ProFSET Food Workshops 26-Nov-2024

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Introduction. What is ProFSET (profset.org)

ProFSET was set-up to identify and coordinate actions in Science and Technology, to meet the future needs of an efficient UK Food Supply Chain. It represents 12,000 professionals in the UK who are members of 11 learned societies and institutions. As such, it can provide unbiased expert opinion for strategy and implementation planning.

It has three main objectives:

Being a united, informed voice to influence and support government, media and the public,

Providing opportunities for collaboration, knowledge sharing and cooperation across industry and academia,

Promoting the Industry as a career path and supporting the development, education and training of professionals.

ProFSET was launched in November 2023 with an inaugural conference.

Its activities of 2024 focussed on a call to action through workshops. This report outlines the discussion and subsequent recommendations for action from the **'Informed Voice'** and **'Education, Attraction and Retention'** workshops.

This report has been compiled by the ProFSET group.

Informed Voice Workshop

Background to the Workshop

A sub-group of professional bodies (IAgrE, IFST, IOP, RSC, IChemE) from ProFSET held discussions with IGD, FDF, Defra, NFU and IUK-UKRI to prioritise "**Informed Voice**" focus areas for the Workshop. They reviewed many recent independent policy documents[1-9].

Four themes emerged all of which will require significant new Science and Technology:

1. A Food System 'pre-competitive' platform to review and implement best practices in resource (Carbon) measurement for unified reporting; to harness the advances in use of renewable energy; and identify new technologies for lower energy consumption in production, manufacturing and distribution.

2. A plan for optimising water conservation, use and distribution across the Food System.

3. To build a matrix of current and future food production capability and map nutritional yield and quality (bioaccessibility) to enable fast track regulation approval.

4. Provide diet related change available to all consumers, by taking a Food Systems approach. Implement a Plan of Action from design to execution, creating healthier food options, using increased nutritional quality of crops, and retaining and enhancing benefits through manufacture and distribution.

The intent of the **'Informed Voice'** workshop was to use expert insights to advise government, and to gain food industry commitment for scale and strategy, in aspects of food production, manufacture and distribution.

The output and recommendations for each theme are given below.

Theme 1. Energy transition

Main Findings, Conclusions and Recommendations.

Net-zero by 2025 was viewed as the "headline" goal set by the UK government, requiring all manufacturing sectors to make contributions. Net-zero is also a focus in the UK's Modern Industrial Strategy: Invest 2035, and Defra's UK Food Security Report 2024. The need to collaborate across manufacturing sectors is critical to deliver net-zero by 2050, given the consensus that the size of the task is enormous and challenging.

While the amount of CO_2 emissions from agriculture and food processing sector is known, there appears to be little knowledge on where the biggest opportunities exist – i.e. the areas that should be considered first that could make a significant contribution to net-zero. Reductions in food waste and a shift towards healthy diets could be initial target areas where ProFSET could have a role through robust science-based opinion, balanced with the need to consider changing consumer behaviour,

Activities that could contribute to the net-zero 2050 goal

Scope 1, 2 and 3 emissions are being addressed by most large organisations, particularly on transitioning to renewables such as purchasing green electricity. The range of activities that organisations are using to address scope 1 and 2 emissions is very diverse, and there appears to be no standard implementation plan that an organisation could adopt to achieve a reduction in scope 1 and 2. Every organisation has a set of unique circumstances that allows them to target emission reductions in a specific way.

Establish training and education programmes to ensure all stakeholders are aware of emissions, to support corporate and personal responsibility in identifying and addressing opportunities. There is an inconsistency between organisations on the degree of proactively educating their employees.

Scope 3 emissions appear to be an area where organisations were struggling to understand what to do. This relates to how to influence customer behaviour.

An example from heavy duty diesel applications for farming and transport was presented.

- While government policy appears to be focused on electrification, it was thought this would not be possible in terms of replacing heavy duty diesel applications. A mixed approach to replacing fossil fuels was required.
- A clear policy strategy is required to encourage a mixed approach which includes alternative fuels such as HVO, hydrogen cells, etc. This also relates to the infrastructure requirements to enable alternative fuels to be widely used.
- There is concern agriculture may have to compete with other sectors, such as the airline sector, for renewables. This could put food security at risk and/or increase costs of food.
- The engineering community is well placed to help determine an energy transition implementation plan that reflects what is technical feasible today, versus what may be possible in the future (e.g. Artificial Intelligence and the contribution it could make to planning transportation logistics).

To drive towards net-zero across the Food Sector requires a joined-up approach to the delivery of integrated technology that would facilitate the energy transition. Large OEM's and SEM's have different complementary skills and expertise. The requirement therefore is to create an independent forum where stakeholders can collaborate on the development of systems rather than individual components that may or may not integrate into farming and food processing practices.

Within "energy transition" there appears to be lots of terminology used to describe activities that lead to reductions in emission and carbon sequestration. These terms include carbon farming and regenerative agriculture. However, the definition of what these mean needs further work to reduce ambiguity. Furthermore, the definition should include a standard method of measuring, recording and verifying (MRV) activities that make contributions to net-zero. This will need regulation by government

Conclusions

Given the size of the energy transition task and the need to collaborate to develop a systems approach, strong leadership is a key requirement. Currently the perception is leadership is weak

and is not driving the collaboration within and across sectors required to address the challenge. It is recognised that ProFSET has a great deal of technical knowledge that can be used to help define policy strategies and implementation plans. However, high level leadership is required to make sure commercial pressures do not detract from achieving goals.

Many organisations would like to contribute to a forum that actively drives collaboration and systems thinking, but it requires leadership to ensure impact. ProFSET with its technical and engineering reach would play a key role in determining how requirements around systems would be implemented.

Recommendations

1. Quantify priority target areas for net-zero within the farming and the food sector. What are the biggest opportunities and what contribution would they make to the energy transition if reductions in emissions could be achieved?
2. Define a project for scope 3 emissions within the farming and food sector to understand the complexity of influencing emissions "up-stream" and the potential contribution they will make to the energy transition.
3. Develop position papers for key target areas that could be used to develop policy. This could be done in collaboration with trade associations such as FDF, NFU, AEA, etc.
4. Assist with defining standards for activities linked to the energy transition. This includes requirements for MRV data standards and an implementation plan to enable MRV to become seamlessly integrated into the food chain.
5. Participate and contribute to a forum to determine systems requirements and how these systems could be designed and implemented through a phased approach that reflects technical capabilities now and in the future.

The Role of ProFSET

Many of its professional members are involved in a variety of projects. ProFSET can coordinate and disseminate new knowledge.

Theme 2. Water Management

Main Findings, Conclusions and Recommendations

The scientific and technical breadth covered by water management and conservation is considerable. The workshop identified the need for a broader range of Small & Medium Enterprises (from environmental agencies to NGOs) in this space to identify opportunities where ProFSET and professional bodies could meaningfully contribute. Nonetheless, there are recognised broad areas of opportunities across the food sector.

There is a growing impact of climate change (such as increase in flooding made worse by, housing development on flood plains) on agriculture practices, e.g. crop adaptations and regenerative agriculture, showing a correlation between soil health and water retention. There is also a need to better understand of the relationship between water – energy – carbon (circular economy), and the role of "water credits" (analogous to carbon credits).

There is a critical need to measure and map the “Water System” end-to-end, but this needs a consistent data-driven approach between all players to align on how and where we measure, what to prioritise to ensure impact, and how to link to carbon and energy. An additional need is to identify and share best practises between companies, nationally and internationally, and opportunities for innovation.

Conclusions

- Water scarcity is not seen as a serious problem in the UK now for food and drink manufacturers but needs a better analysis for the future.
- Water scarcity is different for agriculture and for food production. How is our wastewater being measured? Impact of effluent treatment, public health, agricultural pollution, run off, Nitrates, microplastics etc.
- The UK water supply is all potable (drinkable) – does it need to be ?
- WRAP have an agreement which many businesses have signed up to, but needs further publicity
- Funding for start-ups to implement new / improved water management initiatives are perceived as not fit-for-purpose, with insufficient resources (time, money, people) to implement. Though unsurprisingly, beverage companies are considered best-in-class in water management.
- There is a lack of connectivity / understanding on water management between water utility companies, agri-sector, food manufacturing sector and University research.

Recommendations

1. Water availability, storage and movement requires a strategic review. There is a reservoir shortage in the UK, and water is not always in the right places. The UK should look to other countries who move significant volumes of water such as China

2 . The value of water is dependent on where the user is in the supply chain. Mapping water value throughout the entire agriculture-food chain (e.g. via LCA) could help optimise usage and minimise wastage. This analysis would support how water connects to sustainability priorities (how do we measure, what do we measure, barriers, role of grey water).

3. There are opportunities to identify and adopt best practises from other countries/nations and other manufacturing sectors. It is likely that food and drink companies do not share best practice nor innovations even within the same sector. Suppliers of cross-sector water processing equipment like CIP have an important role with information shared and innovations to reduce water usage balanced against food safety / shelf-life considerations.

4. It is increasingly understood at UK Government level that changes will only be made if incentives, regulations and/or penalties are put in place.

The Role of ProFSET

ProFSET should focus on improving knowledge of water across the agri-food chain. Everyone needs a better awareness of water scarcity/management, and how it impacts them. What does the water ecosystem look like and who is responsible for the different parts, and is it a priority?

Theme 3. Food Resilience and security

Main Findings, Conclusions and Recommendations

Food resilience and food security can have different meanings across the food sector. Indeed, all major food and drink manufacturers have published sustainability strategies and targets to reduce water, pesticides, energy etc. but focussing on their own particular business model

For example, PepsiCo rely on three main crops for its food products (oats, corn, potato) and have funded and published research which benefit all users of these crop, e.g. through publishing an Oats Growers guide and decoding the oat genome to support all growers and improve global crop resilience / yield. Similarly, manufacturers of coffee and chocolate products have published research to support increase resilience of crops

Climate change resilience is increasingly important to reduce variability in crop performance and maintain quality and nutrition of the consumed food product. This is leading food manufacturers to investigate new ingredient sources from crops more resilient to temperature extremes, flooding etc.

Increasingly hot summers are correlated to increased food spoilage, but it is unclear if hot summers are directly correlated to food poisoning due to different eating and cooking habits. Hotter summers, shorter winters, higher rainfall etc., are changing agricultural and food and drink manufacturing practices, particularly in the storage and distribution of crops and finished products. Food manufactures may require formulation changes to maintain shelf-life, e.g. replacing PUFA with SFA in cheese sauces.

Many foods go through first and second order phase transitions during processing e.g. glass transition or gelation / crystallisation events as raw ingredients are converted to the final food during manufacture, to “lock-in” and create consumer-preferred texture and safe products. Damaging excursions and loss of texture through extreme climate events in the Supply Chain is increasing.

Shorter winters impact products like Lambic Beers which need a long slow cold fermentation period.

<u>Conclusions</u>

- Diversification of crop types toward those from sustained hotter climates is creating opportunities in the UK for non-traditional crops, such as pulses, and some champagne growers have acquired land in UK.
- The role of meteorological “big data” for long term climate predictions to support crop selection and decision making is an opportunity across the food sector. Given multi-year cycles to adapt crops to changing climate is an opportunity for IUK pre-competitive funding calls.
- Emerging “urban” farming techniques such as vertical farming have already found application for insect protein (e.g. Healy Group), abandoned buildings for fruit/veg/herbs, aquaponics for Wasabi, salad leaves and herbs. However, these techniques bring new challenges with resources (water and light) and need for maturity control.

- Precision fermentation is increasingly viewed as a solution to reliance on chemically processed ingredients to manufacture food components such as proteins and PUFA, but will compete with biofuel production.
- Consumer-driven selection of alternate food choices, whether lifestyle or intolerance driven, may lead to nutritional differences e.g. nutrients from dairy milk are 100% bioavailable but only 50% bioavailable in soy milk.

Recommendations

1. Food manufacturers already use processing technology to improve food resilience and security without the need for food additives, e.g. to improve Carbon efficiency through electrification, using lower temperature drying to improve nutrient-retention in the consumed food, improving nutrient bioavailability of raw ingredients, and conversion of negative nutrients to positive nutrients (e.g. pulses). These results should be shared

2. Detection of food adulteration is an increasing food security issue. The Association of Public Analysts is being wound up in the UK, and with cost cutting across Trading Standards, there is less food safety testing. ProFSET members like the RSC already support the analytical community, and with links to Universities which have under-used analytical facilities, these facilities should be leveraged for food quality testing.

3. The role of IUK funding routes to support academic partnerships and SME mentoring through leverage of large company infrastructure / resources is another route to strengthen food security

The Role of ProFSET

The role for ProFSET is broad across food security and food resilience from knowledge capture and transfer, with organisations like the IFST already active in this space. Clarifying food regulations/guidelines, best practices for food-safe production and applying “food science” principles to avoid costly food safety recalls, particularly beneficial for risk-averse SMEs.

ProFSET has an opportunity to bridge the gap between academia and industry with knowledge transfer and early careers pipeline support, and support existing organisations such as Sheffield Hallam University’s Advanced Food Innovation Centre, the University of Lincoln’s National Centre for Food Manufacturing and the University of Nottingham’s Food Innovation Centre. Additionally, ProFSET members have an opportunity to better link ingredient suppliers to food manufacturers to food retailers to improve holistic food security understanding.

Theme 4. Healthier Food Options

Main Findings, Conclusions and Recommendations

The National Food Strategy Independent Review (2021) recommended a transition from animal- to more plant-based diets, to improve population health and sustainability. The recent House of Lords report 'Recipe for health: a plan to fix our broken food system' includes similar recommendations, but neither of these have yet been implemented via legislation.

Part of the problem seems to be the lack of a replacement for EFSA in the regulation of novel foods and food safety. A healthy diet was suggested to involve (i) a balanced diet (e.g. the Eat Well plate), (ii) decreases in High Fat, Salt and Sugar (HFSS) foods, and (iii) increased consumption of home cooked foods and less reliance on processed foods/ ready meals.

The cost also needs to be considered, since obesity and related diseases tend to be more prevalent in those with lower socio-economic status. It was also proposed that changes need to be targeted at children, before they develop behaviours and preferences for highly palatable foods (hyperpalatability was proposed to be an issue leading to over-consumption), but also before they develop a functional microbiome ("the gut microbiome is key" and dependent upon fibre intakes).

<u>Conclusions</u>

There are many actions which can be taken by food industry and other players in the food chain, as part of a food system wide approach to healthier food options. This needs to be based on understanding of consumer behaviour and education, government legislation, food industry dynamics, all anchored on science-based nutritional guidance. In particular:

- Reformulate foods to be healthier but do so in small steps to slowly change people's palates/ preferences. Big changes are problematic for both industry and the consumer.
- Legislate to create "a level playing field" and prevent loopholes that allow companies to avoid implementing change (e.g. sugar tax applying to all foods and beverages, not just some).
- Educate the public in food preparation/ cooking skills – children might be the main target for this (e.g. bring back home economics). Making cooking "cool"? Use of Youtube or other videos as this is often used (by younger generations) as a means to find out how to do something.
- Invest in multidisciplinary studies to develop sustainable foods, while at the same time funding more human (or animal) intervention/ mechanistic studies (as opposed to population epidemiological studies) to really evaluate cause and effect of foods (e.g. whether Ultra-Processed Foods really are bad or if it is entirely due to the HFSS intakes).
- Marketing of unhealthy vs healthy foods is problematic, since it is diets rather than particular food items which impact health. More education is required as well as limits on the marketing of "unhealthy foods".
- The use of healthy food vouchers was also suggested (akin to food vouchers in WWII, when diets were arguably healthier).

- Convenience was given as a reason for people preferring ready meals, but it is unclear whether this really is an issue of time, education/ cooking skills or something else (e.g. palatability). Eating at your desk or wedged into short periods of time was also discussed, with the Japanese cited as an example where they eat away from their work, with others (community/ social eating) and do so slowly (eating mindfulness).
- Businesses are consumer-led, so need a culture change in the consumers to force reformulation (but is this feasible?). Behaviour change in consumers is certainly needed.
- Can BIG FOOD companies change? Does it need legislation and/or the consumer on board?

Recommendations

What **Should be done** to influence UK plc research direction:

1. Further regulation and legislation of the sector is inevitable (following the House of Lords report and National Food Strategy). ProFSET and the professional bodies could set out a pathway to manufacturing healthier foods (needs for investment and skills development for the sector) and how the industry could adapt to forthcoming legislative changes and what additional programmes also run alongside changes in a legislative agenda.
2. Create an innovation incentive for healthy food products. For example, use of VAT/ taxes or healthy food vouchers.
3. A national healthy food marketing campaign or other ways of educating the public on diet and health is needed – children are likely to be key, to change their long-term behaviours (and thereby the subsequent generation), but also their ability to choose and prepare healthier foods.
4. Investment in 4 key research areas: (i) development of sustainable healthier foods (including safety), (ii) human (or animal) intervention/ mechanistic studies to clearly evaluate the effect of foods (iii) hyperpalatability is suggested as a key driver of over-consumption, but is there evidence for this, and (iv) evaluating the links between education, home cooking and health, including the impact of populations/ ethnicity

The role of ProFSET

1. Strengthen Academic – Industry links, better communication of industry problems to be solved
2. Advocate role of Science and Technology across the food system
3. Be a hub / focal point for what the food sector needs from a science and technology perspective (e.g. EPSRC Formulation Engineering call was founded on industry-led engagement with academic partners)
4. Advocate the benefit of “science and technology” in foods to consumers
5. Leverage under-used facilities at Universities to support QA, adulteration testing …

Education, Attraction and Retention Workshop

Topic	Scope	Discussion intros.
Education	Influencing curriculum to include food in STEM subjects	• Influencing school curriculum; school outreach programmes • Food Fresk
Attraction	Promoting the industry as an exciting career opportunity	• Mmmake Your Mark campaign • Making the sector appealing to non-food related students
Retention	Supporting development, education and training	• Competencies Framework • IFST professional registers

<u>Education</u>

Food literacy is still emergent as a teaching subject and differs from country to country. The attendees discussed how secondary school education, in UK, has unfortunately lost its relationship with food over recent years. Given the complex problems associated with our current food system, from soil to society, as well as health, environmental, and future sustainability perspectives, the discussion overviewed initiatives that could assist in expanding these educational concepts more broadly.

An example discussed was how, in Ireland, they'd proposed incorporating food science subjects, and related experiments, into the secondary school curriculum in specific STEM subjects (e.g. science, chemistry, biology).

There was also an overview of a public engagement/educational interactive programme initiative, still in development, designed to engage secondary school children in an interactive food game called 'Debunking Food'.

<u>Attraction</u>

The 'Independent Review into Labour Shortages in the Food Supply Chain' (2023) prompted collaboration between businesses, trade bodies and government to launch the Institute of Grocery Distribution (IGD) Mmmake Your Mark initiative (launched August 2024), aimed at inspiring the next generation to consider their careers in food, around: Possibilities, Progression and Purpose.

The recent Engineering Student Launch Pad initiative was discussed as a case study as introduced the sector to those studying engineering, given the wide range of engineering skills required by the food industry.

It included engaging activities and factory tours. A key goal is to integrate food engineering into university curricula by offering case studies, sample questions, and marking schemes aligned with accreditation standards.

The food industry offers career paths across a broad range of disciplines, including engineers, chemists, physicists, psychologists, computer scientists, data analysts, accountants, lawyers, human resources etc.

The workshop discussions covered:

- skill shortages being a global challenge
- whether the food industry suffers from a negative perception (poor pay, long hours, working conditions) or if there is a general lack of awareness about STEM careers within the sector, including in business to business (B2B) companies and those making private label products
- industry outreach - value of on-site work placements if they were easier to run and other opportunities to engage with school children, through competitions, visits, activities, demonstrations etc.
- communicating opportunities given how critical the sector is to the economy (£187 billion per annum). Disappointing that 'Invest 2035: the UK's modern industrial strategy' green paper only mentions food once and governmental recognition fragmented, with food activities split between retail and advanced manufacturing, and not seeing the full picture ('farm to fork', 'soil to society'). Some organisations, including IFST and RSC, have responded.
- tailored engagement strategies to target new talent across different groups, such as students passionate about cooking, such as baking, focussed on careers in new product development (NPD) and STEM-trained individuals unaware of the industry's potential.

Potential next steps to amplify outreach and expand impact included:

i. collaborations, including IGD's Mmmake Your Mark campaign to promote the food industry as an exciting career prospect Mmmake Your Mark campaign toolkit
ii. outreach: leverage Mondelez templates for such programmes and expand opportunities for shorter term (~3-month) graduate placements and work experiences for school students
iii. encouraging industry sponsorship of apprenticeship schemes and university programmes
iv. upskilling career advisors and teachers and careers advisors so well-informed about opportunities. Organise events to engage local teachers, provide case studies and demonstrate the appeal. Raise awareness among parents and carers to address misconceptions
v. parliamentary engagement such as establishment of an All-Party Parliamentary Group (APPG) for food systems to inform and lobby policymakers. IFST sponsors students to engage with Parliamentary Office of Science and Technology (POST) and more opportunities could be sought
vi. education reform: advocate for food technology to be taught by qualified scientists in schools, rather than educators from unrelated disciplines, such as textile design.

The overall view was that the food sector must unify efforts to tackle the challenges effectively, combining attraction of talent and communication of its critical global role in addressing issues.

Retention

To capture the wide variety of career options available the 'Competencies for Food Graduate Careers' was developed by Universities of Nottingham, Reading and Sheffield Hallam University, ratified by industry stakeholders Competencies for Food Graduate Careers | Institute of Food Science and Technology . It aims to inspire graduates and those at an early stage in their career journey looking to explore the range of opportunities available, supporting career path planning. It summarises relevant, desirable behaviours, knowledge and skills, as well as examples of role types and their associated definitions.

Upskilling on new areas, such as Artificial Intelligence (AI) and a grounding in 'food' is required for those coming from non-food backgrounds.

Reward and recognition are important, which can include training, flexibility and progression, as well as financial incentives. As training is usually about 70% on the job, 20% shadowing and 10% formal

With an ever-growing range of possible career development pathways within the food sector, it is now more important than ever to be recognised by an independent professional body. For example, IFST awards Chartered Scientist, Registered Scientist and Registered Science Technician (CSci, RSci and RSciTech) status under license from the Science Council, which offer recognition as a cross-speciality benchmark of career development. It demonstrates a verifiable standard of competence in the field to ones' peers, employers and clients. Similarly, IChemE, IMechE and IAgrE award Chartered Engineer status. IFST also manages specialist registers: Register of Food Safety Professionals (RFSP), Register of Professional Food Auditors and Mentors (RPFAM) and Register of Professional Sensory Scientists (RSensSci). Professional Recognition | Institute of Food Science and Technology. It was discussed that accreditation value differs, for example could be important for nutrition and packaging, but less so for processing

In terms of career progression, it is also important for businesses to retain staff wishing to remain in technical roles, rather than move them to management roles which tend to be less hands-on. It was mentioned that about 80% managers are 'accidental', as in forced by the organisation.

Different generations have varying expectations of how long to stay in a role, company or segment as other factors are important, such as the social situation. We can capture the energy and drive of certain groups. All need to be valued and trusted, and diversity is important.

Overview and opportunities highlighted included:

i. Expand competency frameworks to cover examples of roles for physicists, biologists, chemists, microbiologists etc. as it is important to demonstrate that the opportunities are wider than simply food science and food technology with exciting and complex roles. It is useful to link career spotlights with competencies. Confidence is important as well as robust, relevant knowledge and presentation skills.
ii. Accreditation needs to be understood and valued across the organisation, including HR and by influencing leaders. Staff need visible steps for progression, such as mapping and technical ladders.
iii. Professional registers could be benchmarked against the Institute for Apprenticeships and Technical Education (IfATE) who work with employers to develop, approve, review

and revise apprenticeships and technical qualifications, and other areas such as engineering.

iv. It is also important that support is provided, to enable technical professionals to be kept up to date, such as via professional membership bodies such as those represented by ProFSET, To provide responsibility, challenges can be set and opportunities provided for group working. Mentoring is important, informally or via schemes.

v. Over training can be an issue as staff often leave or transfer away from a company, although encouraging talent churn and exchange, can refresh.

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