Teagasc Food Programme Peer Assessment 2018

Final

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Author:	Peer Assessment Panel
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Contents

1. Introduction

1.1. Overview of Teagasc Evaluation Process

Teagasc is committed to undertaking peer assessments of its research and knowledge transfer programmes on an approximate five-yearly cycle to:

1) Assess if an effective and balanced scientific programme is being delivered which fulfils the mission of the programme and meets the needs of its stakeholders.
2) Determine the quality and productivity, relevance and viability of the research and knowledge transfer programme.
3) Identify how the research and knowledge transfer programme could be improved to make best use of resources.
4) Provide accountability for public funds expended.

Each assessment examines the management, research and knowledge transfer activities of individual programmes. The management assessment focuses on governance, leadership and strategy. The research and knowledge transfer programme assessment focuses on the programme's quality and productivity, relevance and viability. The assessment is designed to be both retrospective and prospective, with an emphasis on the latter in the recommendations so as to help achieve improvement in the future based, to some extent, on knowledge of the past.

The assessment is undertaken, under the auspices of the Teagasc Director, senior management and the Teagasc Business Planning and Performance Evaluation Department (BPPED), by a Peer Assessment Panel (PAP) of national and international experts drawn from outside the programme being assessed. The management and staff of the programme prepare a programme description and self-assessment document in advance of a site visit by the PAP. After the site visit, the PAP produces a written assessment report with recommendations, which is presented to the Teagasc Director of Research. An action plan is drawn up by management of the programme being assessed on foot of the report and submitted to senior management and the Teagasc Authority.

1.2. Overview of the Food Programme

Vision and objectives

The vision for the Food Programme is to 'provide sustainable science-based innovations and solutions for the Irish food industry to ensure economic development and profitability'.

The objectives of the Programme are to:

1) Improve competitiveness of food companies
2) Encourage food diversification/expand product portfolios.
3) Add value.
4) Provide scientific validation.
5) Ensure the highest standards of safe and secure food.
6) Transfer technology
7) Support national policy objectives.

Structure and resources

The Food Programme is conducted in five departments: 1) Food Biosciences, 2) Food Chemistry and Technology, 3) Food Quality and Sensory Science, 4) Food Safety, (5) Food Industry Development. The Food Quality and Sensory Science department was established in 2017. The programme is spread across two research centres, one at Ashtown, Dublin and the other at Moorepark, Fermoy, Co Cork. The staffing, funding and expenditure levels of the programme over the period 2012-2017 are outlined in Tables 1 and 2 below.

Table 1 : Food Programme Staff (Full -Time Equivalents)						
	2012	**2013**	**2014**	**2015**	**2016**	**2017**
Permanent Researcher	36.6	38.4	39.4	38.4	40.4	40.2
Contract Researcher	37	27	16	19	22	29
Post Doc Researcher	0	2	28	36	27	27
Walsh Fellow	76	93	79	99	96	111
Other: hosted student	7	6	15	16	18	22
Other: hosted researcher	12	1	5	7	9	2
Other: hosted industry	11	20	15	19	21	17
Total Research Staff	**179.6**	**187.4**	**197.4**	**234.4**	**233.4**	**243.2**
Technologist	4	3	3	3	5	6
Technician	14.3	13.36	12.36	11.36	10.36	10.36
Contract Technical	5	7	11.5	21.8	17.5	17.5
Maintenance	4	4	3	3	3	3
Domestic	2.5	1.5	1.5	1.5	1.5	1.5
Butcher	1	1	1	1	1	1
Total Support Staff	**30.8**	**29.86**	**32.36**	**41.66**	**38.36**	**39.36**
Total Research & Support	**210.4**	**217.26**	**229.76**	**276.06**	**271.76**	**287.56**

Table 2 : Funding (internal and external) and Expenditure (€000): Food Programme						
	2012	**2013**	**2014**	**2015**	**2016**	**2017**
Total External Funding (€)	7,417	7,792	8,474	11,104	10,287	11,309
Total Grant-in-aid Funding (€)	8,147	7,662	6,887	7,158	7,217	7,431
Fees Receivable (% of total)	18	16	14	14	13	12
External Research Grant (% of total)	71	74	71	74	76	74
Contracts (% of total)	10	8	12	9	9	10
Licensing (% of total)	0	0	0	1	0	1
Other (% of total)	1	2	3	2	2	3
Total Expenditure (€)	15,564	15,454	15,362	18,298	17,504	18,740
Pay costs (% of total)	50	49	51	46	49	49
Non pay costs (% of total)	50	51	49	54	51	51
Total Income as a % of total expenditure	48	50	55	61	59	60

Explanation:

- Grant-in-aid funding: funds provided directly from the state grant of Teagasc
- External research grants: funds received in competition from national and international funding agencies (DAFM, EPA, Horizon 2020, etc)
- Contracts: funds from third parties for specific research activities, e.g. industry, charities, etc.
- Other funding: include laboratory analysis income, interest from property, legacies, etc.

2. The assessment panel and assessment procedure

2.1. Scope and objective of the assessment

The Peer Assessment Panel (PAP) was tasked with assessing Teagasc's Food Programme. In accordance with the *Revised Standard Protocol for the External Independent Peer Assessment of Teagasc Research and Knowledge Transfer Programmes*, the assessment covered the period 2012-2017 and focused on the overall programme and on the five constituent departments.

In accordance with the *Revised Standard Protocol,* the panel's task was to assess the programme's research and knowledge transfer (KT) activities using the following criteria: quality and productivity, relevance to society and viability, or the extent to which the programme is prepared for the future. The latter criterion also includes issues of governance and management leadership skills. Finally, the assessment covered the Walsh Postgraduate Fellowships Programme and issues of research integrity and diversity.

The PAP graded the overall programme and individual departments under each criterion employing the following qualitative categories: outstanding, strong, competent, needs improvement and unsatisfactory. For a description of the criteria see Appendix 3. The panel also provided a descriptive assessment of the Walsh Postgraduate Fellowships Programme and of the programme's research integrity and diversity.

2.2. Composition of the assessment panel

The panel comprised the following seven experts:

- Prof. Dietrich Knorr, Department of Food Biotechnology and Food Process Engineering, Technische Universität Berlin (Panel Chair).
- Dr. Dagmar Brüggemann, Max Rubner-Institut, Federal Research Institute of Nutrition and Food, Department of Safety and Quality of Meat, Kulmbach, Germany.
- Dr. Narelle Fegan, Food Safety and Stability Group, CSIRO Agriculture and Food, Queensland, Australia.
- Prof. Effie Tsakalidou, Department of Food Science and Human Nutrition, Agricultural University of Athens, Greece.
- Ms. Deirdre Smyth, Director of Innovation Food & Beverage Systems, Kerry Global Technology Centre, Nass Co. Kildare, Ireland.
- Prof. Donald McMahon, College of Agriculture and Applied Sciences, Utah State University, USA.
- Dr. Lance O'Brien, Head of Strategy & International Relations, Teagasc.

The secretariat was provided by Dr Kevin Heanue, Evaluation Officer, Teagasc. A short profile of each of the PAP members is provided in Appendix 1.

2.3. Independence

PAP members signed a statement of impartiality and confidentiality. In the statement, they confirmed that they had no relationships, connections or affiliations with the Food Programme or any of its departments that would lead them to feel they would be unable to conduct an independent and impartial review. In signing the statement, the members also declared that they fully understood the confidential nature of the assessment process.

2.4. Data provided to the panel

The following contextual documentation was provided to the PAP prior to the site visit:

- The *Revised Standard Protocol for the External Independent Peer Assessment of Teagasc Research and Knowledge Transfer Programmes.*
- Food Wise 2025, the Irish Government's Agri-Food Strategy.
- Teagasc Technology Foresight Report 2035.
- Food Programme Business Plan 2017.
- The schedule for the site visit.

The Food Programme Self-Assessment document was also sent prior to the site visit. This document contained a summary of recommendations and subsequent actions from the Food Programme peer assessment report of 2011; reflections on each of the five departments together with detailed appendices which included a statement of Food Programme strategy; staff list and profiles; bibliometric analysis & list of publications; list of funded projects; list of collaborators; completed Walsh Fellowships; tables outlining budgets and expenditure; indicators of relevance and tables clarifying the breakdown of research and other staff.

2.5. Procedure followed by the panel

The documentation outlined above was considered by the PAP prior to the site visit. The PAP commenced the assessment on the evening of Tuesday November 13th and continued until the afternoon of Friday November 16th (see schedule of site visit in Appendix 2). At the outset of the site visit, the PAP received thorough scene-setting overviews of Teagasc and the Food Programme from the Director of Research, Prof. Frank O'Mara and Head of the Food Programme, Dr. Mark Fenelon. This provided the panel with insights into recent organisational changes, the Irish policy landscape, staffing issues, funding levels and drivers of change. The role and remit of Teagasc, in general, and of the Food Programme in particular, were outlined. The PAP was also alerted in broad terms to the importance of Food Wise 2025 and Teagasc Technology Foresight 2035.

On the morning of Wednesday November 14th, the PAP agreed as to how the assessment would proceed, the different responsibilities of panel members and how the input for the assessment report would be collated during the site visit. The site visit was split in two, with the panel meeting programme management and staff in Ashtown on Wednesday November 14th, then travelling to Moorepark on the morning of Thursday November 15th and remaining there until the completion of the review on the afternoon of Friday November 16th.

In addition to a series of presentations by, and discussion with, Food Programme staff during the site visit, the PAP also met with a group of stakeholders. Also, on the afternoons of Wednesday November 14th and Thursday November 15th, the panel had an opportunity to inspect some of the programme facilities in Ashtown[1] and Moorepark[2], respectively. On the final afternoon, the panel chairman presented a verbal exit report to the Teagasc Director, Director of Research and Food Programme management.

[1] Meat Industry Development Unit; Prepared Consumer Food Pilot Plant; Sensory Facility; Advanced Food Processing Technologies laboratory

[2] The Teagasc Sequencing Centre; The National Food Imaging Centre (including VR); The Rheology facility; The Robot (BabyBot); The Flavour Chemistry Facility; Moorepark Technology Limited

2.6. Remarks about the assessment process and Evaluation Protocol

The assessment covered the overall programme and the five constituent departments – (Food Biosciences, Food Chemistry and Technology, Food Quality and Sensory Science, Food Safety and Food Industry Development). The full panel contributed to the assessment of the overall Food Programme, while primary responsibility for assessing each of the individual departments was assigned, based on professional expertise, to sets of two members.

3. Assessment of the Food Programme

The panel agrees that, with a view to supporting a growing, increasingly diverse and export-oriented Irish food industry, the Teagasc Food Programme has gone through a rapid period of growth and change in recent years. Over this period, there have been significant changes in the management and structure of the programme; staffing numbers and budgets have grown; considerable investment has been made in new equipment, facilities and infrastructure and progress has been made in working with new and innovative technologies.

The next couple of years will see a continuation of this process of change, with new initiatives coming on stream including the VistaMilk SFI Research Centre; completion of the expansion of MTL Pilot Plant; further investment in equipment for the PCF sector and development of the planned food innovation hub. Moreover, it is expected that the current levels of external grant and other funding opportunities will continue. Changes in the external environment, including rapid development of new science and technologies, changes in the policy arena, and changes in consumer preferences will entail further challenges and opportunities for the programme.

In light of these development, the panel considers that it would be prudent for management to take a step back and look at developing a comprehensive business plan or operating model to ensure that all of the new developments are sufficiently integrated so as to ensure that Teagasc continues, in association with its key national partners, to deliver an effective and efficient programme in support of the Irish food sector; continue to build its international scientific standing; and ensures the maintenance of a balanced scientific programme that will meet Ireland's long-term needs. The Programme overall, in terms of the extent and quality of physical infrastructure, equipment and staff, stands up to comparison with the best institutions around the world. It is important that the necessary operational changes and long-term plans are now put in place to maintain and build on this high standing.

As against this positive assessment, the programme faces challenges from a number of external threats and internal weaknesses. Externally, the Irish food industry is threatened by Brexit, and in particular, a 'no-deal Brexit' will have serious repercussions for the industry, which, in turn, could impact negatively on the scale of the programme. Alternatively, Brexit could also be seen as an opportunity for Teagasc to highlight the role of innovation and investment in science as the best way of countering the potential adverse impacts of Brexit.

The programme is also constrained by the changing nature of its funding, involving rapid growth in external funding sources and a slow decline of core programme funding. The long-term continuation of this trend threatens the ability of management to maintain a balanced portfolio of strategic and applied research and also the capacity to focus on issues of public good in areas of public policy and consumer interest.

Internally, the future success of the programme will continue to be constrained by:

- Restrictions on recruitment needed to develop new programme areas.
- Insufficient technical staff to support an expanding programme.
- Inability to recruit senior level staff and loss of competitiveness in attracting new staff at entry level.
- Loss of staff to industry and the third-level sector.

3.1. Research quality, relevance and viability as a whole

The panel considers that the overall quality of the programme is high, with very good output of high-quality scientific publications as well as relevant industry interactions and outreach activities. Staff members also contribute to scientific and scholarly books and a number of staff are highly cited by international peers. Research staff are regularly successful in winning national and international research grants and are invited as speakers at international conferences. A number have also received significant awards/scholarly prizes and are members of scientific committees and editorial boards.

Relevance is considered as being high, although not all the generic food-related challenges as indicated in Foresight 2035 have yet been considered and the programme does not address the full diversity of the Irish food industry. In addition to the use of patenting, licensing and other IP strategies, management has also developed a number of innovative strategies to enhance programme relevance with industry. These include the Gateways initiative, CRM, contract research, and the location of industry staff on both food research sites. The expansion of MTL, development of the food innovation hub and investment in PFC equipment will further enhance the existing high level of programme relevance.

3.2. Viability of the programme

Looking to the future viability of the programme, the panel considers that programme management comprises a good mixture of young and experienced managers with knowledge, skills and capacity to drive on the programme over the coming years. These are supported by a dynamic and active team of young researchers, support staff and Walsh Fellowship postgraduate students. The recent investment in staff, equipment and infrastructure must be maintained to ensure that the programme continues to work with the best new technologies and remains relevant to an increasingly sophisticated industry. The increasing dependence on external funding and associated contract staff/postdocs does pose a threat to the longer term ability of Teagasc to maintain a balanced programme of research. In this regard, it was difficult for the review panel to identify a system encouraging a balanced portfolio between pro-active and re-active research and project work.

However, the high speed of transformation over the last 4-5 years, including new research centres, larger external funded projects and new infrastructure investment will pose new challenges for management and require adjustments to ensure the ongoing viability of the programme.

The dependence on temporary research personnel also puts knowledge retention at risk. It is viewed as critical for the sustainability of the organization to ensure knowledge and technology retention, especially as research now is dependent on the generation of very large data sets.

3.3. Assessment of PhD training

The Walsh Fellowships Programme offers a unique opportunity to provide funding and human resources for research activity and programme sustainability, as well as a valuable platform for internal leadership training. Many of the peer-reviewed papers listed in the review material appear to have been generated as part of the Walsh Fellowships' activities. Some of these graduates have gone on to post-doctoral positions within Teagasc and many more are now employed in the food industry.

3.4. Assessment of integrity policy of the programme

The panel was assured that Teagasc is committed to abiding by the requirements of the 2013 **National Policy Statement on Ensuring Research Integrity in Ireland**. As such, the review team had no concerns about the integrity policy of the programme as it appeared to be in line with the required best practice in Ireland.

3.5. Assessment of diversity policy of the programme

It was evident from the data presented to the panel that the food programme is delivered by an ethnically diverse range of staff, particularly amongst the cohort of Walsh Fellows and Postdocs. As such, the panel was impressed by the very evident multicultural work environment in the two food centres. The gender balance within the programme is also good, with a 50:50 balance at management level and more females in the permanent and contract employees and postgraduate students' cohorts.

3.6. Recommendations

1. CLARITY ON THE OPERATING MODEL
   The vision and objectives of the programme are very clear, but require a simpler operating model for the long-term development of the programme.
   Key Considerations:
   - Defined scope by department with clear responsibilities for individuals and teams.
   - Clear procedures/ways of working, giving particular focus to interaction between the Ashtown and Moorepark sites and between departments.
   - Business planning that focuses also on development of a balanced portfolio between proactive and reactive research.

2. COMPLY WITH FORESIGHT 2035 FOOD-RELATED RECOMMENDATIONS AND FINDINGS
   Priority should be given to acting on the findings and recommendations of the Foresight 2035 Report, given its key importance in the long-term development of specific food programme-related goals including application and establishment of emerging food processing technologies, advanced packaging technologies, biotransformation processes, advanced formulation dynamics, food structure and health and life- stage nutrition including cognitive performance.

3. FOOD INDUSTRY ENGAGEMENT PLAN
   Develop a more structured way of working with companies across the food sector, including the marine sector. Consideration should also be given to developing a business plan for the pilot plants and to understand return on investment from these impressive state-of-the-art facilities (Ashtown and Moorepark). Careful consideration needs to be exercised in the areas of building restructuring needs (i.e. segregation

of working spaces to ensure confidentiality for multiple users), equipment purchase and technical staff recruitment, including the recruitment of engineer(s) to operate pilot facilities.

4. ENSURE KNOWLEDGE RETENTION, GIVEN THE RAPID TURNOVER OF RESEARCH STAFF
   Although the existing succession planning has brought new staff into the programme, the high dependence on short time researchers (WF´s, postdocs, CRO´s), puts knowledge retention at risk. Retention is especially important in terms of methodologies, equipment handling and maintenance, pilot facility machinery selection and operation.

5. PROVIDE CONTINUED SUPPORT TO MORE RECENTLY DEVELOPED FOCUS AREAS
   While the panel is impressed by the recent pace of transformation, including development of new priority areas, securing new funding sources, creating new industry links and increasing publications, it is advisable that management should now focus for a period on consolidating the gains made with a view to securing their long-term sustainability.

6. ENSURE ADAPTATION TO CHANGING WORLD-WIDE MARKET & CONSUMER REQUIREMENTS AND NEEDS
   Outreach programmes with Asian markets have been initiated and presented which clearly seem a step in the right direction especially in light of the current insecurity regarding the future of the UK market. Adaptation to new consumer needs and requirements could include work on new food raw materials, increased use of plant - based materials, combinations of plant-animal based products, as well as the use of gentle processing technologies and bio-transformation processes.

7. CREATE FOOD ADVISORY PROGRAMME
   Similar to the highly successful and appreciated farm advisory service, a food advisory programme embracing food science and technology transfer and outreach to the entire food sector, particularly for food SMEs, would be most useful.

3.7. Scores

Quality and productivity	Strong
Relevance to stakeholders	Strong
Viability	Strong

4. Assessment of the Food Biosciences Department

4.1. Research quality & productivity

The Food Biosciences Department comprises the largest group of researchers within the Food Programme, with over 100 researchers focusing on the areas of bioactives, gut health, biocontrol, fermented foods and dairy quality. The department has an excellent publication record with a large number of publications including a number of high-impact and highly cited publications and researchers.

The inclusion of a dedicated sequencing facility has enabled the department to provide both a support service and take a lead role in the use of omics technologies and gene sequencing for delivering outcomes to the food industry. It is essential to maintain key staff trained in bioinformatics and ensure that all PhD students receive an element of bioinformatics training for the continued relevance and sustainability of this area into the future.

4.2. Societal relevance

The department has built many successful collaborations at both national and international level, as evidenced by the many initiatives in which they are involved (e.g. APC Microbiome, VistaMilk, FHI and COST) and their success in obtaining funding and working with a large number of collaborators. There is evidence of cross-disciplinary research with a range of industry partners, other government organisations and research institutes, which demonstrates that the work is of relevance to stakeholders. The department is using the Teagasc Foresight 2035 document to guide future research, which should ensure the future relevance of its work. The scientific research areas also align with international trends around food research and stakeholder needs.

4.3. Viability

The department has a sound vision for the future, as it is anticipating the needs of industry and other stakeholders and it has developed specific capability and skills to deliver this vision (such as NGS, microbiome applications, and health-related applications). The approach of working with many collaborators to limit competition for funding is a good one to ensure the future viability of the department.

4.4. Recommendations:

Recommendations 1, 2, and 4 are of specific relevance

4.5. Scores

Quality and productivity	Outstanding
Relevance to stakeholders	Outstanding
Viability	Outstanding

5. Assessment of the Food Chemistry and Technology Department

5.1. Research quality & productivity

The department is globally recognised as a leader in dairy technology research based on a long track record of producing high-quality scientific papers and an extensive portfolio of technologies. This is enhanced by the investment in excellent facilities and people that enables activities ranging from laboratory bench research, through investigation into application of new technologies to food processing to pilot plant and pre-commercialization through MTL.

5.2. Societal relevance

The work of the department is relevant to the expressed needs of the dairy foods industry in Ireland, as is evident from the extensive support provided to the industry, technology transfer and adoption of technologies developed by the department, contract research performed by the department, and high level of employment of PhD graduates from the department by the Irish food industry. The department also provides expertise that can be applied to fields other than the dairy industry.

5.3. Viability

This department has been functioning at a high level in the area of dairy foods applied research for many years, and as a result has built a large portfolio of expertise and technologies that can be used for developing new areas of investigation, as well as being available for transfer to the food industry. It also has strong connections with MTL, including access to its pre-commercialization facilities. The department has many connections with other universities (including through the PhD student programme) and is involved in three large consortium projects. The Walsh Fellowships Programme has been used effectively to maintain and develop academic linkages and to bring in talented young scientists.

5.4. Recommendations:

Recommendations 1, 2, 3, 4, 6 and 7 are of specific relevance

5.5. Scores

Quality and productivity	Outstanding
Relevance to stakeholders	Outstanding
Viability	Strong

6. Assessment of the Food Quality and Sensory Science Department

6.1 Research quality & productivity

Meat: There has been a long and distinguished record in meat research at Teagasc. This is being underpinned for the longer term with the recent programme investment through Meat Technology Ireland (MTI) of €1.6 million over five years from Enterprise Ireland and the meat industry. Teagasc through the Food Quality and Sensory Science department leads two of the five MTI Pillars and the department coordinates sensory for 3 of the pillars.

Dairy: This seems to currently be at the level of involvement in cross-departmental teams with the Food Chemistry and Technology Department. The change from commodity to discipline orientation is apparent in the inter-department involvement in establishing an additional sensory activity at Moorepark for conducting sensory analysis on dairy foods. There are also some international collaborations that are underway that build upon the Programme's expertise in dairy foods and chemical analysis which can support the growth in sensory.

Sensory: During 2012-2017, a key objective of the department was "…to significantly expand Teagasc's sensory science and flavour chemistry capability …" and this has been achieved with expansions in staff, facilities and instrumentation. It should be recognised that this department is a new group, hence cutting-edge research on sensory science is in the process of being enacted and the department still needs to grow its research output to become recognised as an international leader.

Cereal/Bakery: The department is established as a leading research group in relation to gluten-free processing of grains and formulation of gluten free products. This knowledge has been transferred to the Irish food industry. Similarly, with used-of by-product ingredients. There is new research being undertaken that has the potential to be world leading as the sensory science focus of the department is applied to cereals and baked products.

To achieve international recognition for expertise in sensory food science and macroscopic food structure, the Department will require continued effort and output focussed on the research targets for 2018-2025 given in the Self-Assessment Report such as (1) developing world-first immersive and virtual methodologies for deciphering internal crumb structure of aerated baked goods, and link with 2D crumb grain characteristics, (2) implementing novel augmented and virtual reality technologies for capturing and deciphering the dynamics of human sensory perception, and (3) expanding the knowledge of predicting sensory response based on emotional measurements that can lead to a more comprehensive understanding of consumers' relationships with food.

The continued work on cross-cultural sensory research, trained descriptive panels and research into volatile and non-volatile identification in aroma and taste, olfactometry and chemometrics would further build the department's (and Teagasc's) international standing in sensory science.

It will be important to balance workforce and time allocations between (1) training and maintaining descriptive panels and providing training and knowledge transfer to the industry, and (2) the performance of actual cutting-edge sensory science research activities.

6.2 Societal relevance

With respect to the planned expansions in the field of sensory science, the department is aligned with the Teagasc Foresight 2035 document. The close collaboration with Meat

Technology Ireland ensures the societal relevance of the meat research on the national level. However, there is also the question of whether the research efforts will be driven solely by that which is of most importance to Ireland's agricultural needs and perhaps remain more applied and focussed on knowledge transfer, or whether it will be broadened to research areas that are also of mutual interest to the EU or the international science community.

Relevance is tied to addressing immediate needs of Irish agriculture and the achievements of this department are evident in the knowledge transfer activities of the MTI and development of a national sensory network.

6.3 Viability

Staff members in this department have a strong reputation for their work on meats and cereal products and the new department is progressing in adapting to the programme change from a commodity orientation and responsibility to being more discipline focussed across commodities. As these changes are further implemented with cross-department teams, then there will be less duplication between the departments. For example, it will be important to link food structure imaging expertise across meat, bakery and dairy at both microstructure and macrostructure levels and, likewise, to use virtual and immersive technologies.

It would be beneficial for a clear description of expectations to be developed for this department with regards to its future research priorities, addressing immediate stakeholder needs, knowledge transfer, support and service to other departments, and training and service for industry. For example, (1) the Food Quality and Sensory Science department lists 15 research targets for 2018-2025 in its self- assessment report compared to six research targets for the other larger departments, and (2) there is a large amount of sensory evaluation work being performed (such as for the genomic breeding in relation to meat quality) that can be a drain on available resources. A high priority should be given at the programme level to further develop those areas that are of most importance, as the department seems accountable to a lot of different stake holders.

One of the objectives identified in the Sustainable Healthy Agri-Food Research Plan (SHARP) is for the creation of a "consumer oriented industry, with incremental and significant innovations in food." As further insights are gained into understanding consumer needs and preferences, the Teagasc Food Programme can be key to addressing these preferences through the Food Quality and Sensory Science department. Changing demands of consumers in various markets around the world will become of greater importance within the goal of integration of Ireland's agri-food industry into the global food system,

Another topic in the Foresight Report 2035 is the development of sensometrics. This could be led by the Food Quality and Sensory Science department (in collaboration with the other departments) in regard to measuring physical and chemical stability of foods based on key indicators of food quality.

Research capabilities within this department could be built up by assigning Walsh fellowships and by working cross department with people with expertise in protein functionality and hydrolysis that can applied to meat and plant systems. As this group is also providing services to many other groups, the number of support staff should be adjusted accordingly.

6.4 Recommendations:

Recommendations 1, 2, 3, 4, 5, and 6 are of specific relevance

6.5 Scores

Quality and productivity	Competent
Relevance to stakeholders	Strong
Viability	Needs improvement

7. Assessment of the Food Safety Department

The Food Safety Department comprises a small group of permanent researchers covering a wide range of activities and achieving significant impacts for their size. The group has a large number of Walsh Fellows who appear to be well-managed and utilised to produce relevant outputs. The group has a targeted approach for assisting industry and benefiting Ireland in areas related to food safety. The key areas of research are focussed and appropriately based on the Teagasc Foresight report and international benchmarking, with the main focus areas targeting pathogens, microbiomes and innovative technology. The department's scientific priorities are similar to those of other similar research organisations, though the outputs of the Teagasc group are considered outstanding in relation to their size.

7.1. Research quality & productivity

The group has a large number of publications in journals that are appropriate to food safety research and has an impressive record of productivity within appropriate areas of research.

7.2. Societal relevance

The increased investment by stakeholders is evidence of the group's relevance in meeting their needs. The researchers have a strong track record of memberships and invitations to participate in committees influencing food safety issues at both national and international levels. The group is aware of drivers for their research direction and are working towards achieving their objectives and goal of ensuring food safety and market access for Irish food products.

7.3. Viability

The quality of staff within the department is outstanding, as evidenced by the committees they contribute to and the awards received. The group collaborates with relevant organisations and is driving an appropriate research programme to ensure future viability. The group appears to have strong management support systems and governance which will ensure future sustainability.

7.4. Recommendations:

Recommendations 1, 2, and 4 are particularly relevant to this Department

7.5. Scores

Quality and productivity	Outstanding
Relevance to stakeholders	Outstanding
Viability	Outstanding

8. Assessment of the Food Industry Development Department

The Food Industry Development (FID) Department supports innovation in Irish food companies through the provision of technology development and supports and the transfer of knowledge/technology outputs from the research programme. In the self-assessment document, it is stated that the department provides a comprehensive range of services to companies across all sectors of the food industry extending from multinational subsidiaries based in Ireland to Irish international food companies, small and medium-sized enterprises (SMEs) and food entrepreneurs. However, on the basis of the presentation to the PAP and other evidence, it would appear as if the overwhelming focus of the department is on providing technology development and problem-solving support for the food SME sector, food start- up businesses and related stakeholders, through specialist technical training courses and seminars, company specific consultancy, product development and testing, and a technical information service.

The panel strongly urges the FID to be absolutely specific about its role and mission. We believe that it should focus on serving smaller companies and build up a strong competence and reputation for its ability to support national objectives for developing a strong and competitive SME-based food processing sector.

The FID work programme is delivered by a team of researchers, technologists and technicians based at both Ashtown and Moorepark. The team is highly committed and embraces a wide diversity of skills, knowledge and expertise. The department is focused on the provision of specialist services and transfer of research knowledge and technology and has no research function. It also works closely with research staff within the Food Programme, drawing on their knowledge and transferring emerging research outputs to the industry through training, consultancy and contract development work. In addition, the FID maintains strong linkages with national food regulatory authorities and development agencies, such as Enterprise Ireland and Bord Bia.

Overall assessment

At the outset, it should be recognised that the FID differs from the four other departments being reviewed in that its core objectives are focused on the provision of services to industry and not on undertaking research. As such, we must look at different criteria in terms of assessing the work of the department to date and its potential to contribute in the future to the mission of the Food Programme. Because the work undertaken is different from that of the four other departments, this department requires appropriate different reporting process to capture the quantity and quality of the work done.

The department head is a fairly recent appointment who has been given the task of revitalising the department, developing a far more commercial focus and strengthening its procedures and processes. The panel is of the view that for a start, the department must clarify its mission, be clear as to its target audience and how it relates to the other departments in the programme. In particular, it must be clear on what its role is in relation to the Technology Transfer Office and the sectors of industry it is expected to serve. It must also be clear on how it can secure services of staff from other departments and access to facilities such as pilot plants and laboratories. There is further need to clarify its role in relation to the Gateways programme and the new CRM initiative. Above all, there is a pressing need for clear procedures and processes for taking on new clients and new work and how this is recorded and reported on.

Recently, the department was given responsibility for the large investment in equipment for the PCF sector. This will entail a huge increase in interest from the PCF sector and an

added responsibility for the department for ensuring best return on the investment while supporting a sector which is highly exposed to Brexit. This new task will result in having to deal with complex problems around ensuring fair and timely access to equipment, confidentiality for companies and value for the taxpayers' investment. This is all the more reason to strengthen its procedures and systems.

8.1. Research quality & productivity

As mentioned already, FID is not a research department, so the focus of the assessment is on the services provided to customers. The team seem passionate and very capable and the panel was very impressed with the department's leadership. The team members are well-connected to companies in the SME sector and all are well-known and recognised as providing a professional service. The team, with a new and dynamic leader, now has an excellent opportunity to develop a more commercial focus and to prioritise knowledge and technology transfer to small companies. The model of the agricultural advisory service is a good exemplar of what can be developed for the food processing sector. There is no doubt that while the team provides high quality services it must focus on greatly strengthening its commercial focus and help Teagasc to realise the full commercial value of its research knowledge and technologies.

The actual quality of the assistance provided is excellent and appears to be making a real difference, as assessed by the products on display for the panel. It appears to provide assistance and expertise in all areas pertaining to product development, ranging from packaging to shelf-life analysis to manufacturing/food technology.

While it is clear that great work is being done, it is less clear how the workload is generated and how the department is organised into a focused programme. It appears that the majority of the work is based on responding to individual customer demands. However, with the advent of programmes such as Food Works and the new PCF programme, more opportunity will be available to plan in advance. To be fair, it must also be recognised that given the nature of the clientele and the type of work done, there will always be a significant amount of 'fire fighting' activity associated with the department.

The team is dynamic, passionate, committed and engaged in work which is directly relevant to the industry and State support bodies. It has provided technical assistance to a range of high-quality brands owned and operated by SME's. This work is of high importance. Recording the level of productivity again appears to be a challenge. The display of new food products, which the department assisted in developing, clearly showed the level of engagement with industry and emphasises the need to develop an appropriate system for recording and monitoring this productivity data.

8.2. Societal relevance

The raison d'être of the department is to be relevant to addressing the innovation needs of the food processing sector, particularly the needs of SME companies. The link it provides with industry is of the utmost relevance to meeting the overall Teagasc goal of helping Irish companies be more competitive. The training programme is relevant and the development support function helps smaller companies develop business plans they might not otherwise be able to complete.

The department aids in product development and "fire fighting" of real living products that have been launched. All this development work is "real time". While the department now has opportunities to enhance its relevance through various new programmes, including PCF, MTI, Food Works, it will need to become much more proactive and planned in its approach.

It must become organised and develop a new commercial strategy which will make best use of Teagasc research knowledge. Again, it can learn from the model of the current extension service.

8.3. Viability

Sustainability in the longer term will depend on the department's ability to become far more commercial than currently. This may require additional resources, but such can only come on the back of well- thought out strategy and business plan that will seek to get the best of Teagasc food technology out to SME sector.

As outlined above, this department operates to serve real time issues for the industry. It would appear that a lot of the tasks undertaken are customer-driven. There would appear to be little focus on a long-term vision for the development needs of SMEs. Vitality for addressing industry-driven real issues appears to be good.

The team is very experienced but stretched. The approach seems to be governed by a can-do attitude rather than developed against commercial demand. The individuals are very passionate and experienced, but perhaps they would benefit from employing some more specialists, e.g. development technologists and possibly an engineer in the context of the pilot plant. The current way of working is not sustainable from a commercial point of view…the costs and the return shared did not seem practical in the long term.

8.4. Recommendations:

There are 4 specific recommendations for this department.

1. Develop a clear mission and focus aimed at supporting the growth and development of SME food businesses and small start-up companies.
2. Develop a business plan and commercial model setting out clear commercial objectives and metrics for tracking and measuring performance.
3. On the basis of a new business plan, Teagasc senior management should set a clear commercial target for the team along with resource commitments related to achievement of commercial targets.
4. Develop a single Teagasc portal through which FID will manage all new project requests

Overall programme recommendations 1, 2, 3, 5, 6, 7 are also particularly relevant to this Department

8.5. Scores

Quality and productivity	Competent
Relevance to stakeholders	Strong
Viability	Needs improvement

Appendix 1: Profile of Peer Assessment Panel members

Prof. Dietrich Knorr (panel Chair) is Prof. Emeritus at the Department of Food Biotechnology and Food Process Engineering, TU Berlin, Germany. His main activities centre around plant and microbial metabolites as well as emerging food processing technologies especially process development in addition to kinetic and mechanistic studies on microbial inactivation and biopolymer modification. He is editor of the Journal "Innovative Food Science and Emerging Technologies" and co-editor of "Frontiers in Nutrition: Nutrition and Food Science Technology". He was President of the International Union Food Science & Technology 2016-2018. Dietrich is a member of the scientific advisory boards of ILSI Europe, Teagasc, German Institute of Food Technologies and Leibniz Institute Agriculture Engineering. He has published approximately 550 scientific papers, supervised 300 Diploma/Master Thesis and 100 PhD theses. He holds 9 patents and is a ISI "highly cited researcher".

Dr. Dagmar Adeline Brüggemann is Head of the Department for Safety and Quality of Meat at the Max Rubner Institute- Federal Research Institute of Nutrition and Food in Germany since 2014. Prior to this, she held a professorship in Animal Science and Quality of Foods at the Rhine Waal University of Applied Sciences in Kleve, Germany for two years. Dagmar has a strong background in advanced food imaging techniques and specialised on reserch concerning chemical and physical changes in complex food matrices during her years at the Food Science Department of the University of Copenhagen. She has been a member of national committees concerning meat science in Denmark and Germany.

Dr. Narelle Fegan is a co-group leader for the Food Safety and Stability group at the Commonwealth Scientific and Industrial Research (CSIRO) in Australia. Narelle is a principal research microbiologist who has undertaken research into foodborne pathogens since she joined CSIRO in 1995. Her research interests include understanding how bacteria survive, persist and are transmitted through food systems, particularly in relation to animal based food production. Narelle has worked on projects with the poultry, dairy and meat industries focussing on pathogens such as *E. coli*, *Salmonella* and *Campylobacter*. Narelle is interested in the application of omics tools and how they can support improved food safety.

Prof. Effie Tsakalidou is the Head of the Laboratory of Dairy Research in the Department of Food Science & Human Nutrition at the Agricultural University of Athens, Greece. Her research interests lie in the field of lactic acid bacteria, with emphasis on taxonomy, physiology, metabolism, bacteriocins, probiotics, genetics, omics technologies and bioinformatics, technological performance and applications. She has co-authored over 350 publications in the above fields, including papers in peer-reviewed journals, international and national conferences, as well as book chapters. She has been committed in maintaining active collaborations with academic and industrial partners in Greece and across Europe and Oceania, being involved in more than 50 research projects. She has a strong focus on working with the dairy industry to implement research results via patents, licencing agreements and business plans.

Ms. Deirdre Smyth is the Director of Innovation for Kerry Groups Taste & Nutrition business in Europe & Russia. She has responsibility for growing the innovation pipeline, working across a number of technologies, markets and channels. Deirdre holds a Food Science degree from Queens University Belfast and an MBA from University of Ulster. She has 25 years' experience in the Food Industry spanning roles within Innovation, Research & Development, Project Management, Process Optimisation, New Product Introduction and Technology Innovation. She has led research, development and innovation programmes across significant food brands and customers within the European markets.

Prof. Donald McMahon has been on the food science faculty at Utah State University for 30 years and is Professor of Dairy Food Chemistry and Processing. His research focuses on better understanding the chemistry and technology underlying conversion of milk into high quality dairy foods with enhanced nutritional properties. He directs the Western Dairy Center that serves as a regional centre for dairy food research in providing service to the dairy industry with learning, discovery and engagement through its BUILD Dairy programme. He is one of the top dairy foods researchers in the United States with over 100 scientific papers on milk proteins, cheese, ultra-high temperature processed milk and other dairy products.

Dr. Lance O'Brien is Head of Strategy and International Relations at Teagasc. He is a member of the Teagasc Senior Management Team and works on the development of Teagasc organisational policies and strategies, its relationships with international organisations, as well as leading its international agricultural development programme. Lance has a particular expertise in foresight. He led the two recent Teagasc major Foresight projects, namely Teagasc 2030 (2008) and Teagasc Technology Foresight 2035 (2016). He was also a member of the Third EU SCAR Foresight Expert Group. Lance also contributed to the two recent industry-led strategies Food Harvest 2020 (2010) and Food Wise 2025 (2015).

Dr. Kevin Heanue, Teagasc's Evaluation Officer, leads the development of an evaluation culture in Teagasc through the cyclical evaluation of its research programmes, extension activities and once-off evaluations of organisational activities and functions. He provides a secretariat to the Food Programme Peer Assessment panel.

Appendix 2: Schedule for site visit

The following is the proposed schedule of activities for the duration of the Food Programme Peer Assessment from the evening of 13th to afternoon of 16th November 2018. This schedule allows for the following, approximately:

- 20 minute presentation by each Head of Department
- 25 minutes for questions and answers between the Peer Assessment Panel and Department Staff
- 30 minutes for the panel to deliberate after each presentation, Q&A

Tuesday, 13th November 2018

Time	Action	Key Topics
19:30	Welcome and briefing on requirements of the Peer Assessment by Prof. Gerry Boyle, Director of Teagasc and/or Prof. Frank O'Mara, Director of Research	Welcome and briefing on requirements, Teagasc strategy, goals and organisation structure.
20:00	**Dinner (Crowne Plaza Hotel Blanchardstown)**	**Attended by Director, Frank O'Mara, Mark Fenelon and HOD's.**

Wednesday, 14th November 2018

Time	Action	Key Topics
08.15	Transportation from accommodation to Teagasc Ashtown	
09.00	Introduction and approach to Peer Assessment Kevin Heanue, Evaluation Officer & Dietrich Knorr, Chair of Panel.	Explanation of approach to peer review, process for the visit, organisation chart for the Food Programme, who will present and the structure and format of end report; initial assessment (panel only).
10:00	**Presentation by Programme Management** Dr. Mark Fenelon, Head of Food Programme (25 mins)	Overview of programme, research strategy, structure, funding, policy, publications and support mechanisms, technology transfer and strategy. Q&A
10:45	Panel Deliberations	Programme quality & productivity, relevance and viability.
11.15	**Tea/Coffee**	
11:30	**Food Quality and Sensory Science** Eimear Gallagher (20 minutes and Q&A)	Brief overview, examples of contribution to Food Programme objectives, outputs and impacts. Q&A
12:15	Panel Deliberations	Department quality & productivity, relevance and viability
12:45	**Food Safety** Geraldine Duffy **(**20 minutes and Q&A)	Brief overview, examples of contribution to Food Programme objectives, outputs and impacts. Q&A
13.30	**Lunch** (with posters for review)	
14.30	Panel Deliberations	Department quality & productivity, relevance, and viability.
15.00	**Food Industry Development** Ciara McDonagh (20 minutes and Q&A)	Brief overview, examples of contribution to Food Programme objectives, outputs and impacts. Q&A
15.45	Panel Deliberations	Department quality & productivity, relevance, and viability.
16.15	Tour of Ashtown Facilities	
17:45 – 18.15	Panel Deliberations	Panel begins to draft report
19:30	**Dinner in Crowne Plaza Hotel, Blanchardstown**	**Panel only**

Thursday 15th November

Time	Action	Key Topics
08. 00	Transportation from Teagasc Ashtown to Teagasc Moorepark	(approximately 2 hours 30 minutes)
10.30	**Tea/Coffee on arrival**	
11.00	**Food Bioscience Department** Paul Cotter (20 minutes and Q&A)	Brief overview, examples of contribution to Food Programme objectives, outputs and impacts. Q&A
11.45	Panel Deliberations	Department quality & productivity, relevance, and viability.
12.15	**Food Chemistry & Technology Department** John Tobin (20 minutes and Q&A)	Brief overview, examples of contribution to Food Programme objectives, outputs and impacts. Q&A
13.00	Panel Deliberations	Department quality & productivity, relevance, and viability.
13.30	**Lunch** (with posters for review)	
14.30	Tour of Moorepark Facilities	
16.00	Panel Deliberations	Report writing
17.00	**Finish & Depart for Clarion Hotel, Cork**	
20.00	**Dinner in Market Lane Restaurant**	**Panel only**

Friday, 16th November 2018

Time	Action	Key Topics
08:15	Transportation from hotel to Teagasc Moorepark	
09.00	Clarification session between panel and Director of Research, HOPs/HODs or staff if considered necessary	Meeting with Director of Research confirmed. Panel to decide if meetings with others are required.
09.30	Panel Deliberations	Report writing
10:30	**Tea/Coffee available**	
11.00	Meeting with stakeholder representatives (selection of members from stakeholder groups)	Current experiences with Teagasc Views on future needs and capacity of Teagasc to meet these needs
12.00	Panel draft report, and prepare exit presentation for Programme Management	Report writing
13:00	**Lunch**	
14:00	Panel draft report and prepare exit presentation for Programme Management	Report writing
16:00	Panel meets with Prof. Gerry Boyle, Prof. Frank O'Mara, Dr. Mark Fenelon and Heads of Department	Panel present preliminary findings and recommendations from review
17:00	**Finish**	

Appendix 3: Criteria and scores from Revised Standard Evaluation Protocol

Assessment criteria
The PAP assesses the research and KT programme and sub-programmes on the basis of the three criteria outlined below, i.e. quality & productivity, relevance to society and viability, using qualitative assessment (text) and quantitative assessment (five assigned categories – outstanding, strong, competent, needs improvement, unacceptable)

1. Research & KT quality and productivity
The panel assesses the quality of the unit's research and the contribution that the research makes to the body of scientific knowledge. The panel also assesses the scale and productivity of the unit's research results (scientific publications, instruments and infrastructure developed, and other contributions to science).

The panel assesses the quality of the KT unit's activities and methods and the contribution those activities and methods make to the transfer of scientific knowledge. The panel also assesses the scale and productivity of the unit's activities (events, publications, stakeholder involvement, training, education provision and other contributions to knowledge transfer).

2. Research & KT relevance to society/stakeholders
The panel assesses the quality, scale and relevance of research and KT contributions targeting specific farming economic, social or cultural target groups and/or stakeholders, of advisory reports for policy, of contributions to public debates, and so on. The point is to assess contributions in areas that the unit has itself designated as target areas.

3. Research & KT viability
The panel assesses the strategy that the research and KT units intend to pursue in the years ahead and the extent to which they are capable of meeting their targets in research or knowledge transfer during this period. It also considers the governance and leadership skills of the units' management.

Walsh Postgraduate Fellowships Programme, research integrity and diversity

Each programme assessment will also include assessment of three further aspects: the Walsh Postgraduate Fellowships Programme; research integrity; and diversity.

1. *The Walsh Postgraduate Fellowships Programme (WFP)*

The assessment committee considers the supervision and instruction of PhD candidates. The relevant subjects include the institutional context of the PhD programmes, the selection procedures, the programme content and structure, supervision and the effectiveness of the programme plans and supervision plans, quality assurance, guidance of PhD candidates to the job market, duration, success rate, exit numbers, and career prospects. The research unit undergoing assessment responds to a number of questions in the self- assessment, described in the format provided in Appendix 4. The unit should use these questions to reflect on its own PhD programmes and on how it supervises PhD candidates. The assessment committee discusses this during the site visit, comments on this in its report, and, where appropriate, makes recommendations for improvement.

2. *Research integrity*

The assessment committee considers the research unit's policy on research integrity and the way in which violations of such integrity are prevented. It is interested in how the unit deals with research data, data management and integrity, and in the extent to which an independent and critical pursuit of science is made possible within the unit.

The assessment committee bases its assessment on how the research unit itself describes its internal research culture. The research unit undergoing assessment responds to a number of questions in the self-assessment, described in the format provided in Appendix 4 of the Peer Assessment Protocol. The unit should use these questions to reflect on its own data management practices, the level of internal research integrity, and the transparency of its research culture. The assessment committee discusses these points during the site visit, comments on this in its report, and, where appropriate, makes recommendations for improvement.

3. Diversity

The assessment committee considers the diversity of the research unit. Diversity can act as a powerful incentive for creativity and talent development in a research unit. Diversity is not an end in itself in that regard but a tool for bringing together different perspectives and opinions. The assessment committee bases its assessment on how the research unit itself describes its internal diversity. This refers to such topics as gender, age, and ethnic background. The research unit undergoing assessment responds to a number of questions in the self-assessment, described in the format provided in Appendix 4 of the Peer Assessment Protocol. The intention is for the research unit to use the answers to reflect on its own diversity. The assessment committee discusses these points during the site visit, comments on this in its report and, where appropriate, makes recommendations for improvement.

Appendix 4: Action Plan for Implementation of Recommendations

Peer Review of the Food Programme 2018

Action Plan for Implementation of Recommendations

Date: May 28 2019

Submit to: Dr. Frank O'Mara, Director of Research

This action plan outlines the recommendations from the peer assessment report on the Food Programme 2018. The action plan also specifies the actions to be taken, if any, to implement the recommendations outlined, allocates responsibility for these actions and sets a target date by which the action is to be implemented.

No.	General Recommendations	Focus	Actions to be taken	Person responsible	Date for completion
1	CLARITY ON THE OPERATING MODEL The vision and objectives of the programme are very clear, but require a simpler operating model for the long-term development of the programme. Key Considerations: ▪ Defined scope by department with clear responsibilities for individuals and teams. ▪ Clear procedures/ways of working, giving particular focus to interaction between the Ashtown and Moorepark sites and between departments. ▪ Business planning that focuses also on development of a balanced portfolio between proactive and reactive research.	Overall programme and all individual Departments	A visual representation (model) of how the food programme delivers on objectives will be prepared. This model will include project type, size, and complexity; in addition to a road map to deliver to stakeholders. An operating model for converting strategy to deliverables will be included in the model. This will include the scope for each department, expectations, staff duties, resource and financial requirements. The current food programme has built-in mechanisms and procedures which ensure good interactions across the two sites. All departments have staff / students at both locations. The HOD meeting is 'staggered' and provides balanced input from both centres and this will continue. In these meetings, staff capacity planning provides a mechanism for identification of interdisciplinary projects and regular discussions are held on H&S, project development, training and industry interaction. The HOP will continue these communications / interactions and they will be documented in the minutes of the HOD meetings.	HOP / HODs HOP / HODs HOP / HODs	Dec 2019
2	COMPLY WITH FORESIGHT 2035 FOOD-RELATED RECOMMENDATIONS AND FINDINGS Priority should be given to acting on the findings and recommendations of the	Overall Programme and all individual Departments	This action is actively on going with many (numerous) examples of actions / research based on the recommendations of the foresight already delivered.	HOP/HODs	Yearly

	Foresight 2035 Report, given its key importance in the long-term development of specific Food Programme-related goals including application and establishment of emerging food processing technologies, advanced packaging technologies, biotransformation processes, advanced formulation dynamics, food structure and health and life- stage nutrition including cognitive performance.		The food programme strategy will be updated to better reflect alignment with the Foresight 2035 report recommendations. Yearly updates will be provided to the director of research, i.e., on outcomes of the strategic direction in relation to delivering on the Foresight report.	HOP HOP/HODs	
3	FOOD INDUSTRY ENGAGEMENT PLAN Develop a more structured way of working with companies across the food sector, including the marine sector. Consideration should also be given to developing a business plan for the pilot plants and to understand return on investment from these impressive state-of-the-art facilities (Ashtown and Moorepark). Careful consideration needs to be exercised in the areas of building restructuring needs (i.e. segregation of working spaces to ensure confidentiality for multiple users), equipment purchase and technical staff recruitment, including the recruitment of engineer(s) to operate pilot facilities.	Overall Programme and particularly the following Departments. 1. Food Chemistry & Technology 2. Food Quality & Sensory Science 3. Food Industry Development	Existing business / strategic plans / will updated for pilot plants at both Moorepark and Ashtown sites. Note: Business plans are in place (at both centres) for purchase / upgrade of equipment; it is a requirement of procurement and sign off by the senior management group. On-going industry requirements are reviewed through structured meetings between the MTL CEO, general manager and the Teagasc food programme management. A steering group has been established at the Ashtown centre to manage the prepared consumer foods centre.	HOP/HODs	Dec 2019
4	ENSURE KNOWLEDGE RETENTION, GIVEN THE RAPID TURNOVER OF RESEARCH STAFF Although the existing succession planning has brought new staff into the programme, the high dependence on short time researchers (WF´s, postdocs, CRO´s), puts knowledge retention at risk. Retention is especially important in terms of methodologies, equipment handling and maintenance, pilot facility machinery selection and operation.	Overall Programme and particularly the following Depts. 1. Food Biosciences 2. Food Chemistry & Technology 3. Food Quality & Sensory Science 4. Food Safety	Data management procedures and upgrades to hardware systems are currently on-going at Teagasc. Systems will be evaluated with the IT department at Teagasc to facilitate data retention and security and will be incorporated into the Starters / Movers and leavers procedures.	HOP / IT department / Administration	Dec 2019

5	PROVIDE CONTINUED SUPPORT TO MORE RECENTLY DEVELOPED FOCUS AREAS While the panel is impressed by the recent pace of transformation, including development of new priority areas, securing new funding sources, creating new industry links and increasing publications, it is advisable that management should now focus for a period on consolidating the gains made with a view to securing their long-term sustainability.	Overall Programme and particularly the following Depts. 1. Food Quality & Sensory Science 2. Food Industry Development	A new item has been added to the HOD meeting agenda entitled 'Development of New Research Priority Areas' to provide continually updates and monitoring of progress on recently identified strategic areas within the food programme. Meetings will be held (attended by the director of research) with all research staff to review / discuss the direction of the current programme	HOP/HOD	Effective Immediately
6	ENSURE ADAPTATION TO CHANGING WORLD-WIDE MARKET & CONSUMER REQUIREMENTS AND NEEDS Outreach programmes with Asian markets have been initiated and presented which clearly seems a step in the right direction especially in light of the current insecurity regarding the future of the UK market. Adaptation to new consumer needs and requirements could include work on new food raw materials, increased use of plant - based materials, combinations of plant-animal based products, as well as the use of gentle processing technologies and bio-transformation processes.	Overall Programme and particularly the following Depts. 1. Food Chemistry & Technology 2. Food Quality & Sensory Science 3. Food Industry Development	The researchers within the food programme have extensive links to market information through industry client projects, interactions with agencies such as Bord Bia and Enterprise Ireland, and direct linkages with other research providing organisations abroad. These will be continually accessed to ensure that Global changes in consumer needs are maintained at the forefront of research prioritisation. The programme has projects currently ongoing in the plant based area, both at Ashtown (Nutraceutical facility) and Moorepark (both academic and industry projects). This is area will be incorporated more into the research programme in the coming years (e.g., interactions with meat and Dairy proteins and foods). Teagasc researchers are involved in a number of major projects (at National and EU level) that have been submitted in 2018 / 2019 for funding in the plant protein area.	ALL food researchers & technical staff / HOP / HODs	On going
7	CREATE FOOD ADVISORY PROGRAMME Similar to the highly successful and	Overall Programme and particularly the following	A food advisory programme will be considered as part of the customer	ALL food researchers &	Dec 2019

	appreciated farm advisory service, a food advisory programme embracing food science and technology transfer and outreach to the entire food sector, particularly for food SMEs, would be most useful.	Depts. 1. Food Chemistry & Technology 2. Food Industry Development	relation management programme. It will also be delivered through large focused centres such as Dairy Products Technology Centre, Meat Technology Centre, Prepared consumer foods facility, Bia innovator facility etc. The focus on SME's will be mostly addressed through the food industry development department, PCF centre (Ashtown), Bia Innovator facility (Athenry) and MTL (Moorepark).	technical staff / HOP / HODs	
No.	**Specific Recommendations**	**Focus**	**Actions to be taken**	**Person responsible**	**Date for completion**
1	Develop a clear mission and focus aimed at supporting the growth and development of SME food businesses and small start-up companies.	Food Industry Development Department	A strategic document will be prepared detailing the Teagasc food programme's approach to developing the SME food businesses. The following (main deliverables) will be included in this document. 1) Increase the number of staff in the Food Industry development Department and prioritise their work objectives to focus on the prepared consumer foods area. 2) Capacity planning and prioritisation of staff objectives to support SME's, with focus on the prepared consumer foods area 3) Increase Teagasc interaction within the government supported 'Food Works' accelerator programme aimed at developing the next generation of scaleable and export driven Irish food businesses (SME's). This will be done by increasing the number of contact points (Teagasc subject matter experts) 3) Identify, procure, validate and commission new equipment at the Teagasc Ashtown centre to support the	Mark Fenelon	March 2020

			prepared consumer foods sector. 4) Significant increase in numbers of SME's supported through the new Bia innovator facility at the Teagasc Athenry campus. 5) Recruit two new staff for Bia Innovator centre to support food product development for start-up and SME clients 6) Provide new pilot plant / kitchen facilities at Moorepark Technology Limited (MTL) located at the Teagasc Moorepark site to support SME's		
2	Develop a business plan and commercial model setting out clear commercial objectives and metrics for tracking and measuring performance.	Food Industry Development Department	The 2020 Food Programme level 2 business plan will be updated to include additional commercial objectives and metrics. A system will put in place to ensure that each industry services project has a fully executed service contract (service specification)	Ciara McDonagh	April 2020
3	On the basis of a new business plan, Teagasc senior management should set a clear commercial target for the team along with resource commitments related to achievement of commercial targets	Food Industry Development Department	A business plan will be completed for this engagement. As part of this plan, both retrospective and prospective trend analysis on industry services will be carried out. Primary market feedback will be sought to align objectives with company needs and requirement in the comings years. Two new posts have been committed to the Bia Innovator.	Mark Fenelon & SMG	Dec 2019
4	Develop a single Teagasc portal through which FID will manage all new project requests	Food Industry Development Department	Project management system for 1) line manager approval including budget, 2) assignment of unique identifier for each project, 3) Enable quality and yearly review and quality control, 4) improved integrated between document management system and the customer relationship management system.	Mark Fenelon	March 2020

End