reduced in humans. Such examination of the epidemiology of AMR in humans has been extended to meat processing plants. Farmer and veterinarian behaviour with respect to the prescription of antimicrobials is a major issue. Classical agricultural economics would suggest that farmers only make such decisions based on financial criteria, but the evidence suggests that this is not so. Understanding the balance between financial and non-financial drivers is key to formulating policy. Illegal resistance in human or poultry Campylobacter isolates, although this could be the result of co-selection.

Antimicrobial resistance is related to livestock and animal products. However, antimicrobials may be used in cultivation of fruit and vegetables, as may manures from animals treated with antimicrobials that may contain the antimicrobials themselves or their residues. Finnish data suggested that the AMR profiles of Enterobacteriaceae in vegetables were different from those in the human faecal flora. In America, one study found that vegetarians were more frequently infected by AMR E. coli than newly hospitalised patients and so we should keep an open mind about which food exposures may be of most concern.

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What seems to be clear is that treating livestock does result in the emergence of AMR bacteria that may also be of animal health concern. What seems to be clear is that treating livestock does result in the emergence of AMR bacteria that may also be of animal health concern. What seems to be clear is that treating livestock does result in the emergence of AMR bacteria that may also be of animal health concern.
Listeriosis is an infectious disease caused by the intracellular pathogenic bacterium Listeria monocytogenes. The main route of acquisition of L. monocytogenes is through the ingestion of contaminated food. Most listeriosis cases are sporadic and infections are domestically acquired. Listeriosis can cause severe illness, including neonatal infection, severe sepsis and meningitis type symptoms, sometimes resulting in lifelong ill-health and even, in 15-30% of cases, death[8]. In most people however, listeriosis has no symptoms – the clinical feature in healthy people has been described as asymptomatic carriage or it only causes mild symptoms, such as high temperature, nausea, vomiting and diarrhoea for a few days. Particularly vulnerable groups, such as neonates, pregnant women, the elderly and the immunocompromised, are advised to avoid high risk foods, which include ready-to-eat (RTE) delicatessen meat, ready-to-eat meat and other RTE products, such as soft (non-matured) cheeses and cold smoked fishery products[9].

Listeriosis is a relatively rare disease with 0.1 to 10 cases per million people per year, depending on the socioeconomic demographic and the region of the world. The average probability of a single L. monocytogenes CFU to cause illness in a host will reflect the host susceptibility and the virulence of the strain. Although the number of cases of listeriosis is relatively small compared to other food-borne pathogens, the high hospitalisation and mortality rates associated with the infection make it a significant public health problem. The Food Standards Agency has issued guidelines for consumers on how to avoid listeria (Figure 1).

- L. monocytogenes grows and reproduces inside the host’s cells and is one of the most virulent food-borne pathogens. The infective dose varies with the strain and with the susceptibility of the host. The first documented case of listeriosis was in 1924 and its first link to transmission by food was as recent as 1981. The incubation period can vary from three to 91 days[10].

**The challenge**

L. monocytogenes is a gram-positive, rod-shaped, facultative anaerobe, which does not produce endospores, i.e. it is vegetative. In food it is killed (6-log reduction) by thermal processing to an equivalent of 70°C for 2 minutes. L. monocytogenes is quite hardy and robust by comparison with other bacterial species. It has been widely recognised as a very important hazard in the food industry for more than 30 years. Its ability to grow at temperatures below 10°C permits multiplication at typical refrigeration temperatures. It also survives deep freezing at -18°C. It is tolerant to osmotic stress, acidic conditions and high concentrations of salt. It can be found widely distributed in the environment in soil, water, vegetation and the faeces of some animals. Its ubiquity means L. monocytogenes has a multitude of potential environmental sources and routes to gain access to food facilities and subsequently to cross-contaminate products. It may be spread throughout a food site by personnel, inadequately controlled food flows and process design, contaminated

**To reduce the risk of listeria when preparing food at home, it is important to:**

- keep raw and ready-to-eat foods separate to avoid cross-contamination
- wash fruit and vegetables thoroughly
- keep chilled ready-to-eat foods cold – make sure your fridge is working properly and is set to 5°C or below
- always use foods by their use-by date
- follow the storage instructions on the label and use opened foods within two days unless instructions on the packaging say otherwise
- ready-to-eat food must be eaten within four hours of being taken out of the fridge
- cook or reheat foods until they are piping hot right through
- ensure that you follow manufacturer’s instructions in the preparation of all foods.
L. monocytogenes can persist despite aggressive cleaning and sanitisation and be present for months and even years in some factories, harboured in cracks and crevices.

surfaces, improperly managed equipment, brines, cooling water, condensate and aerosols. It forms highly resistant biofilms on food contact surfaces and non-food contact environmental surfaces. L. monocytogenes can persist despite aggressive cleaning and sanitisation and be present for months and even years in some factories, harboured in cracks and crevices. In particular, it can become established and persist in deposits. Clearly normal cleaning and sanitisation practices are often not enough to eradicate L. monocytogenes. Persistence of L. monocytogenes in food processing conditions is generally accepted to be the major source of RTE food contamination. Therefore, RTE food producers must be prepared to high care standards throughout the food supply chain. This should include:

- Good Agricultural Practice (GAP) at the farms
- Good Hygienic Practice (GHP)
- Good Manufacturing Practice (GMP)
- Hazard Analysis Critical Control Point (HACCP)
- Prerequisite programmes for processing and temperature control during distribution including retail stages
- Manufacturing standards coupled with an effective sampling programme to monitor efficacy of hygiene measures and provide feedback for improvement. RTE food must carry appropriate clearly labelled usage instructions as storage conditions after retail are critical.

Research in the European Union indicates that one third of listeriosis cases in the EU are due to:

- growth of L. monocytogenes in the consumer phase of a product’s life, including from cross-contamination by unpackaged foods in the refrigerator, inadequate storage temperatures, not following use-by dates, cooking or reheating instructions.

Due to the long incubation period for listeriosis, it can be difficult to retrospectively identify food which was the source of an infection or outbreak.

The South African outbreak

Cases of human listeriosis sporadically occur around the globe every year. The recent South African outbreak in 2017-18 is the world’s largest recorded human listeriosis incident and has tragically resulted in 216 deaths and more than 500 cases in the past 12 months. The World Health Organization. Twelve subsequent listeriosis cases have come from three provinces: 59% from Gauteng, 33% from Western Cape and 8% from KwaZulu-Natal, with the remaining cases coming from the other provinces.

The timeline for establishing the listeriosis outbreak is shown in Table 1. The implicated polony was a popular, widely consumed RTE processed meat product, which had been exported to 15 countries: Angola, Botswana, Democratic Republic of the Congo, Ghana, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Nigeria, Swaziland, Uganda, Zambia, and Zimbabwe. A number of these countries lack reliable disease surveillance systems and diagnostic tools, making it difficult to identify any subsequent listeriosis infections. Assistance with surveillance has been offered by the World Health Organization. Twelve of the countries have recalled the implicated processed meat products and banned further imports. The facility owned by Enterprise Foods, a subsidiary of Tiger Brands, the South African food giant, is now facing a class action lawsuit. Repairing the damage to the brand and rebuilding consumer trust and confidence will be challenging.

The NICD IMT concluded that 93% of the strains were identiﬁed at an overall awareness on listeriosis. A number of media packages in the 13 locally spoken languages to help raise awareness amongst key stakeholders in the food chain, especially RTE suppliers, vulnerable groups, authorities and district environmental health practitioners, are being implemented. Education in safe food handling is a key measure for the prevention of listeriosis. A dedicated listeriosis website has been created. The World Health Organization has created a social media package in the 13 locally spoken languages to help raise overall awareness on listeriosis and to help tackle public concerns in relation to the ongoing outbreak.

July 2017

The South African National Institute for Communicable Diseases (NICD) noted an increase in laboratory-confirmed cases of listeriosis with an unusually high number of neonatal infections.

5th December 2017

A listeriosis outbreak was declared by the Minister of Health, Dr Aaron Motsoaledi.

4th March 2018

The Ministry of Health announced that the source of the outbreak was RTE-processed meat products manufactured at Enterprise Foods Polokwane, Limpopo production facility. The National Consumer Commission issued the implicated manufacturers with a safety recall on polony and other RTE processed meats. Polony is often eaten by low income communities and sold by street vendors, making distribution difficult to track, trace and recall.

24th April 2018

The business confirmed that independent laboratory re-testing, which it had commissioned, had identified the presence of L. monocytogenes ST6 strain in its products and processing environment.

3rd July 2018

By this time a further 82 facilities producing RTE meat products had been inspected by NICD Incident Management Team members (IMT), who carried out site inspections and took environmental swabs. The number of laboratory-confirmed reported cases per week had declined somewhat, although the implicated products were recalled (Figure 2) with a total of 87 cases reported since 5th March 2018, according to figures published on 28 July 2018.
Evolving risk management systems

Louise Manning and Peter Wareing consider evolving challenges to risk management systems in the food industry and identify options to help organisations manage their own spectrum of risk(s) and remain resilient.

Introduction

The current reality is that food supply chains are global, complex and sometimes opaque. They are also highly reactive, as regulatory, market, technical and social requirements keep evolving and sourcing links become increasingly fluid. In addition, the challenges that present risk to food products and food companies also shift. Some challenges are historic, for example, food safety and food crime, but others are new and contemporary. In the future, evidence suggests that the speed of change will accelerate even faster, requiring businesses to be more resilient and agile. This is the first in a series of planned articles and papers on the theme of risk management in food supply chains.

Resilience is the ability of a supply chain to absorb market and regulatory shocks and remain operational and functioning[1]. Supply chain resilience is affected either by internal factors or by external factors outside the control of actors within the chain, e.g. floods, harvest failure, animal disease and so on. Three elements influence resilience:

- control factors including protocols, policies, procedures, and systems;
- supply and demand factors that create disturbances to the multi-directional flow of materials, product, finance and information; and
- processes, such as transport, communication and infrastructure[2].

Therefore, risk reduction strategies that drive resilience must be embedded within the norms of ‘the way we do things’, and as a result drive agility and adaptive capability, and reduce, or where possible, eliminate risk[3].

Risk management

The Food Law Code of Practice (England)[4] defines risk as ‘the chance or probability that a person will be harmed or experience an adverse health effect if exposed to a hazard’. Risk analysis involves three components:

- risk assessment;
- risk management and
- risk communication[5].

Thus, it is important to reflect on the wider context of risk management systems by being informed via risk assessment processes underpinned by effective risk communication. Effective risk management requires multidisciplinary insights and constructive engagement between food chain actors to develop an integrated supply chain approach using appropriate risk management tools to improve business resilience and in so doing reduce risk[6]. The recently reissued ISO 31000:2018 Risk Management Guidelines[7] describe risk management simply as the ‘coordinated activities to direct and control an organisation with regard to risk’, and further states that ‘controls are any process, policy, device, practice or other conditions and/or actions which maintain and/or modify risk’. The Guide describes the eight principles of risk management as:

1. Customised to the organisation
2. Integrated into all organisational activities
3. A structured and
comprehensive approach
4 Inclusive – ensuring appropriate and timely involvement of necessary stakeholders
5 Dynamic – considering internal and external factors that influence risk
6 Aware of any limitations in the available information (information asymmetry)
7 Aware of the social (human and cultural) factors that influence risk
8 Driving continuous improvement

Risk management approaches should maximise the degree of risk reduction, whilst ensuring that the measures undertaken are efficient, effective in managing the risks, not restrictive and the costs of managing the risks are in line with the benefits derived.

7 Aware of any limitations in the available information (information asymmetry)

6 Aware of any limitations in the available information (information asymmetry)

5 Dynamic – considering internal and external factors that influence risk

4 Inclusive – ensuring appropriate and timely involvement of necessary stakeholders

35

8 Driving continuous improvement

7 Aware of the social (human and cultural) factors that influence risk

6 Aware of any limitations in the available information (information asymmetry)

5 Dynamic – considering internal and external factors that influence risk

4 Inclusive – ensuring appropriate and timely involvement of necessary stakeholders

34

Overcoming information asymmetry

Information is only of value when it meets specific stakeholder needs and can be processed and used by its target users[3]. Further, Verhulst argues although market failures arise when sellers have more knowledge than buyers about the like likelihood of safety issues arising, food safety control capability, provenance, traceability, product attributes, process attributes or nutritional content, i.e. when this information is asymmetrically distributed. This means that for effective risk management to occur, information asymmetry must be overcome so that the required information is available and representative, the characteristics of the information are clearly defined, the information relates to specific food batches and the information is ultimately truthful. Moral hazard is the risk that in a transaction, one party is not acting in good faith through the provision of partial or misleading information[4].

What are the options for reducing information asymmetry?

One option being put forward to reduce asymmetry is the application of distributed ledger technology, such as Blockchain (Figures 1). This technology could be a disruptive innovation that promotes security, reliability and transparency in food supply chain interactions, and its use could lead to enhanced food safety control[5,6]. Distributed ledger technology can be applied as a tool to integrate data across supply chain risk management systems, including inputs from multiple supply chain actors, such as temperature sensors, GPS locators, video cameras, radio-frequency identification (RFID), barcodes/QR codes, as well as product analytical test data, labelling declarations and site certifications relating to foodstuffs, their packaging, and location. This would permit real-time access to the product status, and the time and location of specific actions[7].

With sufficient secure permissioned access agreements, regulators could also undertake real time verification of business activities. The advantages of using such technology include more effective incident responsiveness, reduced cost and increased speed of transactions in the supply chain, the ability to overcome information asymmetry and improve trust between stakeholders (Table 1).

Conclusions

Global supply chains are a complex ecosystem based on trust, especially where elements of the chain are currently opaque in terms of practices and risk management controls. Effective risk management should confirm improved supply chain resilience. Distributed ledger technology, such as Blockchain, has value in development of frictionless borders as a means to more effectively control and reduce cost of transglobal trade. Distributed ledger technology, such as Blockchain, has value.

Table 1. Advantages of using Blockchain technology. (Adapted from Kshetri[8] 2018).

<table>
<thead>
<tr>
<th>Supply chain risk management criteria</th>
<th>Blockchain contribution</th>
<th>Additional supply chain dimensions caused by adoption of Blockchain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>If technologies have already been adopted within the supply chain, there is zero or low marginal cost to generating blockchain code.</td>
<td>There is a cost to embedding the technologies within the chain and this may become a cost tomarket entry for SMEs.</td>
</tr>
<tr>
<td>Reducing cost of product withdrawals and recalls through increased ability to locate affected batches and also being able to communicate more efficiently with the consumer in the event of a product recall.</td>
<td>The cost reduction depends on the complexity and efficiency of systems already in place in a given supply chain. The degree of required utility of Blockchain depends on whether the withdrawal or recall is for a single material or multiple ingredients in a complex product.</td>
<td></td>
</tr>
<tr>
<td>Reduced cost of securely digitally signed documents:</td>
<td>Eliminate paper records that then need to be digitalised to be shared. Requires a level of digital competency that may need cross-industry investment to acquire.</td>
<td></td>
</tr>
<tr>
<td>Reduced regulatory compliance costs:</td>
<td>Auditable data can be provided for regulatory and private organisations to verify.</td>
<td></td>
</tr>
<tr>
<td>Speed</td>
<td>Increased speed of interactions and communication across the supply chain.</td>
<td>Digital interactions rather than traditional paper based, or electronic interactions can be faster. However, legislation needs to keep pace so that digital interactions are admissible as evidence in court and can be used by regulators to take forward prosecutions. Relevance to engage if it is not a regulatory or market access requirement will reduce cost of access.</td>
</tr>
<tr>
<td>Information asymmetry</td>
<td>Access to supply chain data that can be used to assess quality criteria, product integrity and traceability information by businesses, regulators and consumers.</td>
<td>A more integrated communication system should improve equity of access to information, but the system is reliant on the integrity of people inputting the data.</td>
</tr>
<tr>
<td>Increased governance of supply chain</td>
<td>Increased capability to store and retrieve information will drive the hunger for more information to reduce risk i.e recording information because we can.</td>
<td>Data swamping could add transaction costs for businesses in meeting supply chain and regulatory governance requirements.</td>
</tr>
<tr>
<td>Trust</td>
<td>More digital accountability for supply chain data i.e. provenance of information is verifiable.</td>
<td>Supply chain certification processes should be more streamlined. Again, it relies on the integrity of individuals inputting data as with paper-based systems.</td>
</tr>
</tbody>
</table>

References and article available online at: http://www.primority.com

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Global supply chains are a complex ecosystem based on trust, especially where elements of the chain are currently opaque in terms of practices and risk management controls. Effective risk management should confirm improved supply chain resilience. Distributed ledger technology, such as Blockchain, has value in development of frictionless borders as a means to more effectively control and reduce cost of transglobal trade. It can increase the transparency and efficiency of supply chains through greater access to information generated by
Debra Smith describes the aims and activities of the European Hygienic Engineering & Design Group (EHEDG) and explains its links with IFST.

Many of the product recalls in the EU are related to cross-contamination of the food product from the processing environment or processing equipment rather than from failures in the manufacturing process. That is easy to clean and safe in contact with food, i.e. durable and non-toxic. Hygienic design principles include designing equipment and facilities that minimize:

- small surface irregularities, such as crevices, that could provide microbiological or allergen harbourage sites or growth niches;
- small dead areas that could provide harbourage for microbial or allergenic materials;
- large dead areas that could provide harbourage for materials that could provide brand protection issues, such as meat species or pests;
- contamination of the product by foreign bodies arising from the equipment (glass, metal etc.);
- the maintenance of hygienic conditions via structure rigidity and material durability – appropriate

Hygienic design provides:

- defence against external factory hazards (chemical pollution, airborne microorganisms, flooding, pests etc.)
- defence against internal factory hazards – no harbourage sites and ease of cleaning
- internal flows of products, product, packaging, air and waters to prevent cross-contamination
- security against deliberate contamination
- the maintenance of hygienic conditions via structure rigidity and material durability – appropriate foundations, steelwork, floor slabs, surface finishes etc.

Members of EHEDG get access to information that will help maximise food safety through application of hygienic design based on advice provided by consortium members with expertise in their field. They can also purchase the EHEDG Guidelines, attend EHEDG events and training at a discounted cost and become involved in the development of future Guidelines, test methods and training materials.

EHEDG activities

Working Groups

At any one time, over 400 consortium members are actively involved in EHEDG Working Groups. These groups continually develop, write and revise EHEDG Guidelines and other reference documents. Each group’s membership is made up of

- volunteers industry experts with relevant industry knowledge and experience.

Guidelines

EHEDG currently publishes 48 Guidelines covering everything from buildings design to cleaning validation. Some Guidelines are available as free downloads. Remaining EHEDG guidelines are distributed to members via the EHEDGFST platform.

Regional Sections

EHEDG currently has 32 Regional Sections, with more waiting to become fully established. The role of the Regional Section is to disseminate know-how by translating the guidelines into the local language, by holding conferences, and by highlighting the EHEDG Certification and Training programmes. The EHEDG equipment testing and certification is recognised worldwide and more than 520 items or assemblies of equipment have now been successfully certified.

Training

Members of the Training & Education Working Group commit themselves to developing high-quality and practically-oriented training material, for both industry and academia, based on the EHEDG guidelines. The Group is a team of experts mainly from the food industry, academia, educational institutes and consultancies. Members are invited to volunteer to contribute knowledge for improving the EHEDG guideline portfolio. Currently there are 5 training courses available:

- EHEDG Advanced Course on Hygienic Design
- CIP-Cleaning of pipe lines and tanks
- EHEDG Basic Course on Hygienic Design
- Contamination Control
- Hygienic Design in closed / open processes

Additionally, the Working Group is committed to assisting with training upon request, when available.

World Congress

The World Congress on Hygienic Engineering & Design (EHEDG) is a flagship event, taking place every two years at different locations in Europe. The event is a summit for all target groups concerned with hygienic engineering, installation and integration of equipment and facilities for the production and processing of safe food and related products. Designed to educate, equip and empower the delegates, the Congress aims to deliver practical know-how for improving product safety, process efficacy and production efficiencies by hygienic engineering and design.

The key objectives of the Congress are:

- To raise the awareness and analyse the relevance of the hygienic design of the food manufacturing infrastructure to food safety, quality and manufacturing costs
- To provide focus on open and closed plant cleaning and planned preventative maintenance as key prerequisites to ensure the continued hygienic condition of the manufacturing infrastructure
- To present the EHEDG activities as a European and world-wide operating authority in this field by guideline publication, expert working groups, equipment testing and certification as well as high-level training
- To promote the creation of local and international networks to identify any knowledge gaps and problems in hygienic engineering and to provide adequate solutions related to hygienic equipment, installations and processes as well as overall food safety
- To showcase academic developments in the fields of cleaning and food safety culture that will impact the future design and manufacturing infrastructure
- To provide a meeting platform for experts, decision-makers and newcomers in the field of hygienic design and to enhance the dialogue between equipment and plant manufacturers, food producers and processors, authorities and academia.

Links between IFST and EHEDG

In 2016, the IFST Western Branch Committee organised its first conference on hygienic design at Eastwood Park, Ireland. The conference was supported by EHEDG and attended by over 200 delegates from the food and beverage industry. The event was a great success and provided an excellent opportunity for delegates to network and discuss current issues in hygienic engineering. IFST and EHEDG are currently working together to develop a joint conference on hygienic design in 2018, which will cover topics such as hygienic design principles, equipment selection and installation, cleaning and sanitisation, and maintenance and validation. Attendees at the conference will have the opportunity to network with experts from around the world and to learn about the latest developments in hygienic engineering.
Debra Smith
Global Hygiene Specialist,
Vikan

Debra has over 30 years of food safety/research training and experience. At Vikan Foods she is responsible for providing expert hygiene advice and support to the food industry and for the development of new and improved cleaning tools. Prior to joining Vikan, she worked in the microbiology laboratory of Bernard Matthews’ Farms, the Food Safety Division of Defra and as Food Hygiene Research Manager at Campden BRI. She holds qualifications in Applied Microbiology (HNC), Nutrition & Food Science (BSc Hon), and Advanced Food Hygiene and HACCP. She is also a qualified FSSE 22000 auditor, an active Committee Member of both the European Hygienic Design Engineering Group (EHEDG) UK & Ireland Regional Section and the Institute of Food Science and Technology (IFT) Eastern Region, and is currently Chair of Campden BRI Microbiology Members Interest Group.

Debra has been actively involved with EHEDG since 2005, when she joined the Hygiene Department at Campden BRI. Since then she has been working to forge closer links between the IFST and EHEDG.

Email: dsmith@vikan.com
Website: www.vikan.org

The next EHEDG World Congress will take place from 21 to 22 November 2018. Registration is now open: ehedg-congress.org/registration/

Melanie Hargraves explains the benefits and pitfalls of training in nutrition science.

The health, financial and societal costs of being either over or under-nourished mean nutrition is increasingly becoming a priority for research, Government policy and media focus.

Fixing this situation, especially in relation to obesity, is a priority for many countries across the globe and requires concerted efforts from all areas of our environment, of which the food system is a big part. Food science, education, nutrition and public health all intersect and can provide valuable knowledge that can be useful for food scientists and nutritionists as well as the food industry.

The Congress programme has now been finalised and Colin Dennis will deliver the Day 1 keynote address. As a former President of IFST, this reinforces the links between the two organisations. Other eminent European scientists and engineers, from both industry and academia, will speak during the 2-day event.

This year the EHEDG World Congress on Hygienic Engineering and Design will be held at the ExCeL Exhibition Centre in London’s Docklands on 20–22 November in conjunction with Food Matters Live. Food Matters Live is the UK’s only event dedicated to creating cross-sector connections focused on the future of food, drink and sustainable nutrition. It brings together over 800 exhibitors, 400 speakers, 16,000 visitors and 100 free-to-attend conference and seminar programmes to enable collaboration and innovation in support of a sustainable food and drink future. EHEDG has selected this event as an ideal platform for the 2018 World Congress.

The Congress will offer practical information on best practice, as developed within EHEDG guidelines, taking into consideration all legal requirements, guidance and expert advice. It will also provide information about new and innovative ways to manage food hygiene, through both oral and poster presentation of research conducted by industry and academia.

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The event provides an excellent opportunity for IFST members to mingle with EHEDG experts, realise the benefits of hygienic design, gain access to guidance and training, and discover the hygienic design innovations of the future.

It also provides EHEDG members with the opportunity to find out more about IFST and all the benefits that it has to offer as the UK’s leading professional body supporting the food industry.

Both organisations share the same aim of advancing food science and technology based on impartial science and knowledge sharing together with personal development and recognition.

The British Nutrition Foundation is an established nutrition charity offering evidence-based online training courses in nutrition that provide insight into this complex area and are useful for food scientists with an interest in the topic.

Nutrition is a specialist skill, but you can equip yourself with the basics. The work of registered nutrition professionals (such as a Dietitian or Registered Nutritionist) is invaluable within the food chain, they have degree-level education that is essential for interpreting and unpicking the science behind what we eat.

Many organisations employ registered nutrition professionals for this purpose. Whilst an online training course doesn’t replace the expertise of these professionals or qualify one as a nutritionist it can help develop a solid knowledge of the basics and you can apply along with your food science expertise.

Food science and nutrition knowledge complement each other

Government health policies include nutritional policies that require food science solutions, including:

• Reformulation of foods to reduce calories, sugar and salt – requires technical solutions to replace the functionality lost by the ingredient to be reduced/removed
• Levies on sugars-sweetened drinks – exploring new product development opportunities, which allow drinks to be created without the addition of sugars
• Reducing portion/product sizes – maintaining product quality whilst reducing product shape or size

Technological changes to a food do not always equal a nutritional benefit. For example, reducing sugars in a food product is only beneficial if the replacement ingredients do not increase the total calories, fat or salt of the food, and at the same time it must be technically feasible. In addition, having an understanding of which ingredients can provide a public health benefit (e.g. fibre) can be an advantage. Learning about nutrition can provide you with a valuable skill that will help you in your work to discover food science solutions to some of these challenges.

Increasingly, we work in teams of inter-connected disciplines and having an understanding of these different areas and roles will allow you to work more effectively with other food science professionals. It is a great development opportunity and can contribute towards your CPD profile.

Why choose BNF?

There are many nutrition courses
available, however not all of these are reputable or science-based. Nutrition is not a protected title (i.e. anyone could call themselves a nutritionist and offer training) and as such it can be difficult to know which organisations to trust.

Looking for courses which are certified by a reputable authority (such as the British Dietetic Association and Association for Nutrition) is a good place to start. The British Nutrition Foundation is a registered charity that has been providing evidence-based nutrition information for over 50 years. We aim to make nutrition science accessible to all. BNF training courses are developed by qualified nutrition science experts and a certificate is produced on completion, which can contribute towards your continuing professional development (CPD).

Training online means:
• Learning when it suits you
All of the BNF training courses are delivered online. This has several benefits, including:
• Flexibility: training fits in around your schedule and not the other way around
• Saves money and time: no lost time to travel or days out required
• Work at your own pace: complete all in one go or work in chunks

The BNF online training platform provides a range of courses that can take between two and twelve hours to complete and contain courses that are suitable for nutrition beginners as well as those who have a bit of knowledge and would like to know more.

The courses are completed in your own time, on your PC, Mac, tablet or smartphone – you can stop at any time and pick up where you left off. Modules are assessed to check progress, and on completion of the course, you are awarded a personalised certificate.

BNF has the following courses available:
• An introduction to healthy eating and nutrition
• Exploring nutrition and health
• Catering for health
• Food labelling and health claims
• Complementary feeding and obesity
• Allergy – reducing the risk in early life

Getting started
The course An introduction to healthy eating and nutrition is designed to equip people with the basics of nutrition, and you can try the first module for free to see if it is the right level for you. The course is £55, takes between five and seven hours to complete and requires prior nutrition knowledge.

I already have the basics but I’d like to learn more
Exploring nutrition and health builds on the introductory course and explores the topic in more depth; it is good for those who have completed the first course or for anyone who already has some nutrition knowledge. The course covers the nutrition science of energy and nutrients, how nutritional needs change throughout life, how diet and lifestyle affect risk of disease and some of the requirements behind nutrition labels. It takes between ten and twelve hours to complete and costs £125.

Both of these courses are certified by the Association for Nutrition.

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Wow, what a year it has been! I am undertaking a R&D in Food Science with Industrial Training at the University of Reading and am currently completing my placement year. At present I am the secretary of the IFST Student Group but am soon to take on the role of president. I also write the student newsletters along with Alice Bryant.

My placement year as an Ingredient Research Intern at Mondelēz International, Reading Science Centre has been fantastic, not only for the team knowledge I have gained about chocolate, fillings, emulsions and powdered beverages, to name but a few, but also for the development opportunities I have had.

As part of my placement we had an intern challenge, my group focused on sustainability and we worked with a supplier that produces reusable cups for everyone on site. This was a great way to connect with external suppliers and other members of the team, and gave us a valuable opportunity as interns to make positive impact. It was also an extremely fun project and rewarding to see the impact of our cups such as far as India and Mumbai!

The main project I have worked on has come with several challenges along the way and many hours spent in the pilot plant! I only took over a project from an external university partner. It was an emulsion technology at the milligram scale. As a result of much searching of the literature and discussions with my colleagues, this technology has been translated and improved and such that it is now at kg scale! When I first started this project, I found it difficult to see the bigger picture of where the technology could end up, however placement has really taught me business awareness. Through the wonderful art of reformulation, I have been able to start incorporating this emulsion into a fillings product and learnt how tiny changes can make a big difference.

Each day on placement is varied and interesting and, as an intern, you get exposure to so many different tasks.

Hands-on experience
The broad and varied opportunities in the food industry encouraged me to study Nutrition and Food Science with Industrial Training at the University of Reading. While taking my A-levels in biology, chemistry, food technology and physics, I developed an interest in food technology and science. I was interested in how food is produced, and how the technology could end up, however placement has really taught me business awareness. Through the wonderful art of reformulation, I have been able to start incorporating this emulsion into a fillings product and learnt how tiny changes can make a big difference.

Each day on placement is varied and interesting and, as an intern, you get exposure to so many different tasks. I’ve helped many team members with large scale projects, my latest feat is hand tempering and filling 3024 chocolate shells with cream! Have you ever wondered how chocolate shells with cream can be made and if you had the opportunity, please go for it!

Placement definitely teaches you perseverance – you grow in confidence and the experience is great to add to your CV. It gives you examples to talk about in interviews and allows you to see what it is like to work in the food industry. You no doubt will get exposure to different departments (if this isn’t the case definitely ask!), so you can see which areas you really like and the ones you’d prefer not to work in.

To any of you thinking of doing a placement, I couldn’t recommend it strongly enough! It’s a year without exams (great!), a year with multiple freebies (really good ones too!), a year where you can work for a chocolate company but in all seriousness, a year where you have an exponential learning curve. All the training and development opportunities I’ve had on placement, from seeing Cadbury caramel being produced at top speed on the factory line to being trained to use the equipment of the pilot plant, I was regularly able to help me progress on my journey through the food industry. If you have the opportunity, please go for it!
The main body of this 550-page recent publication comprises a comprehensive innovation review featuring more than 400 sustainable packaging examples, from research and development (R&D) concepts through to actual market launches. The entries are divided into 11 ‘reduce, recycle, reuse’ areas namely: compostable, biodegradable, bio materials, light weighting, recycling, reusable, alternative materials, plastic alternatives, increasing shelf life & reducing waste, carbon footprint reduction and edible. These categories are then briefly explained at the start of each section and, as the introduction mentions, are not mutually exclusive as a material may fall under several of the areas. The content section lists the entries according to the wordy headings used for each page, however there is no easy way to search by usage or by packaging type, for example. The introduction also mentions that this is the first such compendium that ThePackHub has published and that it plans to update it early in 2019, hence this version will be replaced within a year. The actual review consists of a full page for each entry, made up of a description, a colour photograph and a user-friendly tick box style summary capturing some, or all, of the following details: supplier name, brand, launch country, market(s) i.e. usage (e.g. food, beverage, consumer goods, health and beauty, household). The food category, for example, is then split into sectors, such as confectionary, fruit, fish, ice cream, meat, cereal, snacks, pizza etc., which helps the reader to understand the specific application. In this feature ‘beverage’ use is subdivided into water, beer, coffee, tea etc. The summaries also capture the relevant trend, principally being sustainability, but some also relate to added functionality. The substrate itself is captured e.g. film, PE, HDPE, plastic, paper, carton board, bio-materials, coating etc. for the stated pack type e.g. lid, cup, bottle, bag, dispenser, jar, tray, sleeve, pouch, box, crate, wrap, punnet etc. Finally, the innovation type is highlighted, which includes such aspects as edible, material substitution, reusable, recycled material and preservation, to help explain the key features and advantages. The appearance and layout of the review is clear. The compendium also includes a short section on industry insight based on the authors’ own recent research. It identifies the main opportunities and challenges, as well as other factors that are necessary to increase sustainable packaging. More than 80% of the brand owner and retailer related respondents had roles in food and drink processing. An A-Z guide of more than 150 sustainable packaging supplier innovators, at the back of the compendium, includes current contact details. In most cases it specifies: a name (no specific job title or role mentioned), email address, telephone number and website hence it serves as a useful directory for those involved with packaging procurement and product development. The final section of the compendium, entitled ‘Who’s Who of Sustainable Packaging’ indexes over 60 of the sustainable packaging industry’s main development companies and organisations, although there are some minor errors in the page numbering. The logo, website addresses, locations, CEO names and contact details of those highlighted, are provided in most cases, alongside a synopsis of their relevant capability, which is another useful feature of the publication. The world’s largest spectral database, with over 2.3 million spectra. Wiley Spectra Lab provides researchers with access to 2.3 million MS, NMR, and IR spectra – the broadest and largest collection in the world. This expert spectral data system uses empirical data and advanced software to help chemists, toxicologists, and life scientists confidently identify chemical substances. To arrange a demo, email dbinquiry@wiley.com www.wileyspectralab.com
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