

Introduction

The 2021 Annual Report is built around the goals outlined in the Teagasc Statement of Strategy. Examples of key achievements and developments for the Research, Knowledge Transfer and Operations directorates are described in the context of these goals.

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Mission

To provide scientific leadership and support to Irish farmers and food companies in achieving a sustainable food system.

A sustainable food system (SFS) is a food system that delivers food security and nutrition for all in such a way that the economic, social and environmental bases to generate food security and nutrition for future generations are not compromised.

Vision

For Teagasc to be a globally recognised leader in developing innovative science-based solutions for the sustainable transformation of our land resources into products and services for the benefit of society.

Chairman's Statement



In 2021 we saw some hugely beneficial developments in relation to the global pandemic caused by Covid-19. The successful vaccine programme meant that Teagasc activities could resume, with caution, by the end of the year. The degree to which Teagasc staff were able to deliver a virtually full service including research, advice and education throughout the pandemic is testimony to the dedication of all Teagasc staff. The use of technologies for delivering knowledge 'virtually' is now well embedded. On the other hand the high attendance at the Moorepark Open Day in September showed the importance of direct contact with farmer clients and the public generally.

An event of great significance for Teagasc in 2021 was the retirement of Professor Gerry Boyle who led the organisation from October of 2007, until September 2021. Gerry has received many accolades for his huge contribution to Irish and world agriculture notably the Academic Palm presented by the Government of France in 2017. I look forward hugely to working with Professor Frank O'Mara who is eminently qualified to lead Teagasc as we face enormous challenges due to the need to protect the environment (including climate change) while also feeding a growing world population.

Weather conditions in 2021 were reasonable for Irish agriculture's grassland system and favourable for Irish tillage systems. The average farm income in 2021 was €34,367, an increase of over €7,000 on the 2020 average income level. This positive outcome for the "average" farmer reflects diverging income performance across the different farm systems represented by the Teagasc NFS. In 2021, average income levels in all of the farm systems reported on by the NFS

increased in 2021, however income levels and the year on year improvements in incomes were very different across the principal farm systems. While average incomes on cattle farms (Cattle Rearing and Cattle Other) improved in 2021, income levels on these two systems in particular continue to lag average incomes earned in other farm systems. On all farms total production costs increased appreciably in 2021 due to higher feed, fertiliser and fuel prices, with the average costs of production on Irish farms represented by the Teagasc NFS increasing by 14%.

Increases in milk and lamb prices led to a strong rise in incomes on dairy and sheep despite higher costs of production. On many cattle farms the increases in production costs significantly offset the increase in output prices, but some cattle farmers continued to receive direct payments linked to the Beep-S, BDGP and Sheep Welfare schemes and these payments together with Pillar I income support payments continued to support family farm income on Irish cattle farms.

Tillage farms experienced strong growth in their costs of production in 2021 due to increased fertiliser and fuel prices. However, relatively high yields per ha and increases in farm gate prices for cereals combined to lead to a very strong increase in the average tillage farm income in 2021. In 2021 the average Tillage farm system in the NFS earned €58,995, an increase of 77% on the average income earned in 2020.

Overall in 2021 Irish dairy farmers are estimated to have seen a considerable increase in their key pasture and forage costs, on both a per hectare and per litre bases. Despite large increases in their costs of production, due to growth in both average farm level milk production in 2021 of circa 6% and growth in the average milk price received of approximately 16%, the average income on Irish Dairy farms in 2021 increased by 23% to €97,350.

In 2021, prices for prime finished cattle and for younger cattle were both higher than in 2020 leading to an increase in market output value on both cattle rearing and cattle other farms. However, the higher output value due to increased cattle prices was offset by higher feed, fuel and fertiliser prices. In 2021 direct costs and overhead costs of production on cattle farms was higher than in 2021 and higher costs of production eroded much of the growth in output value particularly on Cattle Other farms. In 2021, the average family farm income on Cattle Rearing farms increased by 30% but this dramatic percentage increase still left average income on these farms at a very low €10,927. Incomes on

Cattle Other farms are estimated to also have improved only marginally to €16,416 in 2021.

In 2021 the average price of lamb received by Irish farmers increased by more than 28% driven by strong growth in EU markets and the impact of Brexit on UK exports to the EU. Total direct costs of production for Irish midseason lowland lamb enterprises also increased significantly in 2021, while overhead costs of production also increased. The strong growth in the output value on the average sheep farm was sufficient to deliver a large increase in the family farm income earned by the average sheep farms which in 2021 increased by 14% to €20,451.

Due largely to tight international supply and use balances for cereals Irish grain prices at harvest 2021 increased by up to 33% relative to harvest 2020. These higher prices and strong improvements in yields due to favourable growing conditions led to strong growth in output value on Irish tillage farms in 2021. Spring barley yields increased by 11% while winter wheat yields increased by 25% relative to 2020. Higher production volumes and higher prices were more than sufficient to offset higher costs of production in 2021. In 2021 Teagasc estimates that the average tillage family farm income increased by 77% to €65,909 per farm.

While incomes for pig farms are not included within the National Farm Survey Report, the available data indicate that 2021 was a very difficult year for pig producers, with farms moving into loss making territory due to a significant fall in pig prices and a rise in feed costs.

The conclusion of the Trade and Cooperation Agreement (TCA) between the EU and the UK removed the threat of a 'No Deal' Brexit. To date however UK customs and regulatory checks have not been applied to Irish agri-food exports to the UK. Despite Brexit taking place the lack of customs and associated border checks has facilitated growth in the value of Irish agri-food exports to the UK in 2021.

Tommy Cooke completed the second of his terms on the Teagasc board in 2021 and I would like to acknowledge the engagement and wisdom he brought to the role.

I would like to conclude by thanking Professor Gerry Boyle for the immense contribution he made while leading Teagasc and wishing Professor Frank O'Mara well for what will be an extremely challenging period over the coming years.



Pictured at the launch of the Teagasc Signpost Programme are Professor Frank O'Mara, Deirdre Ryan, Director of the Origin Green and Quality Assurance Programmes with Bord Bia; and Liam Herlihy, Teagasc Chairman.

Edited by Mark Moore Teagasc.

Report of the Director



There were many highlights in 2021, not least the easing of restrictions due to Covid-19 by the end of the year. Thankfully, we were able to resume some in person events for farmers, including the dairy open day in Moorepark and the Crops open day in Oak Park, as well as many local and regional events. Likewise in education, our teaching activities were able to return to the classroom. Overall, we had a blend of remote working and staff attending at their place of work, and using both allowed us to deliver a full research, advisory and education programme, with our operations teams effectively running our internal systems. Teagasc also played an important role in the national public health campaign around Covid: the Teagasc sequencing centre in Moorepark was called on to support the National Virus Reference Laboratory in the sequencing of Covid samples. We were of course very willing to make this state of the art platform and expert staff available to the national effort.

As the impact of Covid waned towards the end of 2021, we did see the emergence of another significant issue: very high farm input prices, especially for fertiliser due to very high gas prices. This continued into 2022, and has been exacerbated by the war in Ukraine, and will be a major issue for farm incomes in 2022. Despite these rising input prices towards the end of 2021, it was a relatively good year for farm incomes in most enterprises, particularly in dairying and tillage, with milk output reaching a record level.

Climate change was often in the news in 2021, with the IPCC 6th Assessment report highlighting the need for urgent action if the target of the Paris Agreement of keeping temperature rise below 1.5 degrees is to be met. Also, the COP26 took place in Glasgow. In Ireland, we had the Climate Bill setting in legislation a target to reduce national emissions

by 51% by 2030, relative to 2018. The Climate Change Advisory Council, of which the Teagasc Director is an ex officio member, published its carbon budgets in October, and the Government then published the Climate Action Plan 2021 which will have huge significance for us all. It provides a detailed plan for taking decisive action to achieve the overall 51% reduction in greenhouse gas emissions by 2030, and sets sectoral targets including a 22-30% cut in agricultural emissions by 2030.

Teagasc will be heavily involved in helping the sector to reach these targets: many farmers are already reducing emissions from their farming activities, by implementing the proven technologies outlined in the Teagasc Marginal Abatement Cost Curve (MACC), which are endorsed in the Climate Action Plan. Our research is developing new technologies that can reduce emissions, our advisors will support farmers in the adoption of mitigation technologies, and our education officers will build capacity in the next generation of farmers, so they can farm sustainably and meet the challenges of making a living from food production, whilst farming in harmony with the environment. We will develop our programmes further in this area as it is a major societal challenge that merits an all of organisation response.

A critical piece of our response to climate change is the Signpost Programme which Teagasc launched in 2021. This is a knowledge transfer programme to support farmers to take action to address climate change and other sustainability challenges. It is a unique programme in that all the milk processors and major meat processors are partners to the programme, along with many other industry partners (50 in total). The programme has over 100 demonstration farms in all enterprises, and we will work with these farmers to implement best practice and track progress. We know that peer to peer learning is very effective, so these farmers will play a very important role in engendering positive climate action across the agri sector.

Teagasc has excellent facilities, but there is a need for constant investment to maintain and modernise our infrastructure, and to build new capability. A major new initiative that came to fruition in 2021 was the official opening by an Taoiseach Michael Martin of the National Food Innovation Hub at Teagasc Moorepark. Companies can rent a laboratory/office unit to locate their own R&D staff who can collaborate with our researchers and use the state of the art equipment in Moorepark and MTL. This is an attractive proposition, and the Hub was full at the time of opening.

I was also delighted to see the commitment in Budget 2022 to investment in education facilities at Teagasc Ballyhaise and the National Agricultural Sustainability Research and Innovation Centre (NASRIC) to be established at Teagasc Johnstown Castle. We were delighted to have Minister for Agriculture, Charlie McConalogue, to perform the sod turning for the Johnstown Castle development. This new Centre will expand and enhance the current Teagasc Research and Innovation facilities at the Teagasc Environment Research Centre in Johnstown Castle, County Wexford. The Centre will accommodate up to 85 staff, consisting of research scientists, technical and support staff, to undertake the research necessary to underpin the sustainability of the sector.

Our education service continued to deliver a comprehensive programme of full-time, distance, and part-time courses, and collaborated with many third level institutions in the delivery of their courses. Our staff made huge efforts to deliver our programme, greatly increasing the use of digital tools in the course delivery, which will bring on-going improvements to the Teagasc education service. Other education highlights include the new apprenticeship opportunities which Teagasc is seeking to establish and offer over the coming years.

I would like to commend our advisory colleagues who delivered a huge programme in 2021. Supporting farmers to efficiently run their businesses and adopt or optimise new technologies is the core of the programme, but advisors also dealt with many new or extended schemes during the year. For example, advisors rose to the challenge of supporting farmer applications to the Results-Based Environment-Agri Pilot Project (REAP) which was initiated by the Department of Agriculture Food and the Marine in 2021. Teagasc clients submitted 4,200 applications (40%) out of a total of 10,700. This work gives Teagasc experience of how 'Results Based Schemes' will operate in future.

We launched the new Statement of Strategy titled 'Teagasc Together - harnessing the power of research, advisory and education to create a sustainable food system' which aims to inspire and nurture a strong Teagasc Together ethos and way of working. When our advisory, education and research services work together on a challenge, backed up by our superb operations teams, we are at our more powerful. In order to engender 'Teagasc Together' in how we work, a number of initiatives are planned to ensure that Teagasc staff are working collaboratively across units/centres and directorates to the greatest extent possible to deliver the best service to our clients

and stakeholders. Our strategy is guided by the national strategy for the agri-food industry, Food Vision 2030, which was completed in 2030. This sets out a vision for a food system approach to the industry, very much aligned to the ideas coming from the UN Food System Summit which took place in 2021. Teagasc will play an important role in implementing and delivering the Food Vision 2030 strategy.

This drive towards even greater collaboration of staff across the organisation has been enabled by a more agile way of working. Through better use of digital collaborative tools and more flexibility around where staff work from, staff who were confined to an office, now find it easier to collaborate and hold virtual interactions with colleagues or stakeholders who they may not have worked with before.

Teagasc introduced a new agile working programme prior to the global pandemic. The agile working programme will continue to evolve to ensure that Teagasc can attract and retain the best staff and ensure that staff are engaged and are facilitated to manage a good work life balance. I am personally strongly committed to diversity and inclusion, and have declared 2022 to be a year of focus on it. I am convinced that diversity is very positive for Teagasc, and every staff member should have a sense of inclusion. A number of initiatives have already got underway in 2022, and I look forward to seeing these progress.

As we look forward there are many challenges. The Russian invasion of Ukraine has had wide ranging impacts on agricultural and energy commodity markets and the outlook for farm incomes in 2022 is particularly uncertain with higher farm output price levels likely offset by higher costs of production. Climate change is an ever present issue, while other environmental issues like water quality, biodiversity and air quality have to be addressed. We need to maintain and improve animal welfare and must continue to improve the safety and nutritional value of the food produced in Ireland. While the challenges are significant, so too is the opportunity for the type of food production system we have in Ireland, and Food Vision 2030 sets out an ambitious agenda for the industry, building on its strong foundation. I am confident that Teagasc can contribute hugely to addressing the challenges and grasping the opportunities.

In conclusion I would like to warmly thank Professor Gerry Boyle for his immense contribution to Teagasc and the agri-food industry over his tenure as Director.

Authority Members



Mr. Tommy Cooke



Professor Thia Hennessy



Ms. Eilís O'Connell



Mr. Brian Rushe

Senior Management



Professor Frank O'Mara
Director



Dr. Pat Dillon
Director of Research

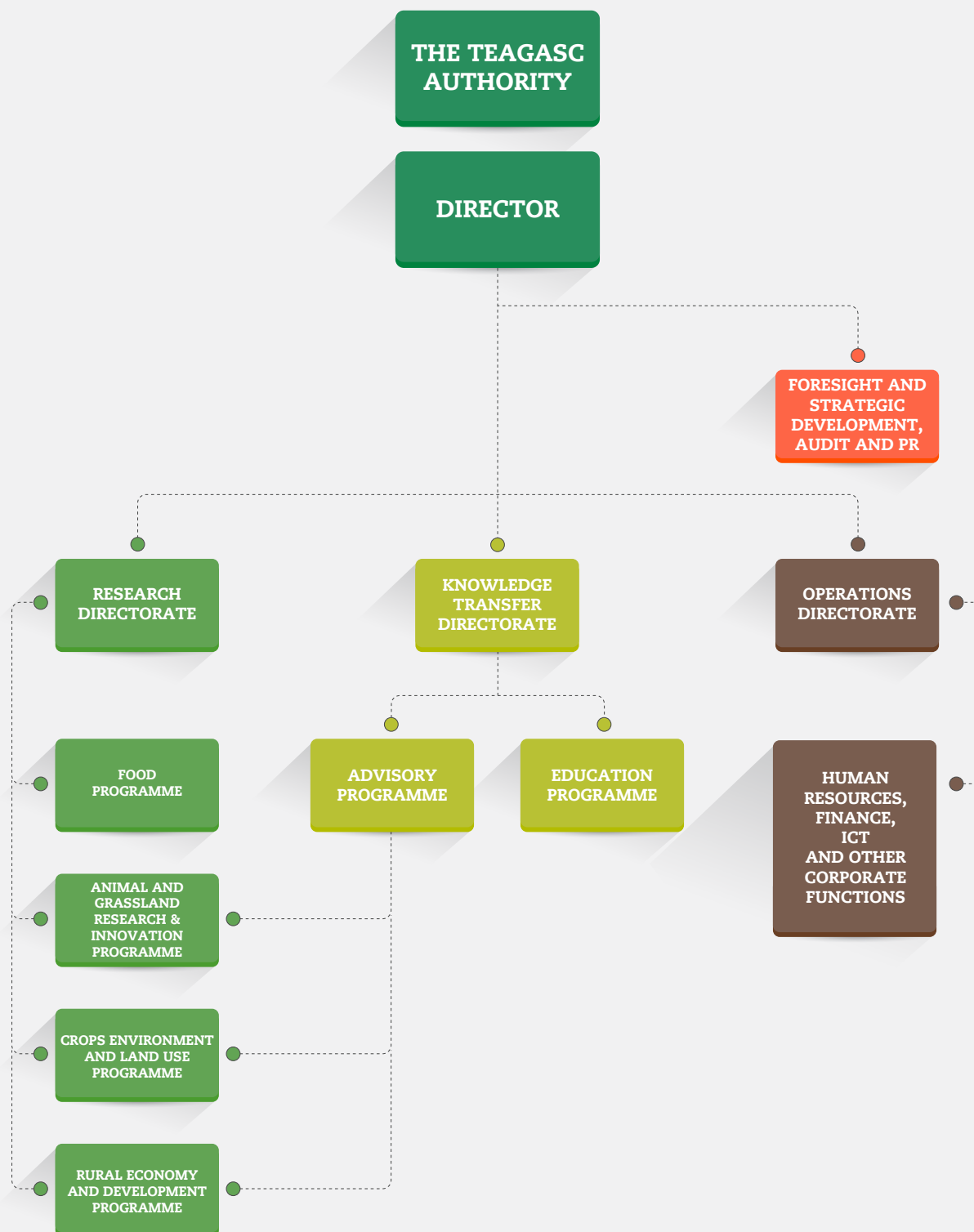


Mr. Alan Phelan
Chief Operating Officer

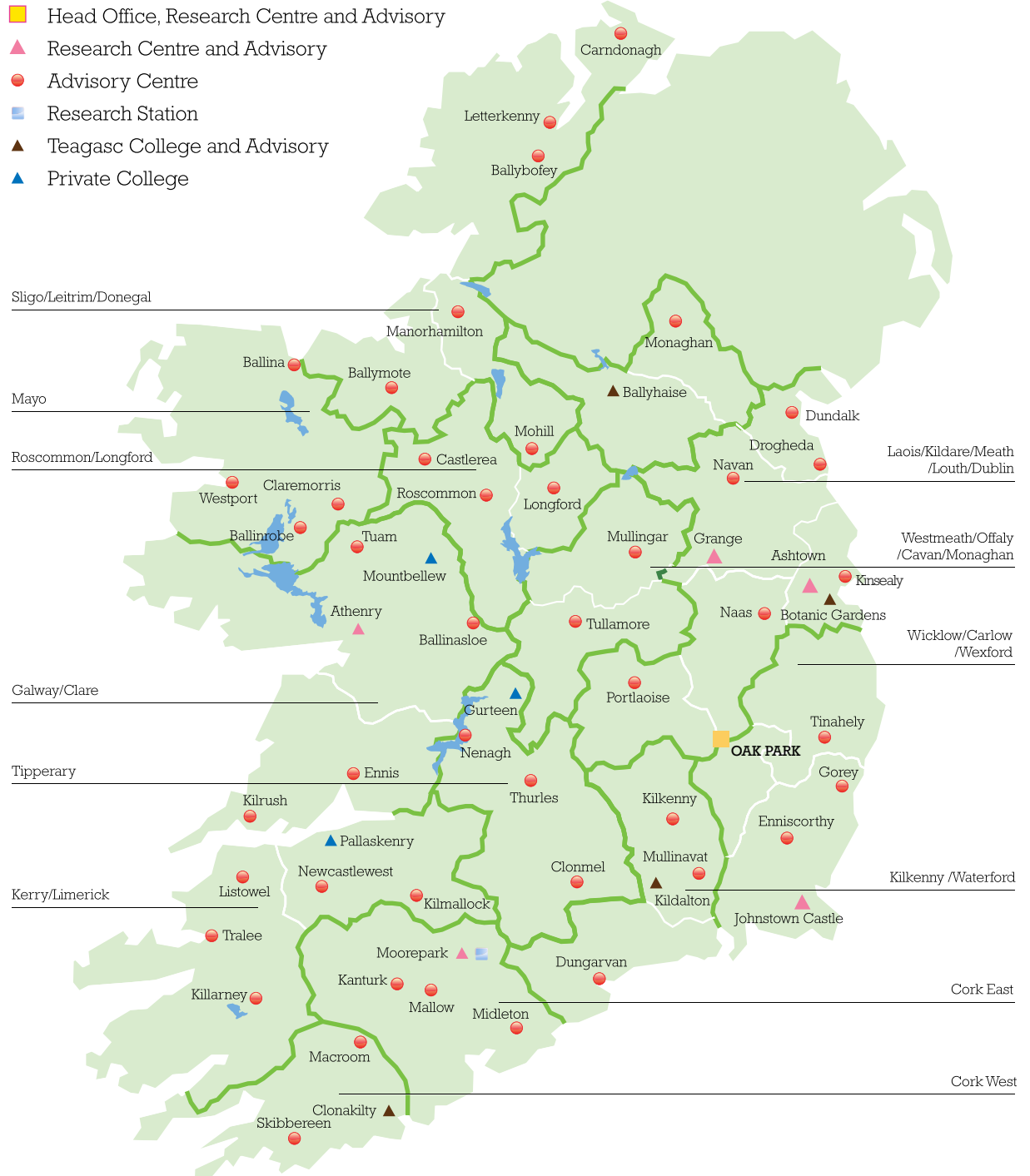


Dr. Stan Lalor
Director of Knowledge Transfer

Organisational Chart



Teagasc Offices & Centres



Strategic Goal 1

To support improvements in farmers' living standards and wellbeing.

- Supporting Viable Farming
- Securing Farmer Health and Safety and Wellbeing
- Enhancing Human Capital (Education)
- Supporting Rural Development
- Supporting Overseas Agricultural Development and SDGs



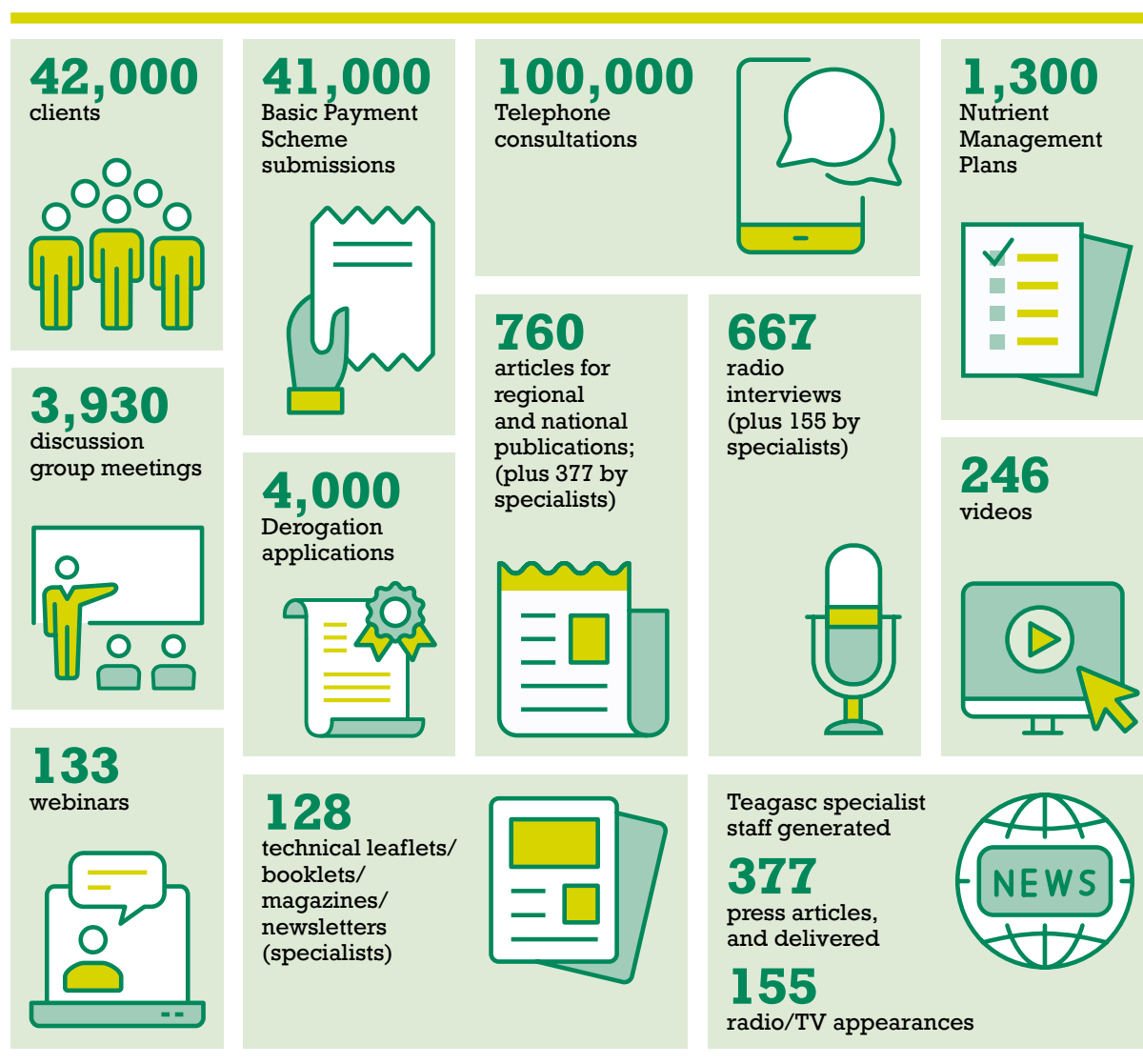
Supporting Viable Farming

Advice

Covid-19 greatly restricted face-to-face interaction with farmers either individually or in groups for large parts of 2021. While Teagasc farm or research staff could attend their workplace for essential tasks, most staff worked from home until mid-May after which farmers could visit Teagasc offices by appointment only. Nonetheless staff continued to provide a service to clients.

Later in 2021 Covid-19 restrictions were eased in stages and farm visits, events and training became possible.

Knowledge Transfer activities by Teagasc regional advisors/specialists in 2021



Enterprise highlights

Beef

Dairy Beef 500

Campaign designed and approved by Teagasc Authority. Funding secured from six industry partners.

Campaign coordinator appointed and two advisors recruited within Teagasc.

Future Beef Programme

The Teagasc Future Beef Programme - Sustainable Cattle Production, was launched by the Minister for Agriculture, Food and the Marine, Charlie McConalogue TD on the farm of Oliver O'Hara, near Manorhamilton in County Leitrim in December.

Breeding replacements

Heifers calving at 24 months are more profitable and produce lower greenhouse gas emissions than later-calving animals. Studies led by Teagasc and funded by both Science Foundation Ireland and the Department of Agriculture, Food and the Marine, investigated the underlying biology of sexual development in bull and heifer calves, including the influence of diet and genetics.

Nutrition and rate of bodyweight gain during the first six months of a calf's life had a much greater effect on the age at which either bull or heifer calves reach puberty than diet or performance thereafter. The work also provided insights into the biological mechanisms and some of the key genes affecting sexual development, which could be used as part of cattle breeding programmes.

Grassfed beef

Pasture-only production systems allow beef to be marketed as 'grass-fed', providing further high-value market opportunities. In Irish suckler calf-to-beef systems, where animals spend up to eight months annually at pasture, grazed pasture and grass silage accounts for around 90% of feed consumed. Removing relatively expensive concentrates from the diet of beef cattle will require animal performance from pasture, both grazed and conserved, to be increased.

Key findings from an initial study showed that early-maturing steers tended to be heavier at slaughter, but late-maturing steers had a heavier carcass (due to higher kill-out proportion), with superior conformation and a lower fat score. When slaughtered directly off pasture at 20-months of age, only the early-maturing steers had an acceptable carcass fat score, whereas all breed types had acceptable carcass fatness.

Multi-species swards

'Multi-species' swards, which include grasses (perennial ryegrass and other grasses), legumes (white and red clover) and herbs/forbs (e.g chicory and plantain), exploit complementarity between pasture species. Studies at Teagasc research farms have found increases in annual herbage yield of up to 25% for multi-species swards compared to perennial ryegrass swards, especially at lower fertiliser nitrogen inputs. Increased nutritive value, anthelmintic properties, benefits in N-excretion, and ultimately, better animal performance are being investigated.



Multi-species sward.

Dairy

Clover

Research at Teagasc Clonakilty found that incorporating white clover into intensively managed swards increased annual herbage production by 1.2t DM/ha, relative to grass-only swards (where both sward types received 250kg N/ha) over four years, with a sward clover content of 23%.

Research at Teagasc Moorepark and Clonakilty has shown that in grass-clover swards, N fertiliser can be reduced by up to 100kg N/ha, while maintaining herbage production (13.5t DM/ha), when a sward clover content of >20% is achieved, compared to grass-only swards receiving 250kg N/ha. As well as savings in N fertiliser, clover in grazed swards can result in increased animal performance.

Milking processes

In a Teagasc farm survey, milking process efficiencies were documented on herringbone and rotary dairy farms using video cameras and infrastructure surveys. The average total milking process time for the herringbone group was 1 hour 45 mins and 2 hours 25 mins for the rotary group.

The average cow throughput was 105 cows/hour for the herringbone group and 155 cows/hour for the rotary group. The aim of the survey was to generate a descriptive profile of all facilities, as well as establish the presence of automation on the farms.

Sexed semen

Two leading Irish A.I. companies, Dovea Genetics and Eurogene AI Services have committed to produce sex-sorted semen at a new facility at Teagasc Moorepark. “This lab will give local dairy and beef producers access to the global gold standard in sex sorted semen, our SexedULTRA 4M® semen, which is more than 90 percent gender accurate and achieves conception rates comparable to conventional semen,” said Juan Moreno, Sexing Technologies CEO. According to Stephen Butler, Reproductive Physiologist at Teagasc. “This lab represents a turning point for Ireland’s dairy and beef industries.”

Grass

Grass10

A report on the first phase of the Grass10 programme was published in January 2021. Acknowledging the achievements of the programme, Teagasc Director, Professor Gerry Boyle said that the number of grassland farmers using PastureBase Ireland (PBI) has increased from 2,393 in 2017, completing on average 14 grass cover measurements per farm, to 3,664 grassland farmers in 2020, completing on average 19 grass cover measurements per farm. Phase II of Grass10, with increased emphasis on clover, was launched.



The winner of the Grassland Farmer of the Year competition, Caroline Walsh, was presented with her award by the Minister for Agriculture, Food and the Marine, Charlie McConalogue TD, in Teagasc Moorepark.

Scheme work

As well as supporting clients through knowledge transfer Teagasc staff assisted clients with scheme applications and compliance.

In addition to the Basic Payment Scheme which is relevant to virtually all farmers, Teagasc advisors assist clients with applications to EU or national schemes and for Derogations related to farm practices examples include REAP and the Nitrates Derogation:

REAP

The Results-Based Environment-Agri Pilot Project (REAP) was initiated by the Department of Agriculture Food and the Marine in 2021. REAP pays farmers to maintain and improve the environmental condition of their land. Farmers could enter between 2ha and 10ha of land which was scored in year one to establish its environmental condition. Applicants worked with their advisors to undertake environmental improvement works on the land that would increase the environmental score in year two.

The scheme focusses on improving existing farm features rather than the creation of new features and habitats. Farms with higher environmental scores received larger payments. Teagasc clients submitted 4,200 applications (40%) out of a total of 10,700. Teagasc advisors completed farm assessments for 1,535 clients accepted into REAP by DAFM. This work gives Teagasc experience of how 'Results Based Schemes' will operate in future.

Derogation applications and compliance

Teagasc clients in derogation (4,760) were required to complete three one day courses in: 1) Nutrient Efficiency / P Build up, 2) Grass management, 3) Sustainability. Due to Covid-19 restrictions these courses were partly delivered on line. A total of 96 courses with 30-50 participants per course were completed.

Teagasc advisors also supported clients with 1,025 Targeted Agricultural Modernisation Scheme (TAMS) applications.

PastureBase Ireland

PastureBase (PBI) Ireland is Ireland's national grassland database and provides daily updates on grass growth across the country for all farmers. In 2021 PBI added a number of important tools to the system to assist farmers to better match nitrogen supply with grass demand. The Nitrogen Use Efficiency (NUE) calculator measures how efficiently nitrogen in slurry, feed and fertiliser converts to milk and meat.

The calculator will also determine the farm gate nitrogen surplus on the farm. Improving NUE and reducing nitrogen surplus will have large environmental benefits. Farmers will be able to benchmark their NUE and farm gate nitrogen surplus values against comparable farms. A 'Nitrogen Planner', which give farmers monthly nitrogen recommendations, was also added in 2021.

Sheep

EuroSheep

The first EuroSheep TransNational WorkShop took place, in March 2021. Delegates from Ireland (Teagasc), France, UK, Spain, Italy, Greece, Hungary and Turkey, encompassing both meat and milk sheep systems of production participated in the virtual workshop.

The aim of the workshop was to discuss the main needs, issues and challenges of stakeholders involved in sheep production in relation to nutrition, health and management of their flocks in the EuroSheep countries. These needs/challenges had been identified in an online survey undertaken by farmers, advisors, veterinarians, and researchers across Europe.

Grass v grass/clover

Average time to slaughter for lambs was 199 days for grass-only treatments and 187 days for grass clover treatments in 2020. There was no difference in average carcass weight (20.3kg) or kill out percentage (46%). Average clover content of the grass clover swards averaged 19% compared to 14% over the last two years. Sward DM production for the grass-only (145kg N/ha) treatments was 11.4 tonnes DM/ha; the grass clover (145kg N/ha) grew 11.9 tonnes DM/ha and the grass clover (90kg N/ha) grew 11.0 tonnes DM/ha.

Tillage

Malting and Distilling Hub

A Malting and Distilling Hub has been established to test and pilot the use of Irish products for their suitability in the drinks industry and is a central plank to the objective of developing higher value markets that complement the current state-of-the-art field and laboratory research facilities at Teagasc Oak Park.

Oats research

Researchers in Ireland and Wales have been awarded €2.7million to explore the development of oat varieties



Farmer Gerard O'Meara and Teagasc tillage advisor Conor Kavanagh examine a mid-winter stand of rye.

that are climate-resistant and have high nutritional value and superior health benefits.

Led by UCD, in collaboration with Aberystwyth University, Swansea University and Teagasc, researchers will work with agricultural communities and stakeholders to promote the health, economic and environmental benefits of growing oats.

Septoria strains confirmed

Researchers in Teagasc have confirmed that Irish strains of septoria are able to overcome a source of genetic resistance present in a range of near-market winter wheat varieties. This is the conclusion of a significant study led by Steven Kildea, Teagasc crops researcher, and accepted for publication in the journal Plant Pathology.

Protein crops

The Irish Protein Stakeholders Group have produced and published a strategic plan to support the growing of native protein crops. The Plan was launched in December by the Minister for Agriculture, Food and the Marine Charlie McConalogue TD.

Forestry

Teagasc Forestry Development officers carried out farm visits and office consultations at various periods of 2021 when Covid -19 regulations allowed see also Advice infographic.

A total of 479 visits were undertaken 23% of these were pre-planting visits where the forestry option was discussed in detail on site. Management visits accounted for 32% of all visits. Harvesting was the subject of the remaining 43% of visits.

To improve efficiency FDO's only carry out pre-planting visits when there is a specific issue on site. Otherwise; landowners are encouraged to discuss the forestry option in an office where permitted or

over phone/zoom call using access to the IFORIS system/Google maps to view the proposed site and any environmental issues that may exist.

Also in 2021, 24 office consultations/zoom calls were held with land owners along with 1,113 email forestry queries from land owners or potential land owners (40% of these were tree planting queries).



Galway farmer Martin Joe Kerrigan and Teagasc advisor Joanne Masterson view some Mayo Blackface ewes.



Pictured at the launch of the strategic plan support the growing of native protein crops (L to R): Michael Moloney, Senior Inspector at Department of Agriculture, Food and the Marine; Michael Fawle, Charles R Wynne, Kildare; Minister for Agriculture, Food and the Marine Charlie McConalogue TD and Michael Hennessy, Head of Crops Knowledge Transfer, Teagasc.

Horticulture

Teagasc provides an advisory and research technical service to the Irish horticulture sector which includes mushrooms, vegetables, fruit, nursery stock and ornamental (incl. cut foliage) production. The service provides decision support for growers and managers on agronomy, including crop planning and advice on optimising inputs and profitability.

Webinars

Webinar topics included mushroom pests and disease, mushroom picking technology and innovation in energy use efficiency, harvesting automation, peat alternatives and pest and disease mitigation.

Pest and disease control webinars emphasised the use of integrated pest management, aimed at the ornamental, soft fruit and protected crops sectors. Topics included thrip control, aphid control, and innovations in integrated pest management in soft fruit. A weed control webinar delivered data from UK trials of herbicides in a range of cut foliage, ornamental field and container produced crops.

Grant scheme

All advisors supported applications to the DAFM scheme of investment aid for the horticulture sector in 2021. Five advisors assisted with over 165 applications and business plans with clients for the DAFM scheme totalling around €35m worth of investments.

Research highlights

Beyond Peat (€1.69m) funded by DAFM, seeks to assess innovative growing media and mushroom casing alternatives, from an agronomic, economic and environmental perspective.

SoftGrip: The development of a soft gripper for the robotic harvesting of mushrooms 2021-2023; EU H2020 funded.

Teagasc researchers were part of a winning team for the SFI Future Innovator Prize: Evaluating quality and shelf life of silicon enriched fresh salad leaves using alternative plastic packaging solutions.

Pigs

Teagasc Virtual Pig Week

Virtual Pig Week took place in October 2021. A different topic was covered each day and a variety of contributors shared their expertise and experience including Teagasc farm staff, advisors and researchers along with pig producers and international experts.

Topics covered over the five days included: farrowing rates; wet feeding; milk supplementation; the ban on Zinc Oxide; marketing opportunities. A new feature this year was the 'EXPO Room' where the Teagasc Pig Development Department students presented a video overview of what is currently happening on some of the many research projects at Teagasc Moorepark.

Podcast

The Pig Edge is Teagasc's monthly Pig podcast for farmers. The number of total plays continues to increase, up 33% in the second half of 2021 compared to the first six months. The average number of plays has increased from 100-150 to 150-175 per month.

Financial tools

The Pig Development Department has developed and updated its suite of financial tools for pig farmers in response to the financial downturn in the sector. These tools include a cash flow programme, current cost ready reckoner and an optimum sale weight calculator.

LEAN Principles

The Pilot Pig Supply Chain Lean Initiative in 2018 proved that applying Lean Principles to the pig production process could deliver real improvements in competitiveness, cost effectiveness, energy use and feed conversion efficiencies.

This Lean programme has continued since the pilot and in 2021 Teagasc Pig Development Department established two programmes, a national programme using Irish Lean Consultants working with farms not previously involved in Lean and an international programme where International experts are working with Irish farms on specific issues including nutrition, biosecurity, reducing antibiotic use and pig welfare.

This initiative is a collaboration between Teagasc, Bord Bia and DAFM, with the objective of supporting the adoption of Lean manufacturing principles to achieve operational and efficiency improvements on pig farms.

Farm business management

Teagasc Profit Monitor Upgraded

The Teagasc Profit Monitor financial benchmarking application has been in use by Teagasc for over 30 years. In November 2021 Teagasc released an upgraded Profit Monitor online system with a new interface and increased options for analysing financial performance on dairy, cattle, sheep, tillage and pig farms.

The Teagasc Profit Monitor allows farmers to link the financial performance on the farm to the main physical measures (hectares, litres, kilogrammes, tonnes) and also to the technical measures (stocking rate, grass utilised, labour input among others). These linkages allow farms to benchmark their performance across successive years and with their farmer contemporaries.

Collaborative farming

Teagasc continues to promote and advise collaborative farming arrangements. In 2021 there were over 3,500 Registered Farm Partnerships in Ireland. These partnerships play a key role in family farm succession planning while also providing an opportunity for existing farmers without a successor to enter an arrangement with interested young farmers.

Teagasc also encourages the adoption of long-term land leasing arrangements, contract heifer rearing and share farming all of which have gained increased interest in recent years.

Transferring the Family Farm

During 2021 Teagasc advisors continued to deal with queries from farm families on the transfer of assets to the next generation. Since Covid-19 prevented the face-to-face Transferring the Family Farm clinic format, Teagasc organised and delivered, in collaboration with relevant experts, a series of two webinars in October.

Presentations on the procedure of writing a will and how the probate process works; how succession mediation can help farm families deal with difficult succession conversations; how the State pension system works and the ins and outs of the Nursing Home Support Scheme (aka the Fair Deal scheme) were delivered to the 1,200 viewers.

Events

Restrictions due to Covid-19 had a major impact on activities in 2021, particularly large indoor events. Many events were conducted 'virtually' particularly during the first half of the year when Covid-19 restrictions prevented even outdoor meetings. The following sample of virtual events indicates that enterprise focussed Knowledge Transfer events continued in spite of Covid-19.

CalfCare

Animal Health Ireland (AHI) and Teagasc ran their annual series of CalfCare covering a wider range of topics relating to calf health. events in January. The events comprised of a combination of webinars, videos, podcasts and supporting newspaper articles.

Once a day (OAD) milking webinar

Currently practised on ca. 200 Irish dairy farms, interest in OAD milking continues to grow. It's seen as a viable option in situations where labour is in short supply; the farm layout results in long walks to and from the parlour; or reducing the number of daily milkings is attractive from a lifestyle perspective.

Teagasc Sheep Conference

The annual national Teagasc Sheep Conference took place on-line over two evenings in January.

National Farm Survey

Each year the Teagasc National Farm Survey (NFS) collects detailed data from a representative sample of Irish farmers. In 2021 the public health measures required to combat the COVID-19 virus continued to disrupt the normal data collection processes used by the Teagasc NFS and this delayed the publication of the Teagasc NFS farm income results for 2021 results until June 14th 2022.

Weather conditions in 2021 were reasonable for Irish agriculture's grassland system and favourable for Irish tillage systems. The average farm income in 2021 was €34,367, an increase of over €7,000 on the 2020 average income level. This positive outcome for the "average" farmer reflects diverging income performance across the different farm systems represented by the Teagasc NFS. In 2021, average income levels in all of the farm systems reported on by the NFS increased in 2021, however income levels and the year on year improvements in incomes were very different across the principal farm systems. While average incomes on cattle farms (Cattle Rearing and Cattle Other) improved in 2021, income levels on these two systems in particular continue to lag average incomes earned in other farm systems. On all farms total production costs increased appreciably in 2021 due to higher feed, fertiliser and fuel prices, with the average costs of production on Irish farms represented by the Teagasc NFS increasing by 14%.

Increases in milk and lamb prices led to a strong rise in incomes on dairy and sheep despite higher costs of production. On many cattle farms the increases in production costs significantly offset the increase in output prices, but some cattle farmers continued to receive direct payments linked to the Beep-S, BDGP and Sheep Welfare schemes and these payments together with Pillar I income support payments continued to support family farm income on Irish cattle farms.

Tillage farms experienced strong growth in their costs of production in 2021 due to increased fertiliser and fuel prices. However, relatively high yields per ha and increases in farm gate prices for cereals combined to lead to a very strong increase in the average tillage farm income in 2021. In 2021 the average Tillage farm system in the NFS earned €58,995, an increase of 77% on the average income earned in 2020.

Overall in 2021 Irish dairy farmers are estimated to have seen a considerable increase in their key pasture and forage costs, on both a per hectare and per litre bases. Despite large increases in their costs of production, due to growth in both average farm level milk production in 2021 of circa 6% and growth in the average milk price received of approximately 16%, the average income on Irish Dairy farms in 2021 increased by 23% to €97,350.

In 2021, prices for prime finished cattle and for younger cattle were both higher than in 2020 leading to an increase in market output value on both cattle rearing and cattle other farms. However, the higher output value due to increased cattle prices was offset by higher feed, fuel and fertiliser prices. In 2021 direct costs and overhead costs of production on cattle farms was higher than in 2020 and higher costs of production eroded much of the growth in output value particularly on Cattle Other farms. In 2021, the average family farm income on Cattle Rearing farms increased by 30% but this dramatic percentage increase still left average income on these farms at a very low €10,927. Incomes on Cattle Other farms are estimated to also have improved only marginally to €16,416 in 2021.

In 2021 the average price of lamb received by Irish farmers increased by more than 28% driven by strong growth in EU markets and the impact of Brexit on UK exports to the EU. Total direct costs of production for Irish midseason lowland lamb enterprises also increased significantly in 2021, while overhead costs of production also increased. The strong growth in the output value on the average sheep farm was sufficient to deliver a large increase in the family farm income earned by the average sheep farms which in 2021 increased by 14% to €20,451.

Due largely to tight international supply and use balances for cereals Irish grain prices at harvest 2021 increased by up to 33% relative to harvest 2020. These higher prices and strong improvements in yields due to favourable growing conditions led to strong growth in output value on Irish tillage farms in 2021. Spring barley yields increased by 11% while winter wheat yields increased by 25% relative to 2020. Higher production volumes and higher prices were more than sufficient to offset higher costs of production in 2021. In 2021 Teagasc estimates that the average tillage family farm income increased by 77% to €65,909 per farm.

While incomes for pig farms are not included within the National Farm Survey Report, the available data indicate that 2021 was a very difficult year for pig producers, with farms moving into loss making territory due to a significant fall in pig prices and a rise in feed costs.

The conclusion of the Trade and Cooperation Agreement (TCA) between the EU and the UK removed the threat of a 'No Deal' Brexit. To date however UK customs and regulatory checks have not been applied to Irish agri-food exports to the UK. Despite Brexit taking place the lack of customs and associated border checks has facilitated growth in the value of Irish agri-food exports to the UK in 2021.

The Russian invasion of Ukraine has had wide ranging impacts on agricultural and energy commodity markets and the outlook for farm incomes in 2022 is particularly uncertain with higher farm output price levels likely offset by higher costs of production.

Farmyard Tours

Looking around parlours and talking to other farmers is an important part of the design process. With farmers unable to travel due to Covid-19, Teagasc built a library of virtual farm/parlour tours on the website. A series of 360 degree photographs allowed viewers to 'move around the parlour' and view it from almost any angle.

Water Quality

The Teagasc Water Quality Week ran throughout the week beginning 22nd March. Water quality week was organised in collaboration with the dairy processing co-ops and the Local Authority Waters Programme (LAWPRO). During the week Teagasc and its partners provided advice to farmers to help minimise losses of nutrients, sediment and pesticides to water.

Virtual College Open Days

Teagasc hosted a series of Virtual Open Days for prospective students, to showcase full-time Level 5 agriculture, horticulture, equine and forestry courses at Teagasc and independent colleges.

Virtual Forest Walks

During February and March, landowners could join online workshops organised by Teagasc's Forestry Development Department, to gain an understanding of what a new forest can offer, learn what's involved, and how to get started in the planting process. A second series of virtual forest walks focused on the management of young forests.

Grassland Farmer of the Year

The Overall Winner of the Grassland Farmer of the Year 2020, Caroline Walsh, from Ballinascorthy, County Cork hosted a virtual event on Wednesday 21st April. Caroline 'took over' the Teagasc Grass10 Twitter account and the Teagasc Instagram account throughout the day providing insights into how she achieves a high level of technical performance in a sustainable way.

Legumes reducing fertiliser N use

This webinar explained how white and red clover, beans and other legumes will have an increasingly important role in the future of Irish agriculture by reducing dependence on artificial fertiliser.

Poultry

Teagasc and industry specialists tackled poultry industry issues during a five-part webinar series. Key topics such as biosecurity, Cocci, Foot Pad Dermatitis, Support Scheme for Renewable Heat (SSRH) and layer management were examined.

Signpost Webinar Series

April 1st 2021 marked one year of the weekly Teagasc "Signpost Webinar Series" which covers

environmental topics. The webinar was about 'Multispecies Swards - sward and animal performance under reduced nitrogen fertiliser inputs' with speakers Helen Sheridan and Professor Tommy Boland, UCD providing insights.

Donegal dairy farmers

Richard and Wendy Starrett, winners of 2020's NDC and Kerrygold Quality Milk Awards (QMA), hosted 2021's National Milk Quality Farm Walk as a webinar and social media takeover on Tuesday, 29th June. The event was organised by Teagasc, with the support of Aurivo Co-Op, the National Dairy Council and Ornua.

Extension and Education Conference

ESEE 2021

25th European Seminar on Extension & Education

21–23 June 2021,

Teagasc Ballyhaise Agricultural College, Cavan, Ireland

The European Seminar on Extension and Education conference is a major international biennial event which presents new research on agricultural extension and education. On June 21-23, ESEE21 it was hosted by Teagasc Ballyhaise College in collaboration with University College Dublin and CAFRE in Northern Ireland. Due to Covid-19 restrictions the conference was delivered on-line.

The title of the 2021 conference was: Learning for Life. Continuous innovation support through extension and education for sustainable farm communities.

1. Digital delivery of advice and education: What have we learned from the disrupted norm?
2. The evolving roles of advisors and educators in supporting learning.
3. Lifelong learning. Encouraging and facilitating continuous learning and development by rural individuals, households, and communities.
4. Evaluation and impact assessment of Ag. Education and Innovation support models.

A large team of Teagasc staff from all parts of the organisation were involved in the organisation and execution of the event. The conference was also supported by Teagasc Knowledge Transfer in that participation fees were waived. The use of an innovative virtual platform enabled the conference to reach more participants (390) in more countries (34) than ever before.

Outdoor events

As Covid-19 restrictions were eased during 2021 major open-air events became possible.

Teagasc Oak Park Open Day

The event was held on June 30th, and July 1st. Due to Covid-19 restrictions, numbers were restricted with the focus on providing demonstrations across the 12 research stands to pre-registered Teagasc Tillage discussion groups. Over 250 farmers attended.

Teagasc Moorepark Open Day

The major outdoor event of 2021 was the Teagasc Moorepark Open Day which took place on Tuesday, 14th, Wednesday, 15th and Thursday, 16th September 2021, for the Irish dairy industry. The Open Day was repeated over the three days to ensure compliance with government Covid-19 guidelines.

Among the topics discussed at Moorepark'21 was greenhouse gas emissions (GHG) from dairy production. Farmers heard how updates to the models and emissions factors have resulted in the GHG intensity of Irish milk being reduced by over 10%. Technologies available for take up at farm level can reduce GHG intensity by a further 26%.

Teagasc researcher Laurence Shalloo pointed out that a new national average GHG intensity of 0.99 kg CO₂-eq per kg fat and protein corrected milk (FPCM) has been calculated by a recently updated Teagasc Life Cycle assessment model.

Teagasc researcher, Jonathan Herron said; *"Improving the efficiency of current dairy systems and the adoption of low emissions technologies can reduce GHG intensity to 0.73 kg CO₂-eq per kg fat and protein corrected milk. Further development and implementation of low emissions technologies is necessary to reduce the GHG intensity and total GHG emission of dairy systems."*



Joe Patton addressing visitors at the Teagasc Moorepark Open Day.

Securing Farmer Health and Safety and Wellbeing

Health and Safety

- Fatal workplace accidents on farms declined in 2021. Ten farm workplace deaths occurred in agriculture 'crop and animal production', one in 'forestry and logging' and one related to construction activity on a farm. Thus, 12 workplace fatalities occurred on farms.
- Training on farm health and safety based on the H.S.A. Risk Assessment was provided to 1,195 farmers at approximately 100 half-day training courses (both on-line and in-person).
- DAFM funded research on farm safety behaviours (acronym Be Safe) with a Post-Doctoral, PhD and Master's Scholar, two PhD studies were on-going related to farmers health and a Masters study related to increased engagement of advisors in farm safety. Three peer reviewed and two international conference papers were published.
- The EU COST Network on Safety Culture and Risk Management in Agriculture with a Teagasc Vice Chair was successfully completed in 2021 with the end of project available on-line at www.sacurima.com
- Teagasc National Farm Survey undertook an additional survey on farm workplace accidents in 2021. The findings of this survey will be analysed and publicised in 2022.
- Due to Covid-19, farm health and safety was actively promoted on-line and in the farming and Teagasc media.
- BeSafe. During 2021 three webinars, addressed by leading international and Irish researchers, were delivered as part of the DAFM funded Behaviours for Safer Farming (BeSafe) project. These focused on farm safety culture, the use of behavioural 'nudges' to increase adoption of safe practices and, co-designing extension interventions.
- A major health and safety exhibit was held at the open day at Teagasc, Moorepark.
- Teagasc and the Health and Safety Authority renewed their Joint Initiative to co-operate in promoting farm health and safety for the period 2021-2024. A new Farm Safety Partnership advisory committee to the H.S.A. was formed in 2021 with a Teagasc member.

On Féirm Ground

'On Féirm Ground' (OFG) was commissioned by the Department of Agriculture, Food and the Marine, the Department of Health and the HSE to examine how Farm Advisory Service (FAS) agricultural advisors might be trained to engage with and support farmers on health issues.

A module to equip frontline agricultural advisors with the knowledge, skills and competencies to engage and signpost farmers on health & wellbeing issues was developed by the National Centre for Men's Health at Carlow Institute of Technology. The module is a component of ENGAGE the national men's health training resource. In 2021, training of OFG trainers (24) was implemented and the first of four rounds of one-day advisor training was conducted.



Enhancing Human Capital (Education)

Education

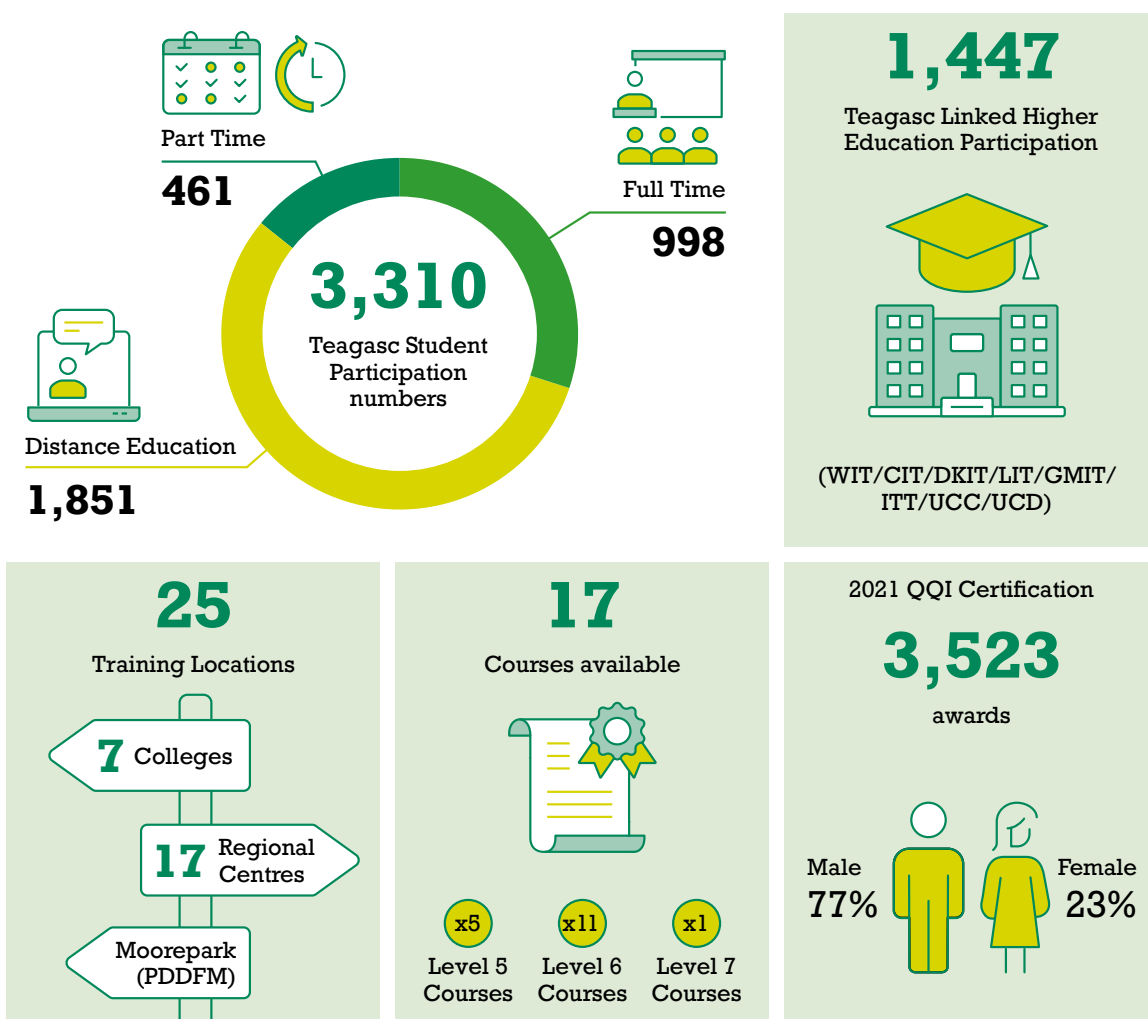
Due to Covid-19 much co-located education provision was suspended and much delivery by Teagasc Colleges and education officers moved 'on-line'. While all guidelines issued by the Department of Further and Higher Education were followed meticulously, Teagasc was able to deliver Level 5 and 6 courses in Agriculture, Horticulture, Equine and Forestry, Pig Husbandry and Dairy Farm Management. A total of 5,133 students participated on Teagasc education courses in 2021.

A review of part-time and Distance Green Cert programmes commenced in 2021. This will include a review of the use of re-mote delivery and the expansion of online assessments. A review of blended learning is due to commence in Q1 2022. A new Moodle platform with enhanced functionality and capacity was launched in September 2021.

Walsh Scholarships

In 2021, Teagasc offered 40 Walsh Scholarship opportunities to pursue postgraduate study on topical agri-food issues. The scholarships are awarded in association with national and international universities, technological universities and Institutes of Technology and will provide scholars with a high quality research experience and transferable skills to advance their careers in the agri-food sector.

Teagasc Student Participation Numbers



Walsh Scholar of the Year

Peter Doyle is the Teagasc Walsh Scholar Gold Medal winner for 2021. Peter was awarded the medal by Professor Frank O'Mara, (then) Director of Research at Teagasc, at a special online ceremony. Peter won the overall award after winning the Animal and Grassland Research and Innovation Programme category.

Teagasc/FBD Student of the Year

The 2020 national winner of the Teagasc/FBD Student of the Year award is Deirdre McMahon, Leagh North, Kinvara, County Galway. Deirdre completed the Teagasc Distance Education Green Cert programme at Salesian Agricultural College, Pallaskenry, county Limerick. She has a degree in nursing and worked as a nurse, but is now involved in the operation of the family dairy herd. She continues to upskill and has completed CPD courses and participates in discussion groups including a women's discussion group. Her goal is an efficient sustainable dairy farm enterprise.

CECRA

CECRA (Certificate for European Consultants in Rural Areas) is a European soft skills training programme designed for agricultural advisors and consultants working with the farming community. The aim of the programme is to create a standard within advisory skills across Europe and supports participants to improve their advisory and extension techniques.

Two Teagasc advisors are the first in Europe to be awarded the European CECRA certificate. Marie Flynn, Teagasc Dairy Advisory based in the Moorepark advisory office, county Cork and Cian Condon, Drystock and Goat advisor based in Teagasc Manorhamilton, county Leitrim were presented with their certificates by Teagasc Director of Knowledge Transfer, Stan Lalor.



Stan Lalor, Director of Knowledge Transfer, Marie Flynn, George Ramsbottom Teagasc, Cian Condon, Mark Gibson head of Knowledge Transfer and Outreach.

Supporting Rural Development

Farm Business Options

A suite of 79 farm diversification factsheets were published on the Teagasc website along with a suite of videos to provide information on a range of ideas and possible options for individuals to explore. Teagasc also delivered 33 recorded webinars on the topics of energy and diversification. A weekly Teagasc webinar 'Farm Business Options' featured news, views and interviews on topics relevant to farm business diversification in Irish agriculture.

Organic farming

In 2021, five QQI 25 hour Organic Farming Principles courses were delivered. Five organic farms were identified for participation in the Teagasc Signpost Programme: two beef, two dairy, one tillage.

Monthly organic autumn webinars started in September, including topics such as: 'Are you considering converting to Organic Farming?'; Options for organic tillage growers; the role of multi species swards on Irish organic farms.

Teagasc/DAFM Organic Farm Walk programme resumed with a walk in Wexford on an organic dairy farm. In December, the delivery of an organic dairy pilot project with a group of dairy farmers began. The aim is to assist farmers to make an informed decision as to whether converting to organic dairy farming is an option. A Teagasc Organics Twitter account was established in 2021.



Teagasc Organic Dairy Farm Walk on the Whitty Family Farm at Dunganstown, New Ross, Co. Wexford. Pictured is the Whitty family, Joe & Alicia Whitty with their daughter Eimear and granddaughter Clodagh with Minister of State in the Department of Agriculture, Food and the Marine Senator Pippa Hackett. Also pictured are Elaine Leavy and Mary Ryan of Teagasc.

Energy

Teagasc advisors are increasingly receiving questions about on-farm energy efficiency and renewable energy. Teagasc Rural Economy Development Programme in association with IT Sligo and Interreg Europe AgroREs project developed a two-day pilot training for advisors during 2021. The training was held at Teagasc Ballyhaise and Gurteen agricultural colleges.

Entitled 'Making Cents with Energy on the Farm' the course enables advisors to begin supporting farmers with energy related queries. This includes improving resource and energy efficiency; adopting innovative technologies or new sustainable practices and processes; and identifying market opportunities.

AgroFossilFree (AFF)

Teagasc is a partner in the international AFF project and organised workshops online during 2021 with stakeholders around the options or strategies to remove or reduce fossil fuels within agriculture.

Equine

The 'Let's Talk Equine' monthly webinar series continued, having commenced in 2020, with a further ten webinars covering a wide variety of topics. Issues addressed included husbandry/health and reproductive management, regulatory changes enforced by Brexit to horse movement Ire/UK, interviews with highly accomplished breeders and producers discussing their own stock and decision making.

The Equine Newsletter returned as an e-Newsletter with content also accessible on the Teagasc website. New sections were created to address Sustainability, Health/Husbandry, and Brexit (equine movements).

Blended learning

62 participants engaged in short course blended training via zoom, moodle and face to face on-farm on the topic of Equine Breeding (Sport Horse).



Apprenticeships

National policy advocates the creation of new apprenticeships and in 2021 Teagasc progressed the development of five land-based apprenticeship programmes in collaboration with Consortium Groups. Consortium Groups are representatives of industry, stakeholder bodies, Teagasc staff and graduates from Teagasc Courses. The programmes under development and to be commenced during 2022 and 2023 are:

- Sportsturf Technician (Higher Level 6) – two years
- Horticulturist (Higher Level 6) – two years
- Assistant Stud Manager (Ordinary Degree Level 7) – three years
- Farm Technician (Higher Level 6) – two years
- Farm Manager (Ordinary Degree Level 7) – two years

All apprenticeships will be validated by Quality and Qualifications Ireland (QQI) with Higher Education Authority funding. Upon successful completion of the programme, each apprenticeship will be recognised by the Department of Agriculture, Food & the Marine for access to schemes, services and grants provided by the government.

Young Breeders Programme

The young breeders training programme aims to enhance the skills and knowledge of those aged 15-25 years of age, and is a joint initiative with Horse Sport Ireland since 2005. The programme returned to on-farm events in October and November and these were very well attended.

Farm business strategy

Business Strategy Course

Teagasc delivers this Level 8 UCD accredited course in collaboration with the UCD Michael Smurfit Business School. The 8th cohort (the course is run annually) of 14 farmer students (pictured left) started module one in November 2021.

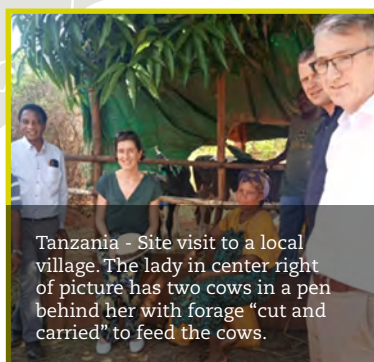
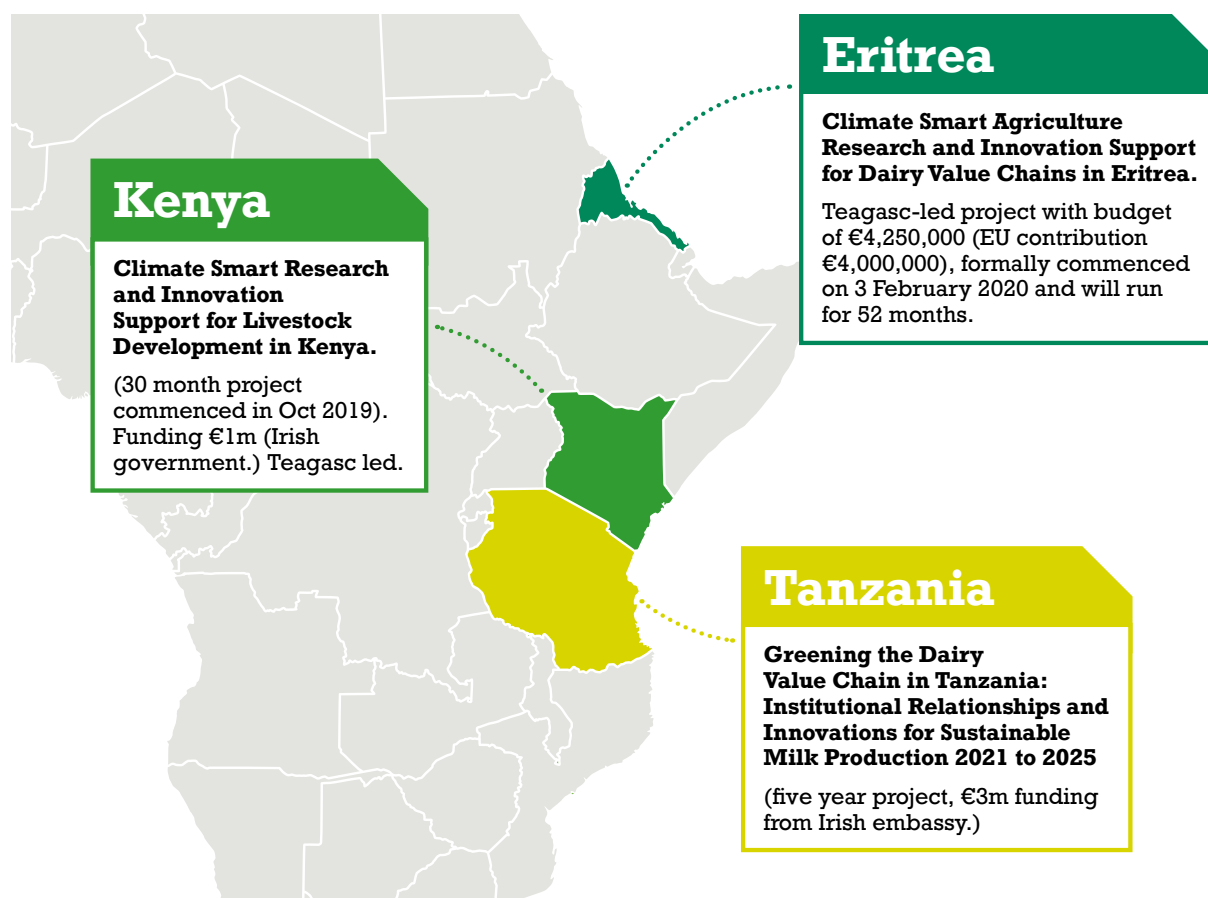
As well as the executive education supplied largely by the Smurfit Business School, participants are supported by Teagasc mentors. Farmer participants in 2021 came from Cork, Tipperary, Laois, Westmeath, Limerick and Waterford. All recommended Covid-19 precautions were observed during the co-located delivery of the course.

Supporting International Agricultural Relations and Development

During 2021 Teagasc were involved in leading three development projects in three different countries in East Africa. All projects are multi-actor and are primarily focussed on supporting the institutes working on the forage based dairy production system and value chain within each country. Despite the impact of Covid 19, significant progress was made on the Kenya and Eritrea projects which focussed on a mix of field activity and capacity building for the local institutes. The Tanzania project kicked off with a visit from Ireland in November 2021. Further details on each project and a full list of project partners is available at www.teagasc.ie.

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Dairy Projects – East Africa



Footnotes:

Tanzania is approximately 13 times the size of Ireland with an estimated population of 60m people and an estimated cattle herd of 25m. Kenya is more than 8 times the size of Ireland with an estimated population of 50m people and an estimated cattle herd of 20m. Eritrea is 70% larger than Ireland with an estimated population of 6m people and an estimated cattle herd of 2m.

Ethiopia - Enhancing the economic opportunities of farmers

Teagasc is currently involved in an economic development project in the Tigray region of Ethiopia, in partnership with Irish Aid and University College Cork.

Teagasc is supporting two PhD's, one of which is a socio-economic examination of the local food chain to see how value added in food production could be increased in order to boost the income levels of rural households. A second PhD involves the development of a farm level economic model to assess how local agricultural production could be optimised, again with the objective of improving the income of households.

The projects are proceeding, although progress has been impeded due to the outbreak of war in the Tigray Region.

Potato Projects: Kenya and Eritrea

Teagasc was involved in three separate Potato Projects projects in Kenya and Eritrea in 2021

The CRRISP (Climate Resilient and Responsible Innovations in Potato) project is a FOSC ERA Net funded project between five partner countries. Teagasc is focussed mainly on innovative potato breeding with Kenyan partners KALRO. A Teagasc funded Walsh Scholar is feeding into this project by examining the physiological characteristics that contribute to the adaptation of Potato varieties at different agro ecologies in Kenya.

A Teagasc funded Walsh Scholar is also analysing the emerging seed potato system in Eritrea. The project made recommendations on how a functional sustainable seed system can be put in place with specific focus on access to sustainable varieties and production of quality seed.



Supervisory Team Discussing adaptation trials in Lelan West Kenya.



Electra Potato growing in Maekel Eritrea.



Harvesting Electra Potato in Eritrea.

Soils and Fertiliser Project: Ethiopia

During 2021 research was conducted by the 3 Teagasc Walsh Scholars in collaboration with GIZ (the German Aid Agency) and Wageningen University to underpin the development of a prototype Fertiliser Decision Support Tool as part of the AFER+ project. This tool is targeted at smallholder farmers for crop and soil specific nutrient advice, based on data that can easily (e.g. visually) be obtained in the field. (Note: The situation in the Tigray region of northern Ethiopia has severely impacted on the projects).

Food Summit 2021

Teagasc contributed to the national dialogues run by DAFM during May 2021 and also led and facilitated two independent dialogues titled "Exploring the role of livestock in developing a sustainable Food System" and "The evolving role of an effective AKIS within a sustainable food system".



Collaborations

Teagasc continued its active participation in the Irish Forum of International Development (IFIAD) during 2021 and also worked closely as a partner in Sustainable Food Systems Ireland (SFSI) in the planning and delivery of a number of key projects during the year. We also continued to work closely with the Department of Foreign Affairs / Irish Aid under our Memorandum of Understanding and liaised with a number of different embassies based in Dublin as well as a number of Irish embassies around the world.

A number of project proposals were advanced in Uganda, Viet Nam and Colombia. Teagasc also hosted a number of virtual visits including a delegation from Chile in partnership with SFSI.



Staff Profiles



Brendan Garry, Education Officer, Mayo

Brendan Garry is an Education Officer in the Mayo advisory region, his primary role is the delivery and co-ordination of adult education programmes to young farmers in the region.

"One of the most rewarding aspects of working in Teagasc is the variety of opportunities that arise," says Brendan. "My first appointment was in 2005 as a Good Farming Practice Advisor in the Ballina advisory office where I provided environmental support to farmers."

In 2012 Brendan says an opportunity arose as a dairy advisor. "I provided technical advice and support to dairy discussion groups, ran farm walks and public events while assisting farmers with their farm expansion plans."

"I always had an ambition to train and guide the future farmers so when a vacancy was advertised for an Education Officer in the Ballinrobe office in 2017, I grabbed the opportunity." He has since enhanced his teaching skills by completing the Professional Diploma in Further Education through NUI Galway.

In Mayo, all staff education or advisory are encouraged to participate in media activities.

"For the past 11 years, I have been part of a team of advisors who produce daily radio programmes for Mid-West Radio as part of a long established collaboration between Teagasc Mayo and Mid-West Radio."

"Since 2018 I have carried out the Regional Digital Co-ordinator role in Mayo and I manage the video production along with maintaining our social media channels which has proved vital for continued knowledge transfer during the COVID 19 pandemic here in the region. As I said before, there's lots of opportunity."



Strategic Goal 2

To enhance the production and processing of safe, nutritious and flavoursome foods in line with sustainable circular bioeconomy principles.

- Processing Safe, Nutritious and Flavoursome Foods
- Providing Scientific Leadership in the Development of an Agri-food Sustainable Circular Bioeconomy (SCB)



Processing Safe, Nutritious and Flavoursome Foods

National Prepared Consumer Food Centre

In 2021 a significant extension to the Department of Agriculture Food and the Marine (DAFM) - funded, Teagasc National Prepared Consumer Food Centre, was completed. This extension has doubled the facilities available to the sector allowing an increased number of companies to develop new products, reformulate existing products and to solve a range of science based challenges.

The extension houses a dedicated packaging unit and thermal processing suite containing state-of-the-art equipment. Declan Troy, Assistant Director of Research Teagasc welcoming the Tánaiste and Minister for Enterprise, Trade and Employment, Leo Varadkar TD on a visit to Teagasc Ashtown Research Centre, in Dublin. Ministers of State at the Department of Agriculture, Food and the Marine, Senator Pippa Hackett and Martin Heydon TD accompanied the Tánaiste.

The main focus of the Food Research programme at Teagasc Ashtown is in driving food innovation in meat and meat products, prepared consumer foods, seafoods and horticultural products while maintaining quality, safety and nutrition.

The visit showcased the newly extended National Prepared Consumer Food Centre and the state of the art facilities and equipment housed there, which have been funded by a €10 million Department of Agriculture, Food and the Marine investment. It is a critical resource for the diverse Prepared Consumer Foods sector, facilitating industry-led research, and allowing companies to pilot new opportunities and address the challenges such as those posed by Brexit.

The Meat Technology Ireland Centre is also hosted at Teagasc Ashtown and has been funded to the value of €8.2 million by Enterprise Ireland and Irish beef and sheep meat processing companies over the past five years.



Declan Troy, Assistant Director of Research Teagasc welcoming the Tánaiste and Minister for Enterprise, Trade and Employment, Leo Varadkar TD on a visit to Teagasc Ashtown Research Centre, in Dublin. The Tánaiste was accompanied by Ministers of State at the Department of Agriculture, Food and the Marine, Senator Pippa Hackett and Martin Heydon TD.

BIA Innovator Campus

The BIA Innovator Campus, which is supported by Teagasc and based on the Mellows Campus in Athenry, is a step-change project that will transform the food entrepreneurship landscape in the West of Ireland. This food innovation hub is a collaboration space for food producers comprised of own door production units, shared production facilities, culinary training kitchens, an auditorium, business support centre and hot desk space.

Food Vision 2030

The vision of “Food Vision 2030” a major new decade-long and pioneering strategy for Ireland’s food and drinks sector received Government approval in August 2021. The aim is that Ireland will become a world leader in sustainable food systems over the next decade delivering benefits for the sector, for Irish society and the environment.

Food Vision 2030 was developed by a cross-sectoral committee of agri-food stakeholders and envisages a pathway to a position of world leadership based on progressing the three pillars of sustainability: economic, environmental and social. It sets out four high-level missions to fulfil this ambition:

1. Viable and Resilient Primary Producers with Enhanced Wellbeing
2. Food that is safe, nutritious and appealing: trusted and valued at home and abroad
3. A Climate Smart, Environmentally Sustainable Sector
4. An Innovative, Competitive and Resilient Sector, driven by Technology and Talent.

Teagasc provided substantial input to the Foodvision 2030 Committee developing the 10 year strategy which replaces Food Wise 2025. There is strong emphasis on sustainability and Teagasc economists supported the DAFM in assessing the implications for the agri-food sector. Jane Kavanagh co-ordinated Teagasc input and attended the Committee meetings as an observer.

The ambitious and innovative roadmap for the agri-food sector aims to agri-food exports from €14bn to €21bn by 2030 – further enhancing Ireland’s position as global leader in safe, sustainable agri-food exports.

Research highlights

Novel drying technologies

Novel drying technologies can reduce high energy costs, allow for addition of heat sensitive materials and enhance the rehydration properties of high-end products. As part of Teagasc’s Drying Platform Development Plan, research is ongoing into vacuum assisted microwave drying from Enwave, and tower-less turbo drying from VOMM. Innovative Drying – Technologies and Analytics for High Quality, Sustainable Products” was the subject of the 2021 Food Innovation Gateways event.

Diet and aroma of raw milk

Teagasc together with University College Cork research has demonstrated that the odour perception of raw milk is influenced by volatile compounds directly from the animal’s diet, but also indirectly from volatiles created during rumen digestion.

Even though the type of volatile compounds present in milk from cows outdoors on pasture of perennial ryegrass (GRS) and from cows indoors on total mixed ration (grass silage, maize silage and concentrates) (TMR) were similar, the abundance of many were significantly different which impacted on the odour perception of the milks. The aroma of raw GRS milk was sweeter with more caramel and toffee notes, while raw TMR milk had more animal, barnyard, smokey notes.



David Mannion using Gas Chromatography-Olfactometry (GC-O) at the Flavour Chemistry Facility in Teagasc Moorepark.

Monitoring microbes

Researchers from Teagasc Moorepark and the APC Microbiome Ireland SFI Research Centre investigated the use of handheld DNA sequencers for routine microbial monitoring in food production systems. An alternative to traditional, expensive culture methods, DNA sequencing can rapidly analyse bacterial DNA and identify the species in a sample.

The handheld device tested in this study proved to be similar to expensive lab-based sequencing systems in terms of the number of bacterial species it could identify in the samples, although a minimum amount of DNA was required for it to function properly. The study suggests that such devices have potential for routine microbial monitoring in food production.

Whey reduces weight gain

Researchers at Teagasc have shown that the addition of bovine associated whey proteins to diets rich in fat reduced weight gain. This was demonstrated in murine (mice) models, where the consumption of high amounts of whey proteins reduced the capacity of dietary fat to cause weight gain by about 20 to 40%, while also reducing blood glucose levels and inflammation.

DNA sequencing of the murine gut microbiome showed that the ingestion of whey alongside the dietary fat promoted the growth of beneficial bacteria, while the dietary fat without whey caused the growth of microbes typically associated with excessive weight gain.

Terroir

A new academic study has provided conclusive proof of terroir's influence on whisky, settling an industry-dividing debate. The concept of terroir – the French principle that factors such as soil, microclimate, and topography together can influence flavour characteristics – has long been accepted in other drinks categories such as wine and cognac, but has polarised whisky experts for years.

Professor Kieran Kilcawley, Principal Research Officer at Teagasc, said: “We utilised gas chromatography olfactometry which enabled us to discern the most important volatile aroma compounds that impacted sensory perception of the new spirit. This research not only highlights the importance of terroir, but also enhances our knowledge of key aroma compounds in whisky.”

Providing Scientific Leadership in the Development of an Agri-food Sustainable Circular Bioeconomy (SCB)

Bioprocess Innovation Suite

The Bioprocess Innovation Suite is a state of the art facility under development at Teagasc Moorepark which will enhance Teagasc's research capabilities in the field of fermentation technology and biotransformation.

Bioprocessing is a process that uses living organisms to produce a desired, value-added product. These processes have the capacity to transform low value products (including waste streams) into higher value products with enhanced functional properties.

The Bioprocess Innovation Suite will consist of a new laboratory housing a collection of bioreactors for microbial screening and scale-up, funded by the SFI Research Infrastructure Programme and Teagasc.

SFI Future Innovator Prize – Leaf No Waste

In 2021 Teagasc, with Technological University of Dublin (TUD), was awarded initial funding through the SFI Future Innovator Prize programme focused on developing disruptive solutions that address food loss and waste across the food supply chain. The project team, led by TUD, and involving a strong collaboration across the Horticulture and Food Industry Development Departments within Teagasc, were successful in both the Concept and Seed Fund competitive processes in 2021. The project focuses on evaluating the quality and shelf life of silicon enriched fresh salad leaves using alternative plastic packaging solutions.

Digital Dairy

The adoption and installation of process analytical technologies in the form of sensors and instruments in a dairy process, can offer tangible benefits for process efficiencies and energy savings. Inline, real time measurements allow for monitoring and control of raw materials, process properties and ensuring end-product quality as well as the energy consumption used during production.

Teagasc is on the forefront of identifying novel rapid sensors (Internet of things (IoT) Near Infrared handheld sensors) and futuristic data acquisition platforms (Industry Internet of things-IIoT) for analysis and viewing of all process data streams required for dairy processors to make well-informed decisions.

Prof. Maeve Henchion delivered an invited presentation to the European Parliament Committee on Agriculture and Rural Development's hearing on 'Perspectives of animal production in the EU in the context of the Green Deal, Farm to Fork and Biodiversity Strategies' on the 21st of June 2021.

Other presenters at this event included Jean-Luis Peyraud from INRAE, Mirjam Lechner, EIP Agri Programme and Sean Finan, European Council of Young Farmers' Vice President. The title of Maeve's presentation was "What does a cow do? And why, and to whom, is this important?"

"Cow" was used as a proxy for livestock production with the title designed to encourage people to consider the many different "products" of livestock production and the competing and conflicting demands on such systems.

Some key messages were:

- (1) that different stakeholders have different perspectives on what a cow does, ranging from a parent seeing cows as a source of high quality nutrition for growing children, to farmers seeing cows as a source of income, to environmentalists seeing cows as emitters of significant amounts of greenhouse gases;
- (2) that a cow does a lot more than produce food;
- (3) that "products" from a cow that may be demanded from the market or society must be paid for or farmers face an "unfunded mandate";
- (4) greater awareness and understanding of these diverse roles across a wide stakeholder cohort is needed for livestock to form part of a sustainable food system.

Research highlights

Bioplastics

Blood is a meat co-product which is generated in large volumes and can have a high pollutant capacity. In general it is transformed into blood meal and used as fertiliser and feed, and in some cases higher value markets are found for highly functional plasma proteins.

However, the red cell fraction of blood has limited applications and innovative alternative solutions are required. In the Teagasc HaemPack project, researchers have developed a new method to

create an innovative biodegradable bioplastic, which is generated from the red cell fraction.

By means of a patent pending process, they are able to transform a highly soluble haemoglobin based material, with poor mechanical and barrier properties, into a non-soluble bio-plastic with enhanced properties which can be of benefit in food and non-food packaging applications. Teagasc researchers are working on upscaling of the process aiming for industrial applications.

U-Protein

Unlocking new sources of protein from crops, grassland and marine resources is the target of U-Protein (**U**nlocking **P**rotein **R**esource **O**pportunities **T**o **E**volve **I**reland's **N**utrition), a €3 million project funded by the Department of Agriculture, Food and the Marine and led by Teagasc.

Protein is the key driver of human health, growth and development. Research on U-Protein spans the entire production process, from the identification, growth and characterisation of proteins from crops and the marine, processing of these proteins, clinical studies and finally incorporation into a consumer product.

In support of the circular bio-economy, the residual biomass from these protein sources will be assessed for bioactive components or valorised to novel or renewable products through microbial biotransformation.



Satakshie Sharma is investigating new sources of protein such as these Oca tubers native to the Andes in South America.

Duckweed

TEAGASC researchers are looking at how wastewater from dairy processing can be used in the cultivation of duckweed, a plant with great potential as a food source. Research at Teagasc is developing a technology suite to process and develop protein-rich ingredients from duckweed by employing state-of-the-art cell disruption technologies including drying, high-pressure processing, microwave and ultrasound assisted extraction. Novel extraction technologies will allow the development of a new value chain for commercial exploitation.

The National Food Innovation Hub

The National Food Innovation Hub at Teagasc Moorepark was officially opened by An Taoiseach Micheál Martin on 17th September 2021. An €8.8 million investment by the Department of Agriculture, Food and the Marine, the Food Hub provides secure, confidential office and laboratory space for food companies to base their research and development teams.



Pictured at the launch of the National Food Innovation Hub in Teagasc Moorepark, Fermoy, Co Cork are An Taoiseach Micheál Martin with left Liam Herlihy, Teagasc Chairman and right Professor Gerry Boyle, former Teagasc Director.

By establishing their research base at the National Food Innovation Hub food companies have the opportunity to collaborate with the Teagasc Food Research Programme and access the adjoining world-class pilot plant facilities at Moorepark Technology Ltd (MTL). Clients at the Food Hub can benefit from the

extensive analytical facilities and technical expertise of Teagasc's food scientists, as well as the Teagasc Animal and Grassland Research and Innovation Programme, also located on the Moorepark campus.

Having been completed in June 2021, the Food Hub is at full occupancy. Client companies work in the areas of dairy and other nutritional products, natural food colours and gut health, with clients representing a mixture of start-up companies, multinationals, Irish Dairy Co-operatives and foreign direct investment.

One of the first food companies to move into the Food Hub were Cybercolours Ltd., a Natural Food Ingredients company. Cybercolours specialise in the sourcing, research, development, manufacture, promotion and selling of natural food colours, for the global food and beverage industry.

Managing Director Noel Sexton explains the benefit of the Food Hub to Cybercolours: "We have worked with Moorepark Technology Ltd over the past twenty years and thus it made complete sense to move our headquarters to the National Food Innovation Hub in June 2021.

"The synergy of being on-site with our production team at MTL has already stream-lined our business with respect to customer opportunities. We are also in the process of engaging with Teagasc on multi-year research collaboration projects."



Cybercolours Managing Director Noel Sexton with Liam Herlihy, Teagasc Chairman, An Taoiseach Micheál Martin, Professor Gerry Boyle, former Teagasc Director, Mark Fenelon Head of Teagasc Food Programme, Minister for Agriculture, Food and the Marine, Charlie McConalogue.

With the completion of the National Food Innovation Hub, the Moorepark campus has developed as a unique research environment in Ireland, providing the people, expertise and infrastructure for food companies to increase their research and development capacity.

Strategic Goal 3

To provide science-based evidence and technologies to enable Ireland meet commitments in regard to gaseous emissions, water quality and biodiversity.

- Mitigating Gaseous Emissions
- Pipeline Research
- SignPost Farms Programme
- Adaptation to Climate Change
- Improving Water Quality
- A more biodiverse agriculture



Mitigating Gaseous Emissions

Research and Innovation Centre

A new National Agricultural Sustainability Research and Innovation Centre (NASRIC) is to be established at Teagasc Johnstown Castle. Minister for Agriculture, Food and the Marine, Charlie McConalogue TD announced in November 2021 that DAFM will provide Teagasc with the required funding (€9m) to immediately commence construction.

Agricultural Catchments Programme (ACP)

In 2021 Teagasc expanded the Agricultural Catchments Programme (ACP) by establishing greenhouse gas and ammonia monitoring and quantifying and modelling nutrient loss from derogation and non-derogation farms. Ammonia monitoring has commenced. Data has been generated from two sheep studies. One beef study has begun and initial results look promising. Other beef and dairy cattle studies are due to commence in 2022.

Research highlights

Feed additives reduce emissions

Teagasc researchers are working with NUIG, Agri-Food and Biosciences Institute; Queens University, Belfast, and a range of industry partners, on the DAFM-funded project, 'METH-ABATE'. The project aims to develop farm ready technologies to reduce methane emissions from ruminant fermentation, and stored manure/slurry.

The objective is to develop and validate anti-methanogenic feed additives for pasture-based systems. The research will monitor productivity, evaluate food safety and sensory properties of meat and milk products from animals that are supplemented with the anti-methanogenic feed additives.

Screening additives Oils, plant extracts, seaweeds, seaweed extracts and halides have been assessed for their methane reducing potential in the laboratory, using a rumen simulation system (RUSITEC). Methane reductions of two-thirds (67%) were observed when including the tropical seaweed, *Asparagopsis taxiformis*, at 1% of dry matter fed.



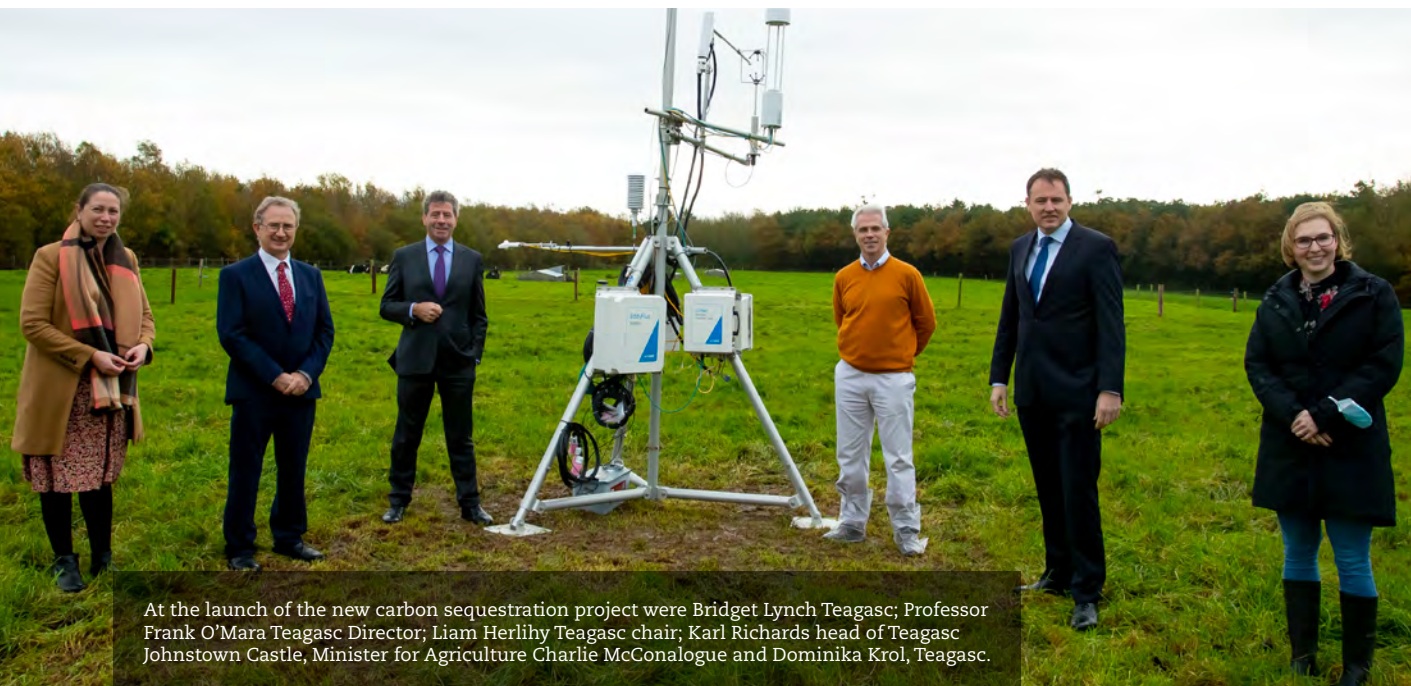
Teagasc Grange PhD student Emily Roskam with a sample of dietary concentrate containing *Asparagopsis taxiformis* which has been shown to significantly reduce methane emissions in cattle.

Burying carbon

Building on the recent investment by the Department of Agriculture, Food and the Marine to establish the National Agricultural Soil Carbon Observatory (NASCO), VistaMilk SFI Research Centre launched a new and collaborative €1.4 million carbon sequestration research project with Dairy Research Ireland, the group which allocates funding from the dairy levy collected from Irish dairy farmers.

The effect of deep ploughing of grassland soil on increasing soil carbon sequestration was recently investigated in an International project across multiple sites in Ireland, Germany and New Zealand. Dominika Krol, Teagasc Researcher based at Johnstown Castle, said that 'deep ploughing to approximately 40cm, inverts grassland soil depositing the carbon-rich topsoil to lower layers, effectively burying and protecting this carbon stock below the zone where soil biology is most active.

Simultaneously the soil from lower layers is brought to the top. This soil is typically characterised by lower carbon content and therefore has larger capacity to absorb new carbon taken from the atmosphere during photosynthesis by the grassland sward, building up soil organic carbon stock and improving sequestration.'



At the launch of the new carbon sequestration project were Bridget Lynch Teagasc; Professor Frank O'Mara Teagasc Director; Liam Herlihy Teagasc chair; Karl Richards head of Teagasc Johnstown Castle, Minister for Agriculture Charlie McConalogue and Dominika Krol, Teagasc.

Carbon footprint

In 2021 Teagasc and Bord Bia launched a campaign through the Signpost Programme to create awareness amongst farmers about the carbon footprint for their farm. Farmers will be asked to significantly reduce carbon emissions over the next few years, but to do this they need to know their baseline emissions.

Beef cattle emissions

The first large scale characterisation of methane emissions in Irish beef cattle conclusively shows that some beef cattle can produce up to 30% less methane emissions, on average, for the same level of productivity.

Novel research led by Teagasc, in collaboration with colleagues at University College Dublin (UCD) and the Irish Cattle Breeding Federation (ICBF), are making strides towards identifying, and ultimately, breeding for low methane emitting beef cattle in a bid to improve the environmental sustainability of the national beef cattle herd in Ireland.

Dairy emissions

Joint TEAGASC, NUIG and University of California research has examined milk quota abolition, dairy expansion and greenhouse gas emissions.

Results from this study indicate that further reductions in GHG emission intensities can be achieved by increasing farm productivity. However, if dairy farms expand output through greater use of chemical fertiliser or imported purchased feeds, this could lead to productivity gains, but at the same time increased emission intensity, and consequently higher total GHG emissions.

Low Emission Slurry Spreading

A large number of farmers will be using Low Emission Slurry Spreading (LESS) equipment such as a dribble bar, or trailing shoe, for the first time this season in place of the traditional splash plate. When moving over to a new method of application it is important to ensure that you are applying the slurry evenly and at the right rate and of course at the correct time.

To make the task of calibration easier, Teagasc has created an online calibration calculator. The calculator is easy to use and will work on a mobile phone.



Forest carbon tool

The Minister of State in the Department of Agriculture, Food and the Marine with responsibility for forestry, Senator Pippa Hackett launched Teagasc's new Forest Carbon Tool. This online tool is a user-friendly way for existing and potential forest owners to calculate how much carbon can be removed in woodlands and highlights the important role of harvested wood products.

Climate Change Advisory Council

The Climate Change Advisory Council is an independent advisory body tasked with assessing and advising on how Ireland can achieve the transition to a low carbon, climate resilient and environmentally sustainable economy. As Teagasc Director Professor Frank O'Mara is an ex-officio member of the council and a member of the CCAC Carbon Budgets and Adaptation committees. In 2021 Kevin Hanrahan and Trevor Donnellan of Teagasc were invited to join the Carbon Budgets Committee.

As part of its work, the Climate Change Advisory Council proposed three five-year economy-wide carbon budgets, covering the periods 2021-2025, 2026-2030 and 2031-2035, to assist the State in achieving its national climate objectives and greenhouse gas emissions targets agreed by the European Union.

- 2021-2025: 295 Mt CO₂ eq. an average of -4.8% for the first budget period.
- 2026-2030: 200 Mt CO₂ eq. an average of -8.3% for the second budget period.
- 2031-2035: 151 Mt CO₂ eq. an average of -3.5% for the third provisional budget.

The carbon budget programme was presented to the Oireachtas by the Minister of the Environment, Climate and Communications. Once adopted by the Oireachtas, the Minister will use each carbon budget to prepare sectoral emissions ceilings for relevant sectors of the economy.

Every year, the Climate Change Advisory Council reviews progress made against these carbon budgets. The review assesses reductions achieved in GHG emissions, compliance with the carbon budget, and every sectoral emissions ceiling for that period.

The Government of Ireland Climate Action Plan 2021 provides a detailed plan for taking decisive action to achieve a 51% reduction in overall greenhouse gas emissions by 2030 and setting us on a path to reach net-zero emissions by no later than 2050, as committed to in the Programme for Government and set out in the Climate Act 2021.

The Plan lists the actions needed to deliver on climate targets and sets indicative ranges of emissions reductions for each sector of the economy. It will be updated annually to ensure alignment with legally binding economy-wide carbon budgets and sectoral ceilings.

The Teagasc research and advisory programmes support farmers to meet the reduction targets for greenhouse gas emissions set in the Government's Climate Action Plan. Many farmers are already reducing emissions from their farming activities, by implementing the proven technologies outlined in the Teagasc Marginal Abatement Cost Curve (MACC), which are endorsed in the Climate Action Plan. (See also Teagasc Signpost Programme).



Signpost Farms Programme

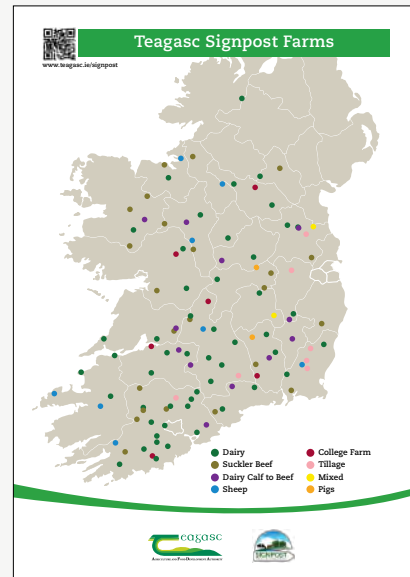
The Signpost Programme is a new, Teagasc-led, collaborative, multi-actor initiative of farmers, agri-food organisations and state agencies, working together for climate action. Building on the success of many industry collaborations over almost 30 years, and recognising the need for a collaborative approach to respond to the major challenge of climate change, Teagasc launched the Signpost Programme in May 2021. Many of the features of previous successful industry collaborations, are included:

- A multi-actor approach involving farmers, advisors, researchers, government and state agencies, agri-food industry organisations (including all milk and beef processors) and media;
- A focus on farmer-to-farmer learning through demonstration farms (there are approximately 120 demonstration farmers participating in the programme, across all enterprises – dairy, beef, sheep, tillage, pigs, poultry, forestry, and including five organic farmers);
- Each demonstration farm is supported by both their local Teagasc advisor, a dedicated programme advisor, and in many cases an advisor working with one of the Signpost partner organisations (resulting in a multi-actor approach at farm level);
- A broad reaching advisory campaign – including facilitating opportunities for farmer-to-farmer learning through demonstration events and discussion groups, and specific farmer training events;
- Clear objectives agreed by all partners at the outset (in this case, to reduce agricultural GHG emissions, in line with both national policy objectives and market/ consumer requirements).

A number of new elements have been added, including:

- A significant research component focusing on soil carbon. The National Agricultural Soil Carbon Observatory (NASCO) project, led by Teagasc researcher, Gary Lanigan, aims to quantify the amount of carbon stored in our soils, using data generated from both soil analysis and carbon flux towers, with the Signpost Farms acting as sites for measurements;
- Detailed data recording by the Teagasc National Farm Survey Unit, leading to the generation of a range of sustainability metrics (including economic, environmental and social indicators) for each participating farm – this will allow us to monitor and evaluate programme progress on the Signpost Farms.

This is a unique initiative led by Teagasc; the first time that all of the partners have been brought together within one programme. Teagasc believes that this multi-actor, climate action by farmers' initiative is unique across Europe.



Adaptation to Climate Change

Anaerobic Digestion

A multi-disciplinary team at Teagasc held the first online meeting of the technical working group for a new Anaerobic Digestion (AD) project called FLEET. It will identify farm scale, landscape level and national level economic and environmental implications of farm supplied alternative feedstock for Anaerobic Digestion (AD) at a regional level. Teagasc economist Fiona Thorne is the principal investigator on the FLEET project which is supported by the SEAI Research and Development fund.

This research will be the first of its kind in Ireland to evaluate the potential for Anaerobic Digestion (AD) to address economic and environmental outcomes at an individual farm level using Teagasc, National Farm Survey data. The willingness to adopt land use change will provide useful policy insights and will be at the forefront of knowledge generation relevant to the energy sector.

Soil moisture monitoring

Funding has been provided by the Department of Agriculture, Food and the Marine (DAFM) under the national Carbon Tax Fund to establish a network of 10 sites equipped with state-of-the-art technology to monitor soil moisture conditions in real time and over the long term. These sites will cover the major soil types, land uses and climatic regimes in Ireland. This project is being jointly lead by University College Dublin, Met Éireann and Teagasc.

Environment podcast

A new Teagasc environment podcast was launched in 2021 Teagasc and adds to the existing suite of enterprise and research podcasts. The 'Environment Edge' will focus on challenges and opportunities in agriculture. Presented by Cathal Somers and Deirdre Glynn from Teagasc, this podcast will bring the latest information, science and opinion on farm sustainability.

VistaMilk

In October VistaMilk SFI Research centre hosted the Minister for Agriculture, Food and the Marine, Charlie McConologue T.D, along with several senior members of his Department and Siobhan Roche from co-funding partner Science Foundation Ireland (SFI) at Teagasc Moorepark

VistaMilk is an SFI world-leading centre for precision-based dairy production and processing that represents a unique collaboration between Agri-Food and information communications technology (ICT) research institutes and leading Irish/multinational food and ICT companies.

The VistaMilk team put together a series of presentations highlighting the vast array of research taking place across its extensive network.

Professor Karl Richards, funded investigator at VistaMilk and Head of Environment Soils & Land Use Department at Teagasc kicked off the showcase with an overview of his team's work on the carbon capturing capacity of Irish soils.

VistaMilk has recently invested in two Eddy Covariance towers to add to the National Agricultural Soil Carbon Observatory network as well as the human resources to operate the network and mine the resulting data.

VistaMilk researchers Katie Starsmore and Ben Lahart demonstrated their novel research on measuring methane in grazing dairy cows using GreenFeed technology. This exciting research builds upon VistaMilk's investigations into reducing methane emissions in grazing systems.

Deirdre Hennessy, VistaMilk funded investigator and grassland senior research officer at Teagasc presented her team's studies on image capture analysis of multispecies swards. This technology, in time, will enable farmers to easily classify sward species diversity using a smart phone application; the research is now being expanded to estimate the quantity and quality of the pasture, a crucial cog in day-to-day farm management of all grazing animals globally.

VistaMilk colleagues Katie Sugrue (Teagasc) and Alan O'Riordan (Tyndall National Institute) spoke about their collaboration in delivering next generation sensor technology to improve animal health and welfare outcomes at farm level.



Pictured at the VistaMilk showcase at Teagasc Moorepark. (L to R) Professor Gerry Boyle, former Director of Teagasc; Professor Frank O'Mara, Director of Teagasc; Charlie McConologue TD, Minister for Agriculture, Food and the Marine; Professor Laurence Shalloo, Deputy Director of VistaMilk; Liam Herlihy, Chairman of Teagasc Authority, Brendan Gleeson Secretary General of the Department of Agriculture, Food and the Marine, and Siobhan Roche, Director of Science for the Economy at Science Foundation Ireland.

Improving Water Quality

Advisory Programme (ASSAP) interim report

The second Agricultural Sustainability Support and Advisory Programme (ASSAP) interim report was published in October 2021. The ASSAP programme is a key part of a wider government and community effort to improve water quality in 190 selected priority areas for action (PAA's) around the country by reducing agricultural and non-agricultural pressures.

The report, from Teagasc and Dairy Sustainability Ireland, focuses on the continued provision of the ASSAP advisory service and interaction with farmers up until the 31st December 2020.

Progress was made on identifying issues in PAA's and the implementation of actions on farms with 1,810 farms assessed in total and 391 follow up farm visits conducted. This is despite the impact the Covid-19 pandemic had on the implementation of the programme in 2020 due to restrictions on farm visits.

Diffuse losses of phosphorus (P), sediment and nitrogen (N) to waters continue to dominate as water quality pressures. The loss of P through overland flow, nutrient management, buffers and livestock access to watercourses were identified as key issues contributing to the pressures on waters.

Nitrates Action Programme

Teagasc made a submission in response to the consultation process run jointly by the Department of Housing, Planning, Community and Local Government (DHPCLG) and the Department of Agriculture, Food and the Marine (DAFM) inviting views and comments. It was prepared by Teagasc's Water Quality Working Group in consultation with the Gaseous Emissions Working Group. These working groups have members drawn from both the Knowledge Transfer and Research Directorates of Teagasc. It was prepared following consultation with colleagues across Teagasc using their collective knowledge and expertise in agri-environmental science and practice and the implementation of the Good Agricultural Practice (GAP) and Nitrates Derogation Regulations.

A more biodiverse agriculture

Hedgerow Week

Understanding hedges better was the theme for the Teagasc Hedgerow Week 2021 which took place from 3 – 10 December. Pippa Hackett, Minister of State at the Department of Agriculture, Food and the Marine, stressed the importance of Ireland's network of hedges at the launch of an exciting programme of online events. Minister Hackett said; *"I am delighted to launch hedgerow week, a week full of valuable information, promoting the value of hedgerows and the ecosystem services they provide."*

Teagasc Director, Professor Frank O'Mara welcomed the involvement of a wide range of organisations and interested stakeholder who were delighted to be involved in addressing this important issue, resulting in a topic of interest to many. Hedges provide a tangible link between town and country, evoking a sense of place, giving character to farms, townlands, parishes and counties, making them distinct from other areas.

European Innovation Partnership

The Teagasc Comeragh Hill Sheep Discussion Group was awarded €118,720 for a one-year project. The group comprises 14 farmer members whose sheep graze over 4,000 hectares of the Comeragh mountains across six commonages and four upland farms. The award was made in June by the Department of Agriculture, Food and the Marine using the European Innovation Partnership model.

The award focus was on promoting biodiversity through collaboration amongst farming groups, community and local action groups who engage with the broader population. Catherine Keena, Teagasc Countryside Management Specialist, who is a member of the project team said; *"natural and cultural heritage-led social innovation has multiple benefits. These include strengthening identity, fostering participation, improving well-being, creating jobs, and maintaining landscape values"*. The strategy will provide a road map on how some of these benefits can be achieved on the Comeraghs.

Biodiversity researcher

Teagasc progressed several initiatives focused on biodiversity. Stephanie Maher was appointed as a new permanent biodiversity researcher based in the Teagasc Environment Research Centre, Johnstown Castle, County Wexford. A project has begun to integrate biodiversity measures in the Teagasc National Farm Survey (NFS). A prototype indicator was developed, with discussions on its refinement ongoing.



Biodiversity photo competition

The overall winner is Roseann O'Neill from Kenmare, County Kerry. As Roseann explains, her winning image captures her 'Class 1 Kerry Bog Pony mare taken through the window of an old cow house.' Roseann's winning image was selected from over 150 diverse images featuring examples of biodiversity in harmony with equine farms around the country which were recently submitted to the Equine Farming and Biodiversity photo competition.



Staff Profiles



Deirdre C. Doyle, Technologist, Teagasc Oak Park

Deirdre Doyle is a technologist based at Teagasc Oak Park working within the Crops Environment and Land Use Programme. *"The biggest part of my job is managing contracted trials work in crops for large international companies. This involves a lot of field work in collaboration with a team of colleagues including farm staff and technicians."*

"I began my career with Teagasc in 2013 working as a technician on bioenergy crops. Subsequently I worked on a project to develop detail winter wheat and spring barley grower guides. I moved to my current position, also located at Oak Park, in 2018."

Deirdre is from Gorey in county Wexford where her family are beef and tillage farmers. She is a keen horsewoman and spends a lot of her spare time jumping horses up to Grand Prix level. *"I'm also a small scale horsebreeder,"* says Deirdre. *"I breed several horses each year with the hope that they will show promise as show jumpers."*

A long time member of the Irish Tillage and Land Use Society Deirdre is the president-elect and will become the first woman to hold the prestigious position in 2023.

Strategic Goal 4

To ensure, through science-based innovation, healthier soils, animals and people.

- Healthy and well-cared for animals
- Healthy Soils
- Human Health and Nutrition



Healthy and well-cared for animals

Suckler calf welfare

The survival and performance of the suckler calf depends on the development of a strong cow-calf bond. Calves are born with an undeveloped immune system and rely on antibodies and other components in colostrum (first-milk) for protection from disease, as well as nutrition.

Since the ability to absorb colostrum antibodies starts to decline after birth, suckling behaviour of newborn calves is very important for their health and welfare.



A primary identifiable risk factor associated with the failure of passive immunity in calves is delayed colostrum consumption. At Teagasc Grange, researchers are studying cow-calf bond development and suckling behaviour post-partum in diverse cow genotypes, as a means to enhance management strategies for improving calf passive immunity. Noeleen Brereton and colleagues are currently working on assisted versus unassisted colostrum feeding, monitoring the suckle reflex for each calf at 10 minutes post partum and identifying calves that require intervention.

International Animal Welfare Science Conference

In late August Teagasc and University College Cork (UCC) hosted the 8th International Conference on the Assessment of Animal Welfare at Farm and Group Level (WAFL), which is the first international animal welfare conference to be held in Ireland. The organising committee was made up of Keelin O'Driscoll, Amy Quinn, and Laura Boyle from the Teagasc PDD, as well as Fidelma Butler from UCC. The conference had been scheduled to take place in UCC August 2020, but due to COVID restrictions, it was postponed until this year, and run on a virtual platform. Nevertheless, it was the largest WAFL conference to date, with over 360 delegates from 32 countries attending.

Pig health

Anticipating the EU veterinary medicine regulation (implementation January 2022) and the ban on zinc oxide (ZnO) at therapeutic doses (June 2022) the Teagasc Pig Development Department, invested major resources to find solutions for when preventive antibiotics and ZnO are no longer available. Six ongoing projects (Projects PigNutriStrat, MonoGutHelath, Proswine, Milkobiome, BM-Farm, AMU-Farm) are attempting to find management solutions for pig producers.

Antimicrobials

A project to develop and trial new behavioural change interventions to support prudent use of antimicrobials and anthelmintics on farms was commenced in October 2021, with PhD student starting with Queens University Belfast. Veterinary and advisory training and pilot design underway in conjunction with QUB and AHI.

VIP visit to Teagasc Grange

The British Ambassador to Ireland, Paul Johnston joined the IFA President Tim Cullinan for a visit to the Teagasc Animal and Grassland, Research and Innovation centre, Grange, County Meath on 10 August. Sustainable cattle production systems were showcased.



The British Ambassador to Ireland, Paul Johnston, with to his left Paul Crosson and Professor Gerry Boyle, former Director of Teagasc.

Healthy Soils

Heavy Soils Programme

The Teagasc Heavy Soils Programme was set up in 2011 to develop a network of dairy farms on poorly drained soils to act as a test bed for strategies and management practices that could be implemented to improve the efficiency and performance of farms dominated by such soils, which account for 30% of grasslands nationally.

'Lessons learned - key findings of the Teagasc Heavy Soils programme' is a 2021 publication which outlines the development of the participating farms over the last ten years.

The key focus areas of the programme to date have been land drainage design, soil characterisation & land management, soil fertility & nutrient use efficiency, grassland management and farm infrastructure. Optimisation of these elements is vital in improving the sustainability of such farms.

Since the beginning of the programme, herd size on the participating farms has increased by approximately 32% from the 2011 level, with a corresponding increase in milking platform stocking rate from 2.12 to 2.82 cows per hectare. Herd EBI has increased from €84 in 2011 to €139 in 2020.

The average output in terms of milk solids per hectare has increased from 850 kg per hectare in 2011 to 1,405 kg/Ha in 2020, an increase of 65%. Average gross output in value terms ranged from €2,935/Ha in 2016, when milk price was at its lowest to €4,530/Ha in 2018.

An on-going review of poorly performing paddocks allows for investment to be planned with regards to land drainage works, soil fertility improvements, reseeding and grazing infrastructure.

SOILGUARD

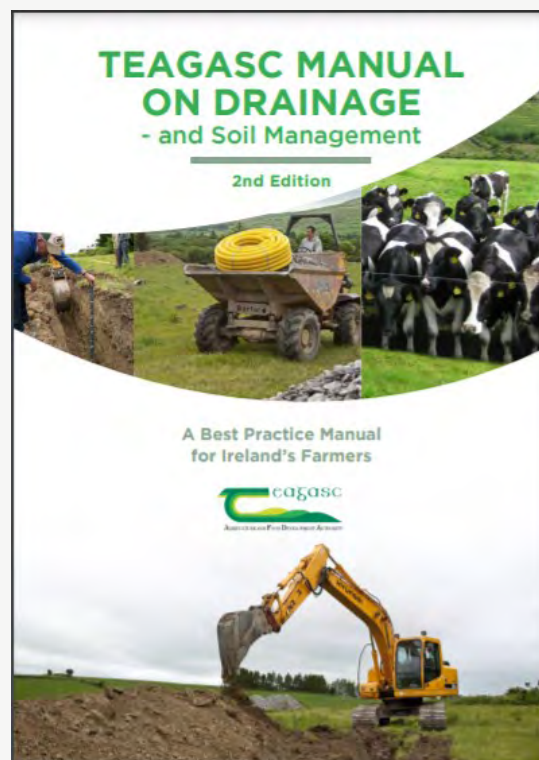
In June 2021, the Horizon 2020 project, SOILGUARD, with twenty-five transdisciplinary project partners from seventeen countries, held its inaugural meeting online.

Teagasc are the Irish partner in the SOILGUARD. Fiona Brennan, Teagasc research officer, Johnstown Castle, Wexford said; *'The importance of the life within our soils to the sustainability, resilience and functioning of our farming systems cannot be overstated. Understanding and harnessing this biology will be key to the development of the carbon neutral and climate resilient agricultural systems of the future'*.

Soils manual

A completely revised second edition of the **TEAGASC MANUAL ON DRAINAGE - and Soil Management** was completed in 2021. This highly visual manual is a 'Best Practice Manual for Ireland's Farmers' and outlines how enhancing the productivity of land, through prudent and environmentally sensitive drainage will play a role in food production.

Drainage of high organic content soils is no longer climate smart and the manual therefore focuses on mineral soils. The manual was a significant team project, led by Pat Tuohy, which brings together the expertise of front-line advisors, educators, economists and research scientists across Teagasc. Contributions from the Department of Agriculture, Food and the Marine further enhance the publication.



Human Health and Nutrition

Bioactives

In food and nutritional studies, the term “bioactive” refers to compounds in food which are not essential nutrients but may have other, separate health benefits. André Brodkorb’s group at Teagasc Moorepark study food digestion and the relationship between a food’s structure and its function in the body.

As a member of the worldwide INFOGEST network, André was a leader in the development of a standardised in vitro model of the digestive system. André comments: “Lab-based digestion models help us to fully understand what is happening once we eat and digest food. It allows us to identify bioactives that are released from food during digestion, while the standardised methods such as INFOGEST allow us to compare and share results with other research groups worldwide.”

André demonstrated this lab model to presenter Aoibhinn Ní Shúilleabháin for an RTE television program, explaining how it allows food scientists to study the digestion of various food types and analyse end-products such as amino acids, fatty acids and sugars, as well as important micronutrients such as vitamins and minerals.



André Brodkorb with Aoibhinn Ní Shúilleabháin.

Human pathogenic microorganisms

A new report on Best Practice for the Control of Human Pathogenic Microorganisms in Plant Production Systems was published in December by the HUPLANTcontrol COST action; Control of Human Pathogenic Microorganisms in Plant Production Systems, with the report publication coordinated by Teagasc.

The report emanates from a workshop that was organised by HUPLANTcontrol and brought together international researchers, regulators, growers and other stakeholders focused on examining best practice for the control of human pathogenic microorganisms in plant production systems.

The workshop was hosted by Teagasc at the Teagasc Food Research Centre in Dublin. The aim of the workshop was to bring together relevant stakeholders to examine biological hazards and control strategies in plant production systems in order to ensure the microbiological safety of horticultural products. A multidisciplinary group of international scientific experts, including researchers in food microbiology, plant microbiology, soil microbiology, microbial ecology, agricultural production, horticulture, microbial pathogenicity and virulence, risk assessment and food safety management participated in the workshop.

Healthy ageing

This Teagasc study provides important information for food companies developing functional foods targeting healthy ageing. The most attractive functional foods were those developed to improve bone and heart health, suggesting that these could be good targets for functional food innovation.

Acceptance of functional foods did not differ by sociodemographic characteristics but rather by health attitudes. This emphasises the importance of promoting the health attributes when marketing new functional food products to consumers.

The study shows that ageing consumers place a lot of trust in the nutrition information provided by their doctors, friends and family. Therefore, communicating the benefits of functional foods designed for healthy ageing should be directed at these trusted groups, as well as at the older consumers themselves.

Staff Profiles

Elizabeth Fennelly, Campus Administrator, Teagasc, Moorepark Campus

Liz Fennelly is the Campus Administrator for the Moorepark Campus primarily focusing on guiding best practice in all administrative and financial elements of the management of the Moorepark Campus.

Liz lives on the Tipperary/Kilkenny border and is from a very strong farming background. On completing her leaving certificate, Liz attended Gurteen Agricultural College and subsequently took on the role of soil sampler for the Tipperary region working with Teagasc Clonmel.

In 2003 Liz joined the ICT Department in Teagasc Head Office, Oak Park, Carlow where she worked as ICT Administrator for six years. Liz was subsequently promoted to Accounts Payable Team Lead in the Finance Department, Head Office, Oak Park, Carlow. During this time Liz undertook a 4 year BA in Accounting (Hons) graduating in 2018. In 2017 Liz moved to Moorepark Campus as Administration Support Officer and four years on Liz was promoted to Campus Administration Officer in Moorepark.

"I really enjoy working with Teagasc, an organisation that offers a diverse range of opportunities to its employees in terms of progression and job satisfaction. We are an organisation of extremely talented and dedicated staff each passionate and committed to their roles."





Peter Doyle is the Teagasc Walsh Scholar Gold Medal winner for 2021. Peter was awarded the medal by Professor Frank O'Mara, (then) Director of Research at Teagasc, at a special online ceremony. Peter won the overall award after winning the Animal and Grassland Research and Innovation Programme category.

Strategic Goal 5

To constantly improve organisational excellence and efficiency in the delivery of our services.

- Resourcing and Managing Current Expenditure
- 'Teagasc Together': Building a More Agile Organisation
- Diversity and Inclusion
- Data Protection
- Collaboration
- Infrastructure Investment
- Leveraging new technology for staff
- Digitalisation and ICT Resources
- Communications and Engagement

Resourcing and Managing Current Expenditure

In 2021 Teagasc implement further standardisation and automation in the procure to pay processes. Some eForms were introduced and construction of an eLearning module for requisitioners commenced. An external consultant was engaged to carry out a business process review of the accounts payable process and the recommendations will be implemented.

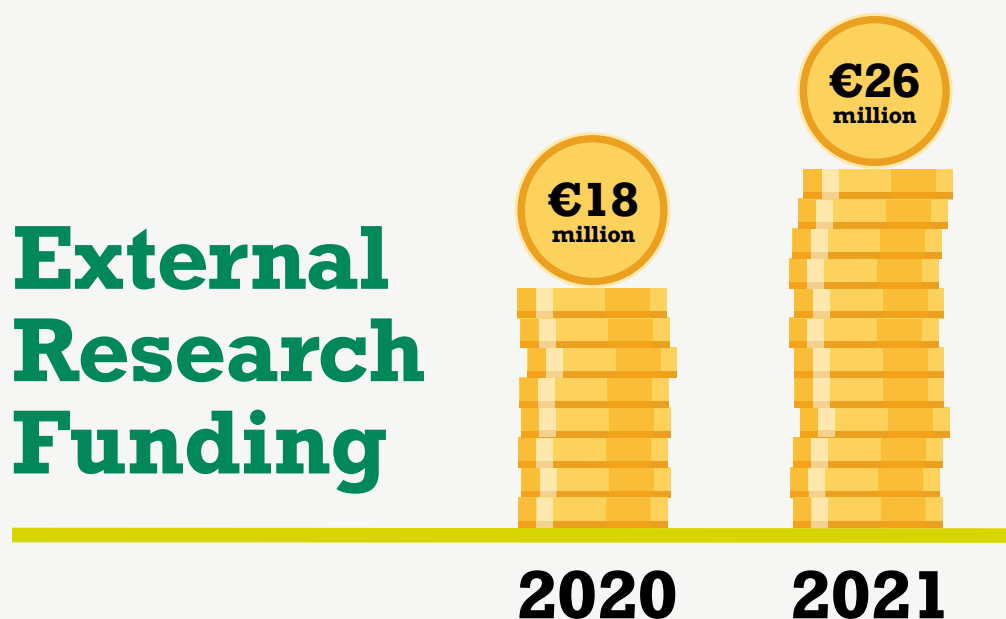
Funding success

Teagasc secured €26 million in external research funding in 2021, an increase from the total of €18 million in 2020. DAFM was a major source of funding again this year with Teagasc securing €7.6 million from the DAFM competitive call in 2021.

As part of this call, Teagasc will lead a €2.2 million project on strategies to increase resilience in Irish forests to address the impacts of climate change and a €1.5 million project to generate a new marginal abatement cost curve analysis (MACC).

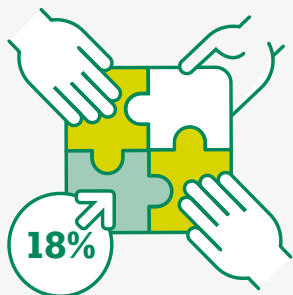
Teagasc also secured €2.8 million from SFI for two major pieces of infrastructure, a soil GHG testing facility and advanced equipment for DNA sequencing. 2021 was the final year of funding in Horizon 2020, the EU's research and innovation programme. In total, Teagasc secured €28.7 million over the lifetime of Horizon 2020 and was ranked 6th across all applicant organisations from all countries in terms of number of projects awarded in the agri-food stream (Societal Challenge 2).

In 2021, more than €1 million was secured for a Horizon 2020 project studying the microbiomes of the ruminant and almost €900,000 was secured for a project on climate neutral farms.



Technology Transfer Office Support

Fostering collaborations with industry



18% of Teagasc research income was generated from collaborative research with industry

Nurturing early stage ideas



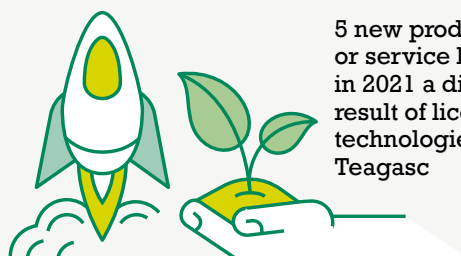
During 2021, the Teagasc Technology transfer team worked with researchers to compile 26 invention disclosures and file 6 new patent applications

Accessing world leading specialist facilities



The combined income from Food Programme technical services and MTL services rose by 12% from €4.4m in 2020 to €5.0m in 2021.

Delivering impacts



5 new products and/or service launched in 2021 a direct result of licensing of technologies from Teagasc

Research Funding



Value of contracts signed for external research funding increased from €18m in 2020 to €26m in 2021



DAFM and EI account for 2/3 of external research funding in 2021



€28.7m funding secured from Horizon 2020 over the lifetime of the programme.



Teagasc ranked 6th of all organisations from all countries for number of projects funded by the agri-food stream of Horizon 2020.

New Teagasc Director

Professor Frank O'Mara commenced his new role as Director of Teagasc on Friday, 1 October, 2021. The Teagasc Authority made the appointment in July with the consent of the Minister for Agriculture, Food and the Marine, Charlie McConalogue TD. Professor O'Mara is an agricultural scientist and sustainable livestock systems specialist, with over 30 years' experience in technical and senior managerial capacities in Agri-Food research, education and development institutions.

Since 2009, Professor O'Mara has been the Director of Research in Teagasc. Under his leadership, the number of peer - reviewed publications increased from 258 in 2008 to 726 in 2020. This has ensured that Teagasc Research has had a major impact on the agri-food sector and government policy over the last decade supported by national and EU funding and has facilitated the growth in the Walsh Scholarship programme.

He qualified with a first class honours B.Agr.Sc from University College Dublin in 1987, winning the McGuckian medal, and the Hussey Prize for agricultural economics in his final year. He went on to obtain a PhD from UCD in 1993, completing his doctorate research at Teagasc Moorepark. In his early career, he was a senior lecturer, Associate Professor and researcher in UCD for ten years, specialising in animal nutrition and animal production.



Congratulating Professor O'Mara on his appointment, Chairman of Teagasc, Liam Herlihy said; "I look forward to working with Frank as Director of Teagasc. He has a particular interest in sustainable agriculture and food systems and I am confident he will successfully lead Teagasc through the changes required to assist Irish farmers and the Agri-food sector to meet the environmental, economic and social challenges facing the sector. I would like to thank Professor Gerry Boyle for his leadership of the organisation as Director, over the last 14 years." Living now in county Carlow, Professor O'Mara is a native of Lisronagh in County Tipperary.




'Teagasc Together': Building a More Agile Organisation

The new Statement of Strategy titled 'Teagasc Together harnessing the power of research, advisory and education to create a sustainable food system' aims to inspire and nurture a strong Teagasc Together ethos and way of working. Sponsored by the new Director of Teagasc, a number of new initiatives are planned to ensure that Teagasc staff are working collaboratively across units/centres and directorates to the greatest extent possible to deliver the best service to our clients and stakeholders.

This drive towards even greater collaboration of staff across the organisation has been enabled by a more agile way of working. Through better use of digital collaborative tools and more flexibility around where staff work from, staff who were confined to an office, now find it easier to collaborate and hold virtual interactions with colleagues who they may not have worked with before.

Teagasc introduced a new agile working programme prior to the global pandemic. The agile working programme will continue to evolve to ensure that Teagasc can attract and retain the best staff and ensure that staff are engaged and are facilitated to manage a good work life balance.

Teagasc staff Full Time Equivalents, Jan 1, 2021

	Research	
	Research HQ	26.6
	Animal & Grassland	221.83
	Crops, Environment & Land Use	183.13
	Food	162.29
	Rural Economics & Development	60.70
	Total Research	654.55
	Knowledge Transfer	
	Knowledge Transfer (KT) HQ	15.54
	KT Advisory Regions*	392.16
	KT Education	136.73
	Total KT	544.43
	Operations	
	Operations	86.06
	Director's Office	12.70
	Total Operations	98.76
Overall Total		1,297.74

*There were 268.55 FTE front line advisors at the start of January.

Diversity and Inclusion

Teagasc launched its Diversity and Inclusion strategy in July 2020 and during 2021 worked on implementing a number of D&I initiatives. In late 2021 Teagasc partnered with inclusio to roll out an interactive digital D&I assessment and training platform. In order to champion the progress made and focus our efforts on addressing some of the D&I gaps that Teagasc has, 2022 was announced as the 'Teagasc Year of Diversity and Inclusion'. Staff will undergo D&I training in 2022 and managers will attend masterclasses on how to build psychological safety.



Teagasc has made good progress in implementing its Gender Equality Plan. Highlights in 2021 included progress made with the Teagasc mentoring programme, the lean-in-circles for female staff and the increase in numbers of female staff holding senior management positions from 12% in 2018 to 22% in 2021.

Equality and Human Rights

The Irish Human Rights and Equality Commission Act, 2014, places a positive duty on public sector bodies to have regard to the need to eliminate discrimination, promote equality and protect human rights, in their daily work.

This is referred to as "The Public Sector Duty". Section 42 of the Act sets out three core steps, as follows, to be undertaken by public bodies:

- I. In preparing strategic plans, public sector bodies must assess and identify the human rights and equality issues that are relevant to their functions – these issues must relate to all of its functions as an employer, policy maker and service provider;
- II. Public bodies must then identify the policies and practices that they have in place or that they plan to put in place to address these issues; and,
- III. In their annual reports, or equivalent documents, public bodies must report in a manner accessible to the public, on their developments and achievement in that regard.

Teagasc set up a working group in 2020 to: carry out a review of the Public Sector Duty; carry out an assessment of any issues and gaps and to develop an action plan. This report sets out the legislative context, Teagasc policies and processes that already exist in support of the Duty, and an action plan to address potential issues and align with the principles and spirit of the Irish Human Rights and Equality Commission Act, 2014.

Women in senior management positions in Teagasc



Data Protection

Teagasc engaged in a review of Data Protection in the organisation during 2021 to ensure that the organisation remains in compliance with the GDPR. Employee Data Privacy Notices were completed and circulated throughout the organisation. The existing Data Protection training was assessed in 2021 with a view to making new training available for all Teagasc users for completion in 2022.

Business Units in Teagasc were asked to review the Data Retention Schedule for their areas in conjunction with International Data Protection Day in January 2021.

The Data Protection Officer provided communications in several different platforms including presentations to the network of Data Champions in Teagasc, to Business Units and at Directorate level meetings during the year. There has also been consistent messaging provided to all Teagasc users in relation to obligations around Data Breach reporting and remote working. Data Subject requests were dealt with in line with the Teagasc policy and in accordance with the GDPR.

Teagasc comes under the Freedom of Information Act 2014 and all requests submitted to Teagasc have been dealt with as required by the legislation.

Energy Report

Teagasc operates out of 55 primary locations nationwide varying in scale from campus to small local advisory offices; the locations break down into:

- 10 Large Campuses averaging at just under 6,000m² of treated/conditioned floor area
- 45 Advisory Offices averaging at just under 340m² of treated/conditioned floor area

In 2021, Teagasc consumed 27,859,458 kWh of energy, which is an increase of almost 12.8% on its 2020 consumption. This is broken down as follows:

- 9,926,249 kWh of electricity (35.6% of total energy);
- 12,647,913 kWh of thermal fuel for space heating (45.4% of total energy);
- 5,285,296 kWh of vehicle fuel, consisting of agricultural, commercial transport and car fleet (19% of total energy);
- 1,093,661 kWh of renewable fuels (3.9% of total energy - this figure does not take account of the portion of purchased electricity which is generated from renewable resources or the renewable fuel element of purchased transport fuels).

A Draft Decarbonisation Strategy was presented to all staff on Tuesday 12th April 2022: this document sets out a clear path which will guide the organisation towards meeting its 2030 targets. These entail reaching a 50% energy efficiency improvement and a new carbon emission reduction target of 51%.

The activities within Teagasc's built environment are the principal energy consumer accounting for approximately 81% of total consumption. Teagasc is conducting condition surveys on all its buildings and is progressing a 5 year project plan for the upgrade and modernisation of advisory offices. Funds have been ring-fenced from the 2022 Capital budget to fund projects that contribute towards reductions in energy consumption and related carbon emissions. Two of the key projects currently being developed are: (1) the stage 1 roll out of LED lighting to Research Centres & Colleges (2) the further installation of photovoltaic arrays across Teagasc sites.

A number of other projects have been identified such as: insulation and building fabric upgrades; thermal heating upgrades (to include heat pumps or other carbon neutral technology where appropriate); building controls optimisation; and installation of Building Management Systems (BMS).

Collaboration

Teagasc/SRUC conference

The role of digital in securing a green rural economy was the focus of a joint virtual conference held by Scotland's Rural College (SRUC) and Teagasc in February.

Dairy collaboration

A Memorandum of Understanding (MoU) was signed on the 9th August 2021 between the University of Limerick and Teagasc. This will facilitate two leading dairy research centres – the Dairy Processing Technology Centre (DPTC) at UL and VistaMilk - to exploit synergies and collaborative opportunities for the benefit of future dairy research.

Sustainability partnership

Ireland's food and farming sector will have a significant competitive advantage in the global market place by creating one of the world's most sustainable food systems through a unique collaboration between animal nutrition company Devenish and Teagasc.

Irish Aid

Teagasc agreed a new MoU and work programme with Irish Aid in 2021.

Part-time agriculture qualifications

Ballyhaise Teagasc Agricultural College and Dundalk Institute of Technology (DkIT) announced the launch of a suite of part-time programmes in agriculture, which commenced in September 2021.

China co-operation agreement

APC Microbiome Ireland (APC), SFI Research Centre at University College Cork, Teagasc and the National Engineering Research Center for Functional Food (NERCFF) at the University of Jiangnan in China, announced a new academic cooperation agreement to foster deeper research collaborations and exchanges between both research centres.

Infrastructure Investment

NASRIC

A National Agricultural Sustainability Research and Innovation Centre (NASRIC) is to be established at Teagasc Johnstown Castle. Minister for Agriculture, Food and the Marine, Charlie McConalogue TD announced that DAFM are providing Teagasc with the required funding (€9m) to commence construction. This new Centre will expand and enhance the current Teagasc Research and Innovation activities at the Teagasc Environment Research Centre in Johnstown Castle, County Wexford.

Director of Teagasc, Professor Frank O Mara said; "The Centre will provide technical support to policy makers and the wider agri-food and land-use sectors to achieve sustainability targets. The Centre will accommodate up to 85 staff, consisting of research scientists, technical and support staff, to undertake the research necessary to underpin the sustainability of the sector."

Leveraging new technology for staff

Building on the introduction of a new internal communications platform for staff in 2020, in 2021 Teagasc rolled out a new digital staff learning management system and also improved functionality for staff and managers to manage leave and absences. Staff can now apply for leave and view their payslip from their smart phones through the PeopleXD app.

Online learning platform

In August 2021, Teagasc Education migrated its online learning platform, Moodle, to a new service provider called Enovation in advance of the start of the 2021 academic year. Moodle is a globally recognised open-source software platform designed to provide educators, administrators and learners with a secure and integrated system for creating learning environments.

Teagasc has been using versions of Moodle since 2008 for the delivery of Distance Education courses, which provide learners with a blend of online and real-world teaching, learning, and assessment opportunities. Teagasc use of the Moodle platform greatly increased during the Covid-19 pandemic, when it enabled course delivery and assessment for full time college students to continue online.

Work began in August 2020, when a working group was convened to consider an upgraded education platform. At the end of this process, an implementation subgroup was formed to work with the new service provider on setting up the new platform and migrating courses, staff, and students onto the new system.

Review of education programmes

A review of the Teagasc Part Time and Distance Education Green Cert Programmes began in October 2021. Terms of reference have been accepted by the Teagasc Academic Council. The purpose of the review is to examine current Teagasc part time and distance education agriculture programmes, with a view to restructuring their delivery to meet the evolving learner needs.

Johnstown Castle Estate

Minister for Agriculture, Food and the Marine, Charlie McConalogue TD, was joined by some descendants of former staff of the Johnstown Castle Estate from 100 years ago, in celebrating the official opening of the majestic Johnstown Castle Estate, Museum & Gardens in County Wexford.

Situated in 120 acres, the historic property opened pre-pandemic following the completion of a €7.5million investment by Department of Agriculture, Food & the Marine and Fáilte Ireland - which was overseen by the owners of the property Teagasc, the agriculture & food development authority, in partnership with The Irish Heritage Trust, an independent not-for-profit organisation.

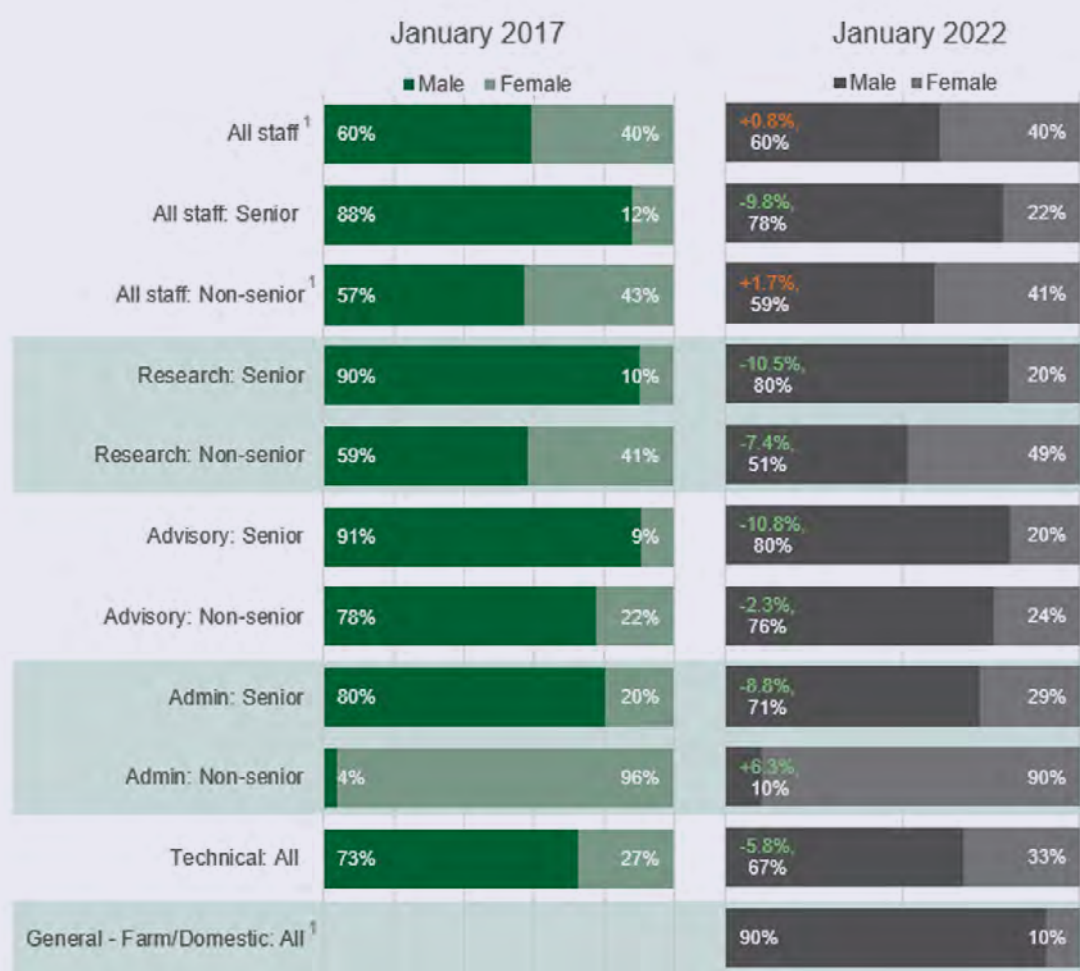
Digitalisation and ICT Resources

Information and Communications Technology

In 2021 all of Teagasc web facing applications were made compliant with new cookies data protection standards. Further investments were made in the area of ICT Security. The upgrading of data links between all sites was completed and further investment is being made in the internal communications infrastructure and the infrastructure that supports hybrid working.

Work started on a Teagasc mobile news app which will be launched in 2022. A project to deliver a receipt portal on the Teagasc website for clients to pay invoices was commenced.

Pay and Gender



¹ For 2021, the General - Farm/Domestic category has been included, affecting the All staff and All staff: Non-senior totals.

Teagasc Statement of Strategy 2021 – 2024

Environmental challenges are the biggest issues facing farmers and the agriculture industry over the next three years. The Teagasc Statement of Strategy 2021 – 2024, published in June 2021, reflects those challenges and outlines the actions planned by the organisation to assist farmers and the wider sector to adapt and respond to these challenges.

Teagasc Chairman Liam Herlihy said; “The environmental agenda is challenging in terms of reducing and adapting to gaseous emissions, improving water quality and enhancing farm biodiversity. Our science has led to the creation of greenhouse gas and ammonia Marginal Abatement Cost Curves. This science underpins public policy. But research doesn’t stand still. Our scientists are also looking to develop future technologies to address the climate challenge.”

Teagasc also plans to establish a National Agricultural Soil Carbon Observatory which will in future contribute to reducing national net emissions as well as laying the scientific foundations for potential “carbon farming”.

The Signpost Programme – Farmers for Climate Action, was recently launched and will be the main driver for the implementation of actions by Irish farmers to reduce emissions. It’s a Teagasc led initiative involving a partnership of almost 40 companies and organisations from the Irish agri-food sector, along with Irish farmers, that have come together for climate action.

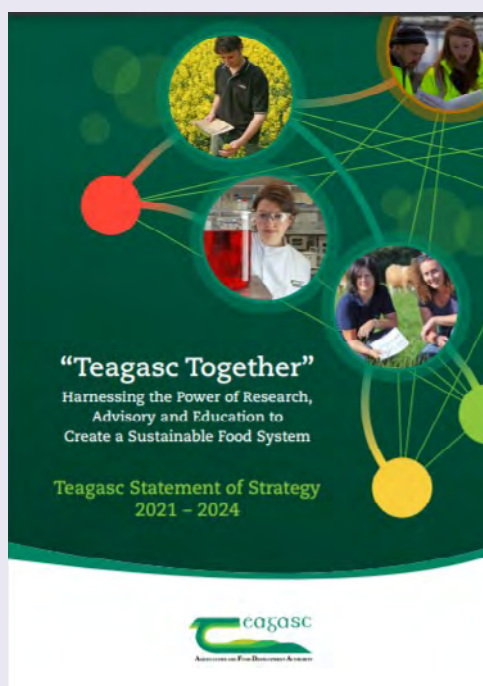
The ASSAP Programme and the Agricultural Catchments Programme are already well established and underpin the Teagasc strategy to address water quality. Working in conjunction with partner organisations, these will continue over the next three years.

In the tillage sector, Teagasc will focus on reducing protein imports with the substitution of Irish grown alternatives while also exploiting niche opportunities for the production of high value crops. Over the period of this strategy it’s intended to establish a Brewing and Distilling Centre at the crops research centre, Oak Park.

Teagasc plans to demonstrate a low intensity profitable blueprint for suckling. A dairy-beef demonstration farm to promote dairy beef is also to be established, which will form part of an advisory campaign to promote dairy beef production.

Former Director of Teagasc Professor Gerry Boyle said; “the overriding ambition of the organisation for the next three years is to make sustainability ‘front and centre’ of all of our activities. We espouse a holistic concept of sustainability that enshrines four dimensions: economic, social, environmental and innovation. Supporting farmers and food companies to innovate lies at the core of delivering on the ambitions for sustainability that are set out in Farm to Fork, the Programme for Government and AgClimatise.”

The low income and profitability challenges facing many farm enterprises is acknowledged with strategies outlined to assist producers to improve returns. Diversification options, that could suit some farmers will be explored and supported through the advisory service.



Communications and Engagement

The Teagasc Statement of Strategy 2021 – 2024 was launched in June.

Irish language

Irish Language Policy Corporate Services reviewed the Teagasc Irish Language Scheme and a working group was set up for staff to input into how the language can be further embedded and implemented in Teagasc. A dedicated space for Gaeilge has been set up on Workvivo for staff to share ideas and suggestions.

Retiree communication

Teagasc Times, the bi-annual Teagasc Times issued to retirees in June 2021. This is the third edition of the publication and has been very well received by retirees. The Pensions Office ask colleagues to encourage retirees to continue to come forward with articles.

History book

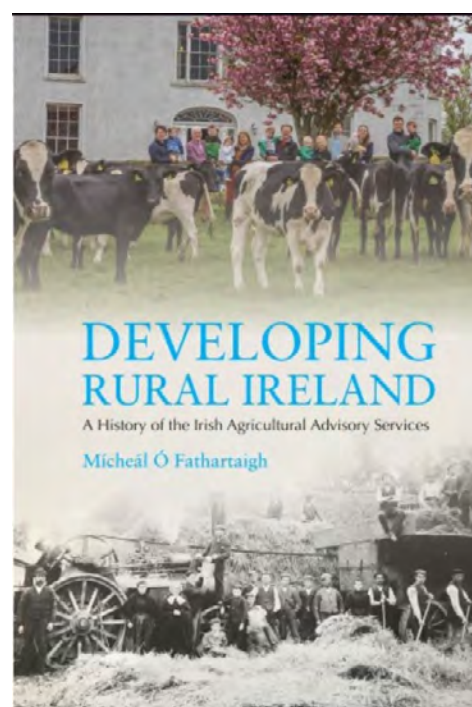
'Developing Rural Ireland - A History of the Irish Agricultural Advisory Services' documents the history of the Irish agricultural advisory services and their role in developing rural Ireland, was launched at a virtual event at Teagasc, Oak Park, Carlow, in September 2021.

Digital strategy

External consultants were engaged to help develop a Digital Transformation Strategy and will deliver a report in Q1 2022.

Science Week 2021

To celebrate Science Week 2021 (7 to 14 November), Teagasc ran 'The Festival of Farming and Food', hosting over 20,000 people at both in-person and online events. In-person events included nature walks highlighting the importance of forestry, and a visit from local school Clarin College to Teagasc Athenry. Teagasc researchers also visited Holy Family School for the Deaf in Cabra, Dublin. Online, broadcaster Jonathan McCrea emceed a series of live events, discussing everything from fruit and vegetables and sustainability, to the science of dairy. The festival was sponsored by Science Foundation Ireland.



Sustainable Future – Teagasc award at BTYSTE 2021 announced

Cian Walsh, a transition year student at St. Brogan's College, Kilbrogan, Bandon, County Cork, has been announced as the winner of the Teagasc award at the BT Young Scientist and Technology Exhibition 2021 (BTYSTE). Cian's project looked at the social, economic and environmental benefits and drawbacks of growing hemp and to determine if it can promote sustainable farming in Ireland. Cian's teacher is Ms Laura O'Regan.

2022 Covid-19 restrictions

At the beginning of 2021 restrictions on Teagasc activities due to Covid-19 were extensive. As the year wore on a return to something near normality occurred.

Overview of restrictions due to Covid-19

From January 1st

Working from home unless essential to attend Teagasc office, lab or farm.

From May 17th

- Advisory Offices open by appointment only
- Essential visitors can attend Teagasc locations with prior approval from Local Management

From June 2nd

- Essential internal meetings can be held in person if required, up to a maximum of 15 attendees
- Face to face interviews may take place for permanent roles

From June 7th

- Research staff return to the workplace where it is necessary for essential programme reasons
- Advisory Offices are open for walk-in clients to arrange consultation appointments
- Outdoor gatherings of up to 100 people are permitted. Regional Manager/HOD approval required for events with over 25 attendee (registration is required).

From July 5th

- Meetings, indoor discussion groups, conferences, training etc. should take place online if possible but can be held in person if required - capacity will depend on the venue and the ability to physically distance (maximum of 50 attendees).
- Outdoor gatherings of up to 200 people are permitted. Regional Manager/HOD approval is required for events with over 120 attendees (registration is required).

From September 20th

Return to the office on a phased (one day per week) and staggered attendance basis from for those colleagues who have been working from home fulltime up to now.

Given the high prevalence of Covid-19, meetings should be held online if possible, however meetings, training and educational programmes may take place when it is considered essential.

From November 19th

A deteriorating situation and high prevalence of Covid-19 in the community, the Government introduced additional protective. Colleagues who must attend the workplace to carry out their duties continue to do so. The Government outlined that “everyone should revert to working from home unless it is absolutely necessary to attend the workplace in person.

Meetings should be held online if possible, however meetings, training and educational programmes may take place when it is considered essential.

Covid-19 Rapid Antigen Detection (RADT) Pilot

Crops Research, Oak Park, Carlow piloted Teagasc's first Rapid Antigen Detection Testing on Thursday 11th February 2021. Voluntary testing began across sites once validated and approval was received from the HSE/DAFM. This was an additional risk mitigation measure to measures that were already in place and participation was voluntary.





Report of the Authority and Consolidated Financial Statements

Financial Year Ended 31 December 2021

Teagasc Consolidated Financial Statements

Financial Year Ended 31 December 2021

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Teagasc Consolidated Financial Statements

Financial Year Ended 31 December 2021

REPORT OF THE COMPTROLLER AND AUDITOR GENERAL FOR PRESENTATION TO THE HOUSES OF THE OIREACHTAS

Opinion on the financial statements

I have audited the financial statements of Teagasc for the year ended 31 December 2021 as required under the provisions of section 12 of the Agriculture (Research, Training and Advice) Act 1988. The financial statements comprise

- the consolidated statement of income and expenditure
- the consolidated statement of comprehensive income
- the statement of financial position of the group and of Teagasc
- the consolidated statement of changes in capital and reserves
- the statement of changes in capital and reserves of Teagasc
- the consolidated statement of cash flows, and
- the related notes, including a summary of significant accounting policies.

In my opinion, the financial statements give a true and fair view of the assets, liabilities and financial position of the group and of Teagasc at 31 December 2021 and of the group's income and expenditure for 2021 in accordance with Financial Reporting Standard (FRS) 102 — *The Financial Reporting Standard applicable in the UK and the Republic of Ireland*.

Basis of opinion

I conducted my audit of the financial statements in accordance with the International Standards on Auditing (ISAs) as promulgated by the International Organisation of Supreme Audit Institutions. My responsibilities under those standards are described in the appendix to this report. I am independent of Teagasc and have fulfilled my other ethical responsibilities in accordance with the standards.

I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my opinion.

Report on information other than the financial statements, and on other matters

Teagasc has presented certain other information together with the financial statements. This comprises the annual report, the governance statement and Authority members' report, and the statement on internal control. My responsibilities to report in relation to such information, and on certain other matters upon which I report by exception, are described in the appendix to this report.

I have nothing to report in that regard.

Seamus McCarthy
Comptroller and Auditor General
24 June 2022

Appendix to the report

Responsibilities of Authority members

As detailed in the governance statement and Authority members' report, the Authority members are responsible for

- the preparation of annual financial statements in the form prescribed under section 12 of the Agriculture (Research, Training and Advice) Act 1988
- ensuring that the financial statements give a true and fair view in accordance with FRS 102
- ensuring the regularity of transactions
- assessing whether the use of the going concern basis of accounting is appropriate, and
- such internal control as they determine is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

Responsibilities of the Comptroller and Auditor General

I am required under section 12 of the Agriculture (Research, Training and Advice) Act 1988 to audit the financial statements of Teagasc and to report thereon to the Houses of the Oireachtas.

My objective in carrying out the audit is to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement due to fraud or error. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with the ISAs will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

As part of an audit in accordance with the ISAs, I exercise professional judgment and maintain professional scepticism throughout the audit. In doing so,

- I identify and assess the risks of material misstatement of the financial statements whether due to fraud or error; design and perform audit procedures responsive to those risks; and obtain audit evidence that is sufficient and appropriate to provide a basis for my opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- I obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the internal controls.
- I evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures.

- I conclude on the appropriateness of the use of the going concern basis of accounting and, based on the audit evidence obtained, on whether a material uncertainty exists related to events or conditions that may cast significant doubt on Teagasc's ability to continue as a going concern. If I conclude that a material uncertainty exists, I am required to draw attention in my report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify my opinion. My conclusions are based on the audit evidence obtained up to the date of my report. However, future events or conditions may cause Teagasc to cease to continue as a going concern.
- I evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

I communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that I identify during my audit.

I report by exception if, in my opinion,

- I have not received all the information and explanations I required for my audit, or
- the accounting records were not sufficient to permit the financial statements to be readily and properly audited, or
- the financial statements are not in agreement with the accounting records.

Information other than the financial statements

My opinion on the financial statements does not cover the other information presented with those statements, and I do not express any form of assurance conclusion thereon.

In connection with my audit of the financial statements, I am required under the ISAs to read the other information presented and, in doing so, consider whether the other information is materially inconsistent with the financial statements or with knowledge obtained during the audit, or if it otherwise appears to be materially misstated. If, based on the work I have performed, I conclude that there is a material misstatement of this other information, I am required to report that fact.

Reporting on other matters

My audit is conducted by reference to the special considerations which attach to State bodies in relation to their management and operation. I report if I identify material matters relating to the manner in which public business has been conducted.

I seek to obtain evidence about the regularity of financial transactions in the course of audit. I report if I identify any material instance where public money has not been applied for the purposes intended or where transactions did not conform to the authorities governing them.

GOVERNANCE STATEMENT AND AUTHORITY MEMBERS' REPORT

Governance

The Authority of Teagasc was established under the Agriculture (Research, Training and Advice) Act, 1988. The functions of the Authority are set out in the First Schedule of this Act. The Authority is accountable to the Minister for Agriculture, Food and the Marine and is responsible for ensuring good governance and performs this task by setting strategic objectives and targets and taking strategic decisions on all key business issues. The regular day-to-day management, control and direction of Teagasc are the responsibility of the Director and the senior management team. The Director and the senior management team must follow the broad strategic direction set by the Authority, and must ensure that all Authority members have a clear understanding of the key activities and decisions related to the entity, and of any significant risks likely to arise. The Director acts as a direct liaison between the Authority and management of Teagasc.

Teagasc is a registered charity in the Republic of Ireland (charity number CHY 9086), granted charitable status under Section 207 of the Taxes Consolidation Act 1997 and with a Charities Regulatory Authority Number 20022754.

Authority responsibilities

The work and responsibilities of the Authority are set out in the Agriculture (Research, Training and Advice) Act, 1988, which also contains the matters specifically reserved for Authority decision. Standing items considered by the Authority include:

- declaration of interests,
- reports from committees,
- financial reports/ management accounts,
- performance reports, and
- reserved matters.

Section 12(1) of the Agriculture (Research, Training and Advice) Act, 1988, in conjunction with S.I. No.418 of 2011, requires the Authority of Teagasc to keep, in such form as may be approved by the Minister for Agriculture, Food and the Marine with consent of the Minister for Public Expenditure and Reform, all proper and usual accounts of money received and expended by it.

In preparing these financial statements the Authority of Teagasc is required to:

- select suitable accounting policies and apply them consistently,
- make judgements and estimates that are reasonable and prudent,
- prepare the financial statements on the going concern basis unless it is inappropriate to presume that it will continue in operation, and
- state whether applicable accounting standards have been followed, subject to any material departures disclosed and explained in the financial statements.

The Authority is responsible for keeping adequate accounting records which disclose, with reasonable accuracy at any time, its financial position and enables it to ensure that the financial statements comply with Section 12(1) of the Agriculture (Research, Training and Advice) Act, 1988. The maintenance and integrity of the corporate and financial information on the Teagasc website is the responsibility of the Authority.

Since March 2020 a novel strain of coronavirus (Covid-19), and the government measures taken to mitigate its impact, are having an effect on the activity of Teagasc. The Authority is closely monitoring the impact of the pandemic on the 2022 budgets, cashflows and the associated risks. Teagasc has implemented measures to ensure operations adhere to current health authority guidelines necessary to protect the health of staff, students and clients, while ensuring business continuity.

The risks associated with Covid-19 have been assessed and documented on a risk register which is continually under review by Senior Management.

The Authority is responsible for approving the annual business plan and budget. An evaluation of the performance of Teagasc by reference to the annual business plan and budget was carried out on 05 January 2022.

Teagasc Consolidated Financial Statements

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GOVERNANCE STATEMENT AND AUTHORITY MEMBERS' REPORT

The Authority is also responsible for safeguarding its assets and hence for taking reasonable steps for the prevention and detection of fraud and other irregularities.

The Authority considers that the financial statements of Teagasc give a true and fair view of the financial performance and the financial position of Teagasc at 31 December 2021.

Authority performance review

An external performance evaluation of the how the Authority of Teagasc operates was undertaken in 2020.

Authority structure

The Authority consists of a Chairperson and ten ordinary members, all of whom are appointed by the Minister for Agriculture, Food and the Marine. The members of the Authority are typically appointed for a period of five years (and may be re-appointed for a second term) and meet on a monthly basis, except in August. The table below details the appointment period for the Authority members in place during 2021:

Authority member	Role	Period of appointment
Herlihy, Mr. Liam	Chairperson	17 September 2018 – 16 September 2023
Buckley, Mr. John	Ordinary Member	28 September 2018 – 27 September 2023
Cooke, Mr. Tommy	Ordinary Member	05 October 2011 – 04 October 2021
Donnelly, Ms. Martina	Ordinary Member	10 October 2019 – 09 October 2024
Duffy, Mr. Patrick	Ordinary Member	28 September 2018 – 27 September 2023
Fitzgerald, Prof. Gerald	Ordinary Member	15 September 2013 – 14 September 2023
Hennessy, Prof. Thia	Ordinary Member	23 May 2018 – 22 May 2023
O'Connell, Ms. Eilís	Ordinary Member	30 October 2018 – 21 January 2023
Reynolds, Ms. Elizabeth	Ordinary Member	07 July 2020 – 06 July 2025
Rushe, Mr. Brian	Ordinary Member	27 January 2020 – 26 January 2025
Woulfe, Mr. Liam	Ordinary Member	29 April 2015 – 28 April 2020 and 03 July 2020 – 02 July 2025

The Authority has established five committees, as follows:

1. Audit and Risk Committee (ARC): comprises three Authority members and one external member. The role of the ARC is to support the Authority in relation to its responsibilities for issues of risk, control and governance and associated assurance. The ARC is independent from the financial management of the organisation. In particular the committee ensures that the internal control systems including audit activities are monitored actively and independently. The ARC reports to the Authority after each meeting, and formally in writing annually.

The Authority members of the Audit and Risk Committee during 2021 were: Mr. Liam Woulfe, Chairperson, Prof. Thia Hennessy, Ms. Eilís O'Connell and Ms. Elizabeth Reynolds. The external member was Mr. Noel O'Connell. Prof. Thia Hennessy assumed the position of chair of the committee upon Mr. Woulfe's appointment cessation on 02 June 2021. There were four meetings of the ARC in 2021.

2. Operations Committee (OC): comprises four Authority members. The role of the OC is to support the Authority in reviewing and considering matters relating to the Operations Programme in Teagasc and to report and make recommendations to the Authority, as well as adopting good practice. The Authority members of this committee during 2021 were: Mr. Tommy Cooke, Chairperson, Mr. Liam Herlihy, Ms. Elizabeth Reynolds, Ms. Martina Donnelly and Mr. Patrick Duffy. Mr. Patrick Duffy assumed the position of chair of the committee upon Mr. Cooke's office expiry on 04 October 2021. There were four meetings of the OC in 2021.

3. Advisory & Education Committee (AEC): comprises five Authority members. The role of the AEC is to support the Authority in reviewing and considering matters relating to the Advisory and Education Programmes in Teagasc and to report and make recommendations to the Authority, as well as adopting good practice. The Authority members of this committee during 2021 were: Mr. John Buckley, Chairperson, Mr. Brian Rushe, Mr. Patrick Duffy, Ms. Martina Donnelly and Mr. Tommy Cooke. There were three meetings of the AEC in 2021.

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GOVERNANCE STATEMENT AND AUTHORITY MEMBERS' REPORT

4. Research Committee (RC): comprises five Authority members. The role of the RC is to support the Authority in reviewing and considering matters relating to the Research Programmes in Teagasc and to report and make recommendations to the Authority, as well as adopting good practice. The members of this committee during 2021 were: Prof. Gerald Fitzgerald, Chairperson, Ms. Martina Donnelly, Mr. John Buckley, Prof. Thia Hennessy and Mr. Brian Rushe. There were two meetings of the RC in 2021.

5. Nominations Committee (NC): comprises six Authority members. The role of the NC is to consider vacancies on the Teagasc Authority and make recommendations on how best to fill the vacancies. The members of this committee during 2021 were: Mr. Liam Herlihy, Chairperson, Prof. Gerald Fitzgerald, Mr. Tommy Cooke, Ms. Elizabeth Reynolds, Prof. Thia Hennessy and Mr. Patrick Duffy. There were three meetings of the NC in 2021.

Schedule of attendance, fees and expenses

Schedule of attendances at the Authority and Committee meetings for 2021 is set out below including the fees and expenses received by each member:

Authority Meetings 2021	06 Jan	03 Feb	03 Mar	07 Apr	05 May	02 Jun	07 Jul	01 Sep	06 Oct	03 Nov	01 Dec	Fees 2021 €	Expenses 2021 €
Herlihy, Mr. Liam	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	20,520	8,774
Buckley, Mr. John	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	11,970	2,205
Cooke, Mr. Tommy	✓	✓	✓	✓	✓	✓	✓	✓				8,978	181
Donnelly, Ms. Martina	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	2,844
Duffy, Mr. Patrick	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	11,970	538
Fitzgerald, Prof. Gerald	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	11,970	581
Hennessy, Prof. Thia	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	529
O'Connell, Ms. Ellis	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	199
Reynolds, Ms. Elizabeth	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	11,970	145
Rushe, Mr. Brian	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	11,970	64
Woulfe, Mr. Liam	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	11,970	360
												101,318	16,275

Teagasc incurred hospitality and accommodation expenses of €7,704 on behalf of Authority members in 2021. Three Authority members did not receive a fee under the One Person One Salary (OPOS) principle. Mr. Noel O'Connell, external member of the ARC, received fees of €5,200 in 2021.

Gender Balance in the Authority membership

As at 31 December 2021, the Authority had 4 (36%) female and 6 (64%) male members, with one position vacant. The Authority therefore does not meet the Government target of a minimum of 40% representation of each gender in the membership of State Boards as set out in the Annex to the Code of Practice for the Governance of State Bodies issued in September 2020. A number of Authority members will retire by rotation in 2023 and the Authority has been advised to have consideration for the Code of Practice for the Governance of State Bodies on gender balance and diversity requirements when nominating replacement members to the Authority.

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GOVERNANCE STATEMENT AND AUTHORITY MEMBERS' REPORT

Audit & Risk Committee	19 Feb	29 Jul	06 Oct	01 Dec
Woulfe, Mr. Liam	√			
Hennessy, Prof. Thia	√	√	√	√
O'Connell, Ms. Eilis	√	√	√	√
O'Connell, Mr. Noel	√	√	√	√
Reynolds, Ms. Elizabeth		√	√	√

Operations Committee	22 Feb	10 May	26 Aug	17 Dec
Cooke, Mr. Tommy	√	√	√	
Herlihy, Mr. Liam	√	√	√	√
Donnelly, Ms. Martina	√	√	√	√
Duffy, Mr. Patrick				√
Reynolds, Ms. Elizabeth	√	√	√	√

Research Committee	02 Jun	17 Dec
Fitzgerald, Prof. Gerald	√	√
Buckley, Mr. John	√	√
Donnelly, Ms. Martina	√	√
Hennessy, Prof. Thia	√	√
Rushe, Mr. Brian	√	√

Advisory & Education Committee	29 Apr	05 May	03 Nov
Buckley, Mr. John	√	√	√
Cooke, Mr. Tommy	√	√	
Donnelly, Ms. Martina	√	√	√
Duffy, Mr. Patrick	√	√	√
Rushe, Mr. Brian	√	√	√

Nominations Committee	01 Mar	02 Jun	24 Sep
Herlihy, Mr. Liam	√	√	√
Cooke, Mr. Tommy	√	√	√
Duffy, Mr. Patrick	√	√	√
Fitzgerald, Prof. Gerald	√	√	√
Hennessy, Prof. Thia	√	√	-
Reynolds, Ms. Elizabeth	√	√	√

Key personnel changes

There was one retirement from the Authority during 2021.

Teagasc Consolidated Financial Statements

Financial Year Ended 31 December 2021

GOVERNANCE STATEMENT AND AUTHORITY MEMBERS' REPORT

Disclosures required by the Code of Practice for the Governance of State Bodies (2016)

The Authority is responsible for ensuring that Teagasc has complied with the requirements of the Code of Practice for the Governance of State Bodies ("the Code"), as published by the Department of Public Expenditure and Reform in August 2016. The following disclosures are required by the Code:

Consultancy costs

Consultancy costs include the cost of external advice to management and exclude outsourced 'business-as-usual' functions.

	2021 €'000	2020 €'000
Legal advice	250	186
Financial/ tax advice	86	25
Pensions/ human resources	147	87
Architectural/ engineering advice	701	391
Research advice	260	351
Other	309	258
Total consultancy costs	1,753	1,298
Consultancy costs capitalised	569	345
Consultancy costs charged to Income and Expenditure and Retained Revenue Reserves	1,184	953
Total	1,753	1,298

Legal costs and settlements

The table below provides a breakdown of amounts recognised as expenditure in the reporting period in relation to legal costs, settlements and conciliation and arbitration proceedings relating to contracts with third parties. This does not include expenditure incurred in relation to general legal advice received by Teagasc which is disclosed in Consultancy costs above.

	2021 €'000	2020 €'000
Legal fees – legal proceedings	14	12
Counterparty legal costs	-	-
Settlements	93	139
Total	107	151

The total number of cases included in the 2021 settlements is 16 (2020: 23).

Travel and subsistence expenditure

Travel and subsistence expenditure is categorised as follows:

	2021 €'000	2020 €'000
Domestic		
Authority	16	12
Employees	1,975	1,895
International		
Authority	-	-
Employees	78	106
	2,069	2,013

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GOVERNANCE STATEMENT AND AUTHORITY MEMBERS' REPORT

Hospitality expenditure

The Statement of Income and Expenditure includes the following hospitality expenditure:

	2021	2020
	€'000	€'000
Staff hospitality	50	31
Client hospitality	64	16
Total	114	47

Closure of Teagasc canteens as a consequence of Covid-19 triggered a cost reduction of €404k in 2021 (€383k in 2020) compared to 2019 whilst necessitating a modest increase in hospitality expenditure.

In accordance with their employment/ placement agreements some staff and students are entitled to meals in college canteens. The cost of provision of these meals in 2021 was €20,485 (2020: €18,414).

Teagasc has a 10 year premium seat sponsorship agreement with Croke Park at an annual cost of €4,800 for staff incentive and stakeholder entertainment which covers the period October 2012 to September 2022. The costs attributable to staff incentives in 2021 were €4,800.

Statement of compliance

The Authority has adopted the Code of Practice for the Governance of State Bodies (2016) and has put procedures in place to ensure compliance with the Code. Teagasc was in compliance with the Code of Practice for the Governance of State Bodies for 2021.

Teagasc is a signatory of the Charities Governance Code, which is overseen by the Irish Charities Regulator. The Authority reviewed and approved Teagasc's annual report form in November 2021. 2021 is the first financial year on which Teagasc and other charities will formally report on their compliance with the Code to the Irish Charities Regulator.

Mr. Liam Herlihy
Chairman
01 June 2022

Mr. Tommy Cooke
Member of the Authority
01 June 2022

STATEMENT ON INTERNAL CONTROL

Scope of responsibility

On behalf of Teagasc I acknowledge the Authority's responsibility for ensuring that an effective system of internal control is maintained and operated. This responsibility takes account of the requirements of the Code of Practice for the Governance of State Bodies (2016) and the Charities Governance Code.

Purpose of the system of internal control

The system of internal control is designed to manage risk to a tolerable level rather than to eliminate it. The system can therefore only provide reasonable and not absolute assurance that assets are safeguarded, transactions authorised and properly recorded and that material errors or irregularities are either prevented or detected in a timely way.

The system of internal control, which accords with guidance issued by the Department of Public Expenditure and Reform, has been in place in Teagasc for the year ended 31 December 2021 and up to the date of approval of the financial statements.

Capacity to handle risk

Teagasc has an Audit and Risk Committee (ARC) comprising three Authority members, one of whom is the Chair, and one external member with financial and audit expertise. The ARC met four times in 2021.

Teagasc has also established an internal audit function which is adequately resourced and conducts a programme of work agreed with the ARC. The function is supported by external firms providing internal audit services.

The ARC has reviewed the risk management policy which sets out Teagasc's risk appetite, the risk management processes in place and details the roles and responsibilities of staff in relation to risk. The policy has been issued to all staff who are expected to work within Teagasc's risk management policies, to alert management on emerging risks and control weaknesses and assume responsibility for risks and controls within their own area of work.

Risk and control framework

Teagasc has implemented a risk management system which identifies and reports key risks and the management actions being taken to address and, to the extent possible, to mitigate those risks.

A risk register is in place which identifies the key risks facing Teagasc and these have been identified, evaluated and graded according to their significance. The register is reviewed by the Authority on a monthly basis and by the ARC on a quarterly basis. The outcome of these assessments is used to plan and allocate resources to ensure risks are managed to an acceptable level.

The risk register details the controls and actions needed to mitigate risks and responsibility for operation of controls assigned to specific staff. I confirm that a control environment containing the following elements is in place:

- procedures for all key business processes have been documented,
- financial responsibilities have been assigned at management level with corresponding accountability,
- there is an appropriate budgeting system with an annual budget which is kept under review by senior management,
- there are systems aimed at ensuring the security of the information and communication technology systems,
- there are systems in place to safeguard the assets, and
- control procedures over grant funding to outside agencies ensure adequate control over approval of grants and monitoring and review of grantees to ensure grant funding has been applied for the purpose intended.

Teagasc Consolidated Financial Statements

Financial Year Ended 31 December 2021

STATEMENT ON INTERNAL CONTROL

Ongoing monitoring and review

Formal procedures have been established for monitoring control processes and control deficiencies are communicated to those responsible for taking corrective action and to management and the Authority, where relevant, in a timely way. I confirm that the following ongoing monitoring systems are in place:

- key risks and related controls have been identified and processes have been put in place to monitor the operation of those key controls and report any identified deficiencies,
- reporting arrangements have been established at all levels where responsibility for financial management has been assigned, and
- there are regular reviews by senior management of periodic and annual performance and financial reports which indicate performance against budgets/ forecasts.

Procurement

I confirm that Teagasc has procedures in place to ensure compliance with procurement rules and guidelines. Total procurement related expenditure was €59.4m. Teagasc reviews the compliance status of all purchase orders with a value greater than €25,000. In 2021 Teagasc found that of 278 purchase orders, those relating to six suppliers were non-compliant and the value of the non-compliant purchase orders was €484,821 (2020: €166,180). Notwithstanding that these procurements were non-compliant Teagasc is satisfied that good value for money was achieved.

Advance payment of grants

I confirm that Teagasc has procedures in place to ensure compliance with pre-funded grants. Teagasc provides advance grant funding to three private colleges and a number of universities. Teagasc engaged with the Department of Agriculture, Food and the Marine to seek derogated sanction from the Department of Public Expenditure and Reform to continue the practice of pre-funding grants. This was received for 2021.

Impact of COVID-19 pandemic to the control environment

The onset of the Covid-19 pandemic in early 2020, and the resulting public health advice and safety measures, changed the working practices of Teagasc. Teagasc has monitored the developments closely, seeking to mitigate the risks that may affect its business operations, staff and stakeholders. Actions taken by Teagasc have included:

- Initiating a business continuity plan which was an aggregate of plans prepared by each business unit in Teagasc.
- Transitioning the Authority of Teagasc to a remote environment for the purpose of making business decisions.
- Making necessary adaptations to Teagasc's physical office environment in line with published guidance and expert assessment.
- Ongoing COVID-19 risk assessments for staff and stakeholders.
- Continual assessment of significant risks pertaining to the COVID-19 pandemic and the agility of Teagasc to respond effectively.
- Ensuring robust segregation of duties persists and adequate cover is in place should specific approving authorities be unavailable.
- Ensuring all existing data protection and records management policies and procedures continue to apply as normal.
- Assessing potential for weaknesses in internal controls resulting from COVID-19 and taking measures to monitor and update internal controls where necessary.

Review of effectiveness

I confirm that Teagasc has procedures to monitor the effectiveness of its risk management and control procedures. Teagasc's monitoring and review of the effectiveness of the system of internal control is informed by the work of the internal and external auditors, the Audit and Risk Committee which oversees their work and the senior management within Teagasc responsible for the development and maintenance of the internal control framework.

I confirm that the Authority conducted an annual review of the effectiveness of the internal controls for 2021 on 02 March 2022.

STATEMENT ON INTERNAL CONTROL

Internal control issues

No weaknesses in internal control, apart from those noted under Procurement, were identified in relation to 2021 that require disclosure in the financial statements.

Teagasc Consolidated Financial Statements

Financial Year Ended 31 December 2021

CONSOLIDATED STATEMENT OF INCOME AND EXPENDITURE YEAR ENDED 31 DECEMBER 2021

	Note	2021 €'000	2020 €'000
Income			
Oireachtas grants	4	141,398	141,350
EU funding	5	4,365	3,644
Livestock trading income		4,579	3,661
Operational income	6	37,650	33,887
Gain/ (loss) on disposal of fixed assets	12	793	(22)
Other grants, donations and voluntary levies		3,525	3,285
Sale of goods		47	84
Research and technology services		1,916	1,082
Total Income		<u>194,273</u>	<u>186,971</u>
Expenditure	7	<u>(184,669)</u>	<u>(176,779)</u>
Operating surplus		9,604	10,192
Interest receivable		<u>1</u>	<u>2</u>
Surplus before transfers and taxation		9,605	10,194
Transfer to Capital Account	23	<u>(7,618)</u>	<u>(7,567)</u>
Surplus for the financial year before taxation		1,987	2,627
Taxation	11	<u>25</u>	<u>65</u>
Surplus for the financial year		<u>2,012</u>	<u>2,692</u>
Surplus attributable to			
Teagasc		2,101	2,898
Non-controlling interest		<u>(89)</u>	<u>(206)</u>
		<u>2,012</u>	<u>2,692</u>

The Statement of Cash Flow and Notes 1-35 form part of these financial statements.

Mr. Liam Herlihy
Chairman
01 June 2022

Professor Frank O'Mara
Director
01 June 2022

Teagasc Consolidated Financial Statements

Financial Year Ended 31 December 2021

CONSOLIDATED STATEMENT OF COMPREHENSIVE INCOME YEAR ENDED 31 DECEMBER 2021

	Note	2021 €'000	2020 €'000
Surplus for the financial year		2,012	2,692
Actuarial loss on retirement benefit liabilities	10	(54,458)	(75,420)
Adjustment to deferred retirement benefit funding	10	54,458	75,420
Total comprehensive income for the year		<u>2,012</u>	<u>2,692</u>
Teagasc		2,101	2,898
Non-controlling interest		<u>(89)</u>	<u>(206)</u>
		<u>2,012</u>	<u>2,692</u>

The Statement of Cash Flow and Notes 1-35 form part of these financial statements.

Mr. Liam Herlihy
Chairman
01 June 2022

Professor Frank O'Mara
Director
01 June 2022

Teagasc Consolidated Financial Statements

Financial Year Ended 31 December 2021

STATEMENT OF FINANCIAL POSITION AS AT 31 DECEMBER 2021

	Note	Group		Teagasc	
		2021 €'000	2020 €'000	2021 €'000	2020 €'000
Non-current assets					
Property, plant and equipment	12	136,055	128,453	123,953	116,335
Investments	14	676	598	677	599
		<u>136,731</u>	<u>129,051</u>	<u>124,630</u>	<u>116,934</u>
Current assets					
Inventories	15	6,776	5,649	6,776	5,649
Receivables: amounts falling due within one year	17	25,873	24,624	25,297	24,194
Cash and cash equivalents	18	51,162	43,342	48,611	40,442
		<u>83,811</u>	<u>73,615</u>	<u>80,684</u>	<u>70,285</u>
Payables: amounts falling due within one year					
Payables and accruals	19	22,741	22,244	21,750	21,171
Deferred income	21	23,560	20,403	23,372	20,357
		<u>46,301</u>	<u>42,647</u>	<u>45,122</u>	<u>41,528</u>
Net current assets		<u>37,510</u>	<u>30,969</u>	<u>35,562</u>	<u>28,757</u>
Total assets less current liabilities		174,241	160,020	160,192	145,691
Provisions for liabilities					
Deferred tax	22	37	63	-	-
Payables: amounts falling due after one year					
Deferred income	21	16,948	12,330	16,888	12,224
Payables and accruals	20	406	406	-	-
		<u>156,850</u>	<u>147,220</u>	<u>143,304</u>	<u>133,467</u>
Deferred retirement benefit funding	10	1,414,380	1,366,697	1,414,380	1,366,697
Retirement benefit liabilities	10	(1,414,380)	(1,366,697)	(1,414,380)	(1,366,697)
Net assets		<u>156,850</u>	<u>147,220</u>	<u>143,304</u>	<u>133,467</u>
Capital and reserves					
Capital account	23	123,953	116,335	123,953	116,335
Revenue reserves	24	20,152	18,140	19,351	17,132
Capital contribution		12,745	12,745	-	-
		<u>156,850</u>	<u>147,220</u>	<u>143,304</u>	<u>133,467</u>
Reserves attributable to Teagasc		150,158	140,439	143,304	133,467
Non-controlling interest		6,692	6,781	-	-
		<u>156,850</u>	<u>147,220</u>	<u>143,304</u>	<u>133,467</u>

The Statement of Cash Flow and Notes 1-35 form part of these financial statements.

Mr. Liam Herlihy
Chairman
01 June 2022

Professor Frank O'Mara
Director
01 June 2022

Teagasc Consolidated Financial Statements

Financial Year Ended 31 December 2021

CONSOLIDATED STATEMENT OF CHANGES IN CAPITAL AND RESERVES AS AT 31 DECEMBER 2021

GROUP

		Capital account	Capital contribution	Revenue reserves	Capital contribution	Total
				Non- controlling interest	Non- controlling interest	
	Note	€'000	€'000	Group €'000	€'000	€'000
At 1 January 2020		108,768	6,400	14,806	642	136,961
Surplus/ (deficit) for the year		-	-	2,898	(206)	2,692
Actuarial loss on retirement benefit liabilities	10	-	-	(75,420)	-	(75,420)
Adjustment to deferred retirement benefit funding	10	-	-	75,420	-	75,420
Total comprehensive income		-	-	2,898	(206)	2,692
Addition to capital contribution		-	-	-	-	-
Amounts capitalised in respect of purchased assets	12	15,251	-	-	-	15,251
Net amount released on disposals	12	(30)	-	-	-	(30)
Less: amortised in line with asset depreciation	12	(7,594)	-	-	-	(7,594)
Impairment loss	12	(60)	-	-	-	(60)
At 31 December 2020		116,335	6,400	17,704	436	147,220
			140,439		6,781	147,220
Surplus/ (deficit) for the year		-	-	2,101	(89)	2,012
Actuarial loss on retirement benefit liabilities	10	-	-	(54,458)	-	(54,458)
Adjustment to deferred retirement benefit funding	10	-	-	54,458	-	54,458
Total comprehensive income		-	-	2,101	(89)	2,012
Amounts capitalised in respect of purchased assets	12	16,058	-	-	-	16,058
Net amount released on disposals	12	(253)	-	-	-	(253)
Less: amortised in line with asset depreciation	12	(8,187)	-	-	-	(8,187)
At 31 December 2021		123,953	6,400	19,805	347	156,850
			150,158		6,692	156,850

The Statement of Cash Flow and Notes 1-35 form part of these financial statements.

Teagasc Consolidated Financial Statements

Financial Year Ended 31 December 2021

STATEMENT OF CHANGES IN CAPITAL AND RESERVES AS AT 31 DECEMBER 2021

TEAGASC

		Capital account	Revenue reserves	Total
	Note	€'000	€'000	€'000
At 1 January 2020		108,768	13,963	122,731
Surplus for the year		-	3,169	3,169
Actuarial loss on retirement benefit liabilities	10	-	(75,420)	(75,420)
Adjustment to deferred retirement benefit funding	10	-	75,420	75,420
Total comprehensive income		-	3,169	3,169
Amounts capitalised in respect of purchased assets	12	15,251	-	15,251
Net amount released on disposals	12	(30)	-	(30)
Less: amortised in line with asset depreciation	12	(7,594)	-	(7,594)
Impairment loss	12	(60)	-	(60)
At 31 December 2020		116,335	17,132	133,467
Surplus for the year		-	2,219	2,219
Actuarial loss on retirement benefit liabilities	10	-	(54,458)	(54,458)
Adjustment to deferred retirement benefit funding	10	-	54,458	54,458
Total comprehensive income		-	2,219	2,219
Amounts capitalised in respect of purchased assets	12	16,058	-	16,058
Net amount released on disposals	12	(253)	-	(253)
Less: amortised in line with asset depreciation	12	(8,187)	-	(8,187)
At 31 December 2021		123,953	19,351	143,304

The Statement of Cash Flow and Notes 1-35 form part of these financial statements.

Teagasc Consolidated Financial Statements

Financial Year Ended 31 December 2021

CONSOLIDATED STATEMENT OF CASH FLOW AS AT 31 DECEMBER 2021

GROUP

		2021	2020
	Note	€'000	€'000
Cash flow from operating activities	27	23,707	23,807
Interest paid		(183)	(88)
Taxation		-	8
Net cash flow from operating activities		<u>23,524</u>	<u>23,727</u>
Cash flow from investing activities			
Payments to acquire tangible fixed assets	12	(16,771)	(15,667)
Receipts from sales of tangible fixed assets	12	1,067	50
Payments to acquire investments	14	(1)	-
Interest received		1	2
Net cash used in investing activities		<u>(15,704)</u>	<u>(15,615)</u>
Net increase in cash and cash equivalents		7,820	8,112
Cash and cash equivalents at 1 January		<u>43,342</u>	<u>35,230</u>
Cash and cash equivalents at 31 December		<u>51,162</u>	<u>43,342</u>
Cash and cash equivalents consists of:			
Cash at bank and in hand	18	30,728	27,842
Short term deposits	18	<u>20,434</u>	<u>15,500</u>
Cash and cash equivalents at 31 December		<u>51,162</u>	<u>43,342</u>

The Statement of Cash Flow and Notes 1-35 form part of these financial statements.

NOTES TO THE FINANCIAL STATEMENTS

1. General information

Teagasc (the Agriculture and Food Development Authority of Ireland) was established under the Agriculture (Research, Training and Advice) Act, 1988. The mission of Teagasc is to support science-based innovation in the agri-food sector and the broader bioeconomy that will underpin profitability, competitiveness and sustainability. Teagasc's principal and registered office is at Oak Park, Carlow.

Teagasc owns a 57% share in Moorepark Technology Limited whose principal activity is the provision of services for Research and Development.

2. Summary of significant accounting policies

The basis of accounting, and significant accounting policies adopted by Teagasc, are set out below. They have all been applied consistently throughout the year and for the preceding year.

2.1 Statement of compliance

The financial statements of Teagasc for the year ended 31 December 2021 have been prepared in accordance with FRS 102, the financial reporting standard applicable in the UK and Ireland issued by the Financial Reporting Council (FRC).

2.2 Basis of consolidation

For the purposes of these financial statements, the 'Teagasc Group' comprises the parent entity Teagasc and its subsidiary Moorepark Technology Limited. The accounting policies and accounting period of the subsidiary are consistent with those of the Group. Inter-company transactions and balances and gains on transactions between group companies are eliminated. The investment in the subsidiary is accounted for at cost less impairment. Details of the subsidiary are provided in Note 14.

2.3 Basis of preparation

The financial statements have been prepared under the historical cost convention, except for certain assets and liabilities that are measured at fair values as explained in the accounting policies below. The financial statements are in the form approved by the Minister for Agriculture, Food and the Marine with the concurrence of the Minister for Public Expenditure and Reform under Section 12 of the Agriculture (Research, Training and Advice) Act, 1988 in conjunction with S.I. No.418 of 2011. The following accounting policies have been applied consistently in dealing with items which are considered material in relation to Teagasc's financial statements.

2.4 Revenue recognition

Oireachtas grants

Teagasc receives government grants in respect of research and other projects (revenue grants) and capital grants to fund capital investment. Revenue grants that do not include performance criteria are recognised as income on a cash receipts basis. Grants received which impose specific performance criteria are credited to deferred income and recorded as a creditor until the relevant performance criteria have been met and the grants are recognised as income. Capital grants are released to income over the expected useful life of the relevant asset purchased.

Sale of goods

Revenue from the sale of goods is recognised when the significant risks and rewards of ownership of the goods have passed to the buyer, usually on dispatch of the goods, the amount of revenue can be measured reliably, it is probable that the economic benefits associated with the transaction will flow to the entity and the costs incurred or to be incurred in respect of the transaction can be measured reliably.

NOTES TO THE FINANCIAL STATEMENTS

Advisory fees

Teagasc receives income for annual advisory service contracts, annual discussion group contracts and additional advisory services provided. Income from annual advisory service contracts is recognised in the accounting period when the relevant invoice has issued. Income in relation to discussion group contracts and additional advisory services is recognised in the accounting period in which the service is rendered and the outcome of the contract can be estimated reliably.

Accrued income

Income earned on goods/ services delivered, but unbilled, is recognised in accordance with contractual terms as accrued income on the Statement of Financial Position. Income earned on research projects, but unclaimed, is recognised as accrued income on the Statement of Financial Position, taking into account the individual rules of all funding bodies.

Royalty income

Royalty income is recognised on an accruals basis in accordance with the substance of the relevant agreements.

Tuition fees

Revenue is recognised over the period of instruction.

Comparative figures

Comparative figures have been regrouped and reanalysed, where necessary, on the same basis as those for the current period.

2.5 Employee benefits

The Group provides a range of benefits to employees, including paid holiday arrangements and defined benefit pension plans.

Short term benefits

Short term benefits, including holiday pay and other similar non-monetary benefits, are recognised as an expense in the period in which the service is receivable.

Defined benefit pension plans

The Group operates defined benefit pension schemes which are funded annually on a pay as you go basis from monies available to it, including monies provided by the Department of Agriculture, Food and the Marine, and from contributions deducted from staff salaries. Pension Scheme liabilities are measured on an actuarial basis using the projected unit method. Actuarial valuations are obtained annually and are updated at each Statement of Financial Position date.

Teagasc also operates the Single Public Services Pension Scheme (Single Scheme), which is the defined benefit scheme for pensionable public servants appointed on or after 01 January 2013. Single Scheme members' contributions are paid over to the Department of Public Expenditure and Reform.

Retirement benefit costs reflect retirement benefits earned by employees in the period and are shown net of staff pension contributions which are retained by the Group. The Single Public Services Pension Scheme contributions are remitted to the Department of Public Expenditure and Reform. An amount corresponding to the retirement benefit charge is recognised as income to the extent that it is recoverable, and offset by grants received in the year to discharge retirement benefit payments. Actuarial gains or losses arising from changes in actuarial assumptions and from experience surpluses and deficits are recognised in the Consolidated Statement of Comprehensive Income for the year and a corresponding adjustment is recognised in the amount recoverable from the Department of Agriculture, Food and the Marine.

Retirement benefit liabilities represent the present value of future retirement benefit payments earned by staff to date. Deferred retirement benefit funding represents the corresponding asset to be recovered in future periods from the Department of Agriculture, Food and the Marine.

NOTES TO THE FINANCIAL STATEMENTS

2.6 Leases

At inception Teagasc assesses agreements that transfer the right to use assets. The assessment considers whether the arrangement is, or contains, a lease based on the substance of the arrangement.

Operating leases

Leases that do not transfer all the risks and rewards of ownership are classified as operating leases. Payments under operating leases are charged to the income statement on a straight-line basis over the period of the lease.

2.7 Taxation

The taxation expense for the period comprises current and deferred tax recognised in the reporting period. Tax is recognised in the income statement. Current or deferred taxation assets and liabilities are not discounted.

Current tax

Current tax is the amount of income tax payable in respect of the taxable profit for the year or prior years. Tax is calculated on the basis of tax rates and laws that have been enacted or substantively enacted by the period end.

Management periodically evaluates positions taken in tax returns with respect to situations in which applicable tax regulation is subject to interpretation. It establishes provisions where appropriate on the basis of amounts expected to be paid to the tax authorities.

Deferred tax

Deferred tax arises from timing differences that are differences between taxable profits and total comprehensive income as stated in the financial statements. These timing differences arise from the inclusion of income and expenses in tax assessments in periods different from those in which they are recognised in financial statements.

Deferred tax is recognised on all timing differences at the reporting date except for certain exceptions. Unrelieved tax losses and other deferred tax assets are only recognised when it is probable that they will be recovered against the reversal of deferred tax liabilities or other future taxable profits.

Deferred tax is measured using tax rates and laws that have been enacted or substantively enacted by the period end and that are expected to apply to the reversal of the timing difference.

2.8 Research and development

Expenditure on research activities is recognised as an expense in the period in which it is incurred.

2.9 Tangible assets

Property, plant and equipment

Property, plant and equipment are stated at cost less accumulated depreciation and accumulated impairment losses. Such costs include costs directly attributable to making the asset capable of operating as intended.

Land is not depreciated. Assets under construction are not depreciated. Depreciation is provided on all property, plant and equipment at rates calculated to write off the cost, less estimated residual value, of each asset on a systematic basis over its expected useful life as follows:

Computer equipment	3 years
Plant and vehicles	5 years
Laboratory and office equipment	10 years
Industrial plant and equipment	10 years
Farm buildings	20 years
Industrial and manufacturing buildings	30 years
Other buildings	50 years

A half year's depreciation is charged in the year of acquisition and disposal of assets.

NOTES TO THE FINANCIAL STATEMENTS

The carrying values of property, plant and equipment are reviewed for impairment when events or changes in circumstances indicate that the carrying value may not be recoverable. If there is an indication of impairment the impairment loss, or the reversal of an impairment loss, is recognised immediately in the Consolidated Statement of Income and Expenditure.

The estimated useful lives, residual values and depreciation methods are reviewed, and adjusted as appropriate, at the end of each financial year.

The gain or loss, being the difference between the sales proceeds and the carrying amount of the asset, arising on disposal or retirement of an item of property, plant and equipment is recognised in the Consolidated Statement of Income and Expenditure. Any amount in the revaluation reserve relating to that asset is transferred to retained earnings directly.

Fully depreciated plant and equipment is retained in the financial statements until it is no longer in use.

Assets for re-sale

Tangible assets are classified as held for sale when the carrying amount is expected to be recovered principally through a sale transaction and a sale is highly probable. They are stated at the lower of carrying amount or fair value less cost to sell.

Impairment of non-financial assets

At each financial year end date non-financial assets not carried at fair value are assessed to determine whether there is an indication that the asset (or asset's cash generating unit) may be impaired. If there is such an indication the recoverable amount of the asset (or asset's cash generating unit) is compared to the carrying amount of the asset (or asset's cash generating unit).

2.10 Financial assets

Investment in subsidiary

The investment in the subsidiary Moorepark Technology Limited is measured at cost less impairment. If there is objective evidence of impairment, an impairment loss is recognised in the Consolidated Statement of Income and Expenditure in the year.

Other investments

Investments listed on a recognised stock exchange are measured at their fair value, and movements are recorded through the Consolidated Statement of Income and Expenditure and the Consolidated Statement of Comprehensive Income. Other financial assets comprising investments in unquoted shares and financial investments are measured at their fair value if this can be reliably determined; otherwise they are measured at the value attributed to them at the date of acquisition less impairment. If there is objective evidence of impairment, an impairment loss is recognised in the Consolidated Statement of Income and Expenditure and the Consolidated Statement of Comprehensive Income in the year.

2.11 Inventory

Biological assets

Livestock and own farm produce are valued using the fair value model. Fair value is determined on the basis that animals and own farm produce are sold on the open market. Gains and losses, which arise from these valuations, are reflected in full in operational income.

Other inventory

All other inventory is stated at the lower of cost and net realisable value.

2.12 Receivables

Receivables are recognised at fair value, less a provision for impairments. The provision for impairments is a specific provision, and is established when there is objective evidence that Teagasc will not be able to collect all amounts owed to it. All movements in the provision for impairments are recognised in the Consolidated Statement of Income and Expenditure.

NOTES TO THE FINANCIAL STATEMENTS

2.13 Payables

Payables, including trade and other payables and deferred income, are initially recognised at transaction price, unless the arrangement constitutes a financing transaction, where the debt instrument is measured at the present value of the future receipts discounted at a market rate of interest. Advanced research income, where a portion of the funds is due to be paid to partnering organisations, is included in deferred income.

2.14 Provisions and contingencies

Provisions

Provisions are recognised when the Group has a present legal or constructive obligation as a result of past events; it is probable that an outflow of resources will be required to settle the obligation; and the amount of the obligation can be estimated reliably.

Provisions are measured at the present value of the expenditures expected to be required to settle the obligation using a pre-tax rate that reflects current market assessments of the time value of money and the risks specific to the obligation. The increase in the provision due to passage of time is recognised as a finance cost.

Contingencies

Contingent liabilities, arising as a result of past events, are not recognised when (i) it is not probable that there will be an outflow of resources or that the amount cannot be reliably measured at the reporting date or (ii) when the existence will be confirmed by the occurrence or non-occurrence of uncertain future events not wholly within the Group's control. Contingent liabilities are disclosed in the financial statements unless the probability of an outflow of resources is remote.

Contingent assets are not recognised. Contingent assets are disclosed in the financial statements when an inflow of economic benefits is probable.

3. Critical accounting estimates and judgements

The preparation of the financial statements requires management to make judgements, estimates and assumptions that affect the amounts reported for assets and liabilities as at the Statement of Financial Position date and the amounts reported for revenues and expenses during the year. However, the nature of estimation means that actual outcomes could differ from those estimates.

The following judgements have had the most significant effect on amounts recognised in the financial statements:

Useful economic lives of property, plant and equipment

The Group depreciates the tangible fixed assets over their estimated useful lives after taking into account their estimated residual values. The estimated useful life reflects management's estimate of the period that the Group intends to derive future economic benefits from the use of the Group's tangible fixed assets. The residual value reflects management's estimated amount that the Group would currently obtain from the disposal of the asset, after deducting the estimated costs of disposal, as if the asset were already of the age and in the condition expected at the end of its useful life. Changes in the expected level of usage and technological developments could affect the economics, useful lives and the residual values of these assets which could then consequentially impact future depreciation charges. See Note 12 for the carrying amount of tangible fixed assets.

Valuation of investments

At the end of each financial year, an assessment is made on whether there are indicators that Teagasc's investment in the subsidiary is impaired. Where necessary, Teagasc's assessments are based on the estimation of the value-in-use of the assets by forecasting the expected future cash flows for a period of up to 5 years, using a suitable discount rate in order to calculate the present value of those cash flows. See Note 14 for the carrying amount of investments.

NOTES TO THE FINANCIAL STATEMENTS

Impairment of receivables

Teagasc assesses receivables on a continuous basis for any objective evidence of impairment by considering factors, including the ageing profile, the creditworthiness and the past collection history of each debtor. If the financial conditions of these debtors were to deteriorate, resulting in an impairment of their ability to make payments, additional allowances may be required. See Note 17 for the carrying amount of trade and other receivables.

Retirement benefit obligation

Teagasc has an obligation to pay retirement benefits to certain employees. The cost of these benefits and the present value of the obligation depend on a number of factors, including; life expectancy, salary increases, asset valuations and the discount rate on corporate bonds. Management estimates these factors in determining the net retirement benefit obligation in the Statement of Financial Position. The assumptions reflect historical experience and current trends. See Note 10 for the disclosures relating to the retirement benefit scheme.

Provisions

The Group makes provisions for legal and constructive obligations, which it knows to be outstanding at the year-end date. These provisions are generally made based on historical or other pertinent information, adjusted for recent trends where relevant. However, they are estimates of the financial costs of events that may not occur for some years. As a result of this and the level of uncertainty attaching to the financial outcomes, the actual outcome may differ significantly from that estimated.

Teagasc Consolidated Financial Statements

Financial Year Ended 31 December 2021

NOTES TO THE FINANCIAL STATEMENTS

4. Oireachtas grants

		2021	2020
	Subhead	€'000	€'000
Vote 30: Agriculture, Food and the Marine Grant-in-aid for general expenses	C.5	131,490	133,920
Grant for human resource purposes	C.5	10,500	10,500
Food research and agriculture research	C.3	2,296	1,861
Stimulus collaborative research programme	C.3	2,013	2,045
Agricultural catchments programme	B.3	2,500	2,400
Knowledge transfer programme	B.7	9	469
National Prepared Consumer Foods centre	C.4	436	1,484
National carbon observatory	C.10	1,939	29
Grant for forestry publicity and awareness and training	B.10	617	670
Grant for forestry education	B.10	39	12
Carbon tax measures	B.13	28	-
Retirement Benefit Funding			
Net deferred funding for RB		(6,775)	(8,564)
ASC remitted to Vote 30		(2,638)	(2,610)
SPSPS remitted to DPER		(1,056)	(866)
		<u>141,398</u>	<u>141,350</u>

A grant without any performance criteria is recognised in income when the grant proceeds are received. Oireachtas grants received which impose specified future performance conditions are recognised in income when those conditions have been met. Oireachtas grants, received before income recognition is satisfied, are recorded as separate liabilities in the Statement of Financial Position. At year end, Teagasc had unfilled conditions included in the Statement of Financial Position as liabilities with respect to the following:

		2021	2020
	Note	€'000	€'000
FIRM/Stimulus/Coford	21	5,413	4,224
National carbon observatory	21	3,041	2,032
National Prepared Consumer Foods centre	21	1,582	1,018
		<u>10,036</u>	<u>7,274</u>

5. EU funding

	2021	2020
	€'000	€'000
Farm Survey Income	156	144
INTERREG	155	322
Marie Curie	164	309
Horizon 2020	3,726	2,701
Other EU Income	164	168
	<u>4,365</u>	<u>3,644</u>

Horizon 2020, which commenced in 2015, ran to the end of 2020 and is the main financial tool through which the European Union supports research and development activities covering almost all scientific disciplines. Horizon Europe commenced in 2021 replacing Horizon 2020.

Teagasc Consolidated Financial Statements

Financial Year Ended 31 December 2021

NOTES TO THE FINANCIAL STATEMENTS

5. EU funding (continued)

A grant without any performance criteria is recognised in income when the grant proceeds are received. EU grants received which impose specified future performance conditions are recognised in income when those conditions have been met. EU grants, received before income recognition is satisfied, are recorded as separate liabilities in the Statement of Financial Position. At year end, Teagasc had unfilled conditions included in the Statement of Financial Position as liabilities with respect to the following:

		2021	2020
	Note	€'000	€'000
Horizon 2020		8,440	7,261
Marie Curie		155	487
Other EU Income		710	433
	21	<u>9,305</u>	<u>8,181</u>

6. Operational income

	Operations	Knowledge Transfer	Research	2021	2020
	€'000	€'000	€'000	€'000	€'000
Advisory service fees	-	11,073	67	11,140	11,043
Course fee income	30	4,894	432	5,356	3,794
Other fees	19	1,722	14,921	16,662	15,209
Other farming operations	-	1,084	2,676	3,760	3,316
Publications and miscellaneous	67	93	572	732	525
	<u>116</u>	<u>18,866</u>	<u>18,668</u>	<u>37,650</u>	<u>33,887</u>

A grant without any performance criteria is recognised in income when the grant proceeds are received. State agency grants received which impose specified future performance conditions are recognised in income when those conditions have been met. State agency grants, received before income recognition is satisfied, are recorded as separate liabilities in the Statement of Financial Position. At year end, Teagasc had unfilled conditions included in the Statement of Financial Position as liabilities with respect to the following:

		2021	2020
	Note	€'000	€'000
Science Foundation Ireland	21	10,154	6,339
Enterprise Ireland	21	4,250	3,733
		<u>14,404</u>	<u>10,072</u>

Teagasc Consolidated Financial Statements

Financial Year Ended 31 December 2021

NOTES TO THE FINANCIAL STATEMENTS

7. Expenditure

	Operations	Knowledge Transfer	Research	2021	2020
	€'000	€'000	€'000	€'000	€'000
Pay (Note 9)	7,059	34,733	43,457	85,249	81,684
Travelling and subsistence	111	1,084	874	2,069	2,015
General operating expenses (Note 8)	8,634	10,275	24,431	43,340	40,773
Financial charges	307	87	13	407	631
Depreciation (Note 12)	270	1,587	7,037	8,894	8,292
Impairment loss (Note 12)	-	-	-	-	60
Grants to private colleges (Note 28)	-	2,922	-	2,922	2,868
Student grants	-	464	7	471	460
Cost of livestock purchases	-	65	679	744	490
Cost of research and development services	-	-	142	142	128
Walsh scholarship grants	-	530	5,545	6,075	5,634
Other grants	332	4	296	632	1,104
	<u>16,713</u>	<u>51,751</u>	<u>82,481</u>	<u>150,945</u>	<u>144,139</u>
Staff training				509	400
Retirement benefits (Note 10)				<u>33,215</u>	<u>32,240</u>
				<u>184,669</u>	<u>176,779</u>

In 2021 141 (2020: 148) staff received overtime payments. The highest aggregate amount paid to an individual was €20,701 (2020: €17,772).

Teagasc Consolidated Financial Statements

Financial Year Ended 31 December 2021

NOTES TO THE FINANCIAL STATEMENTS

8. Analysis of general operating expenses

	Operations	Knowledge Transfer	Research	2021	2020
	€'000	€'000	€'000	€'000	€'000
Farming supplies/ services	-	1,098	4,925	6,023	5,444
Maintenance/ repairs	692	2,839	6,017	9,548	10,033
Rents/ rates/ insurances	1,142	466	1,044	2,652	2,508
Postage/ telephones	625	972	270	1,867	1,799
Power/ fuel/ petrol	171	568	1,872	2,611	2,451
Laboratory supplies	-	-	3,596	3,596	3,762
Printing/ stationery/ publicity	592	1,071	932	2,595	2,102
Seminar/ classroom/ library supplies	66	1,185	819	2,070	1,752
Services of external agencies	892	970	1,051	2,913	2,356
Student and staff canteen supplies	41	204	146	391	482
Audit fee	76	-	16	92	84
ICT supplies/ services	4,156	224	553	4,933	4,498
Legal/ professional fees	420	449	782	1,651	1,121
Miscellaneous programme costs	(98)	212	2,202	2,316	2,297
Special events and miscellaneous	34	16	32	82	84
	<u>8,809</u>	<u>10,274</u>	<u>24,257</u>	<u>43,340</u>	<u>40,773</u>

9. Staff

The average number of staff employed by the Teagasc during the year was as follows:

	2021	2020
Professional	819	793
Technical	159	157
Administrative/ clerical	236	233
Farm/ domestic	108	107
	<u>1,322</u>	<u>1,290</u>

Additional superannuation contributions of €2,638,438 (2020: €2,610,218) were deducted from salaries and paid to the Department of Agriculture, Food and the Marine. Effective from 1 January 2019, members of public service defined benefit pension schemes pay an additional superannuation contribution (ASC) arising from the Public Service Stability Agreement (2018 - 2020) and the Public Service Pay and Pensions Act 2017.

Teagasc Consolidated Financial Statements

Financial Year Ended 31 December 2021

NOTES TO THE FINANCIAL STATEMENTS

9. Staff (continued)

Employee short-term benefits breakdown

Employees' short-term benefits in excess of €60,000 are categorised into the following bands:

Employee benefits	Teagasc Number of employees
€60,000 to €69,999	197
€70,000 to €79,999	135
€80,000 to €89,999	51
€90,000 to €99,999	29
€100,000 to €109,999	35
€110,000 to €119,999	28
€120,000 to €129,999	11
€130,000 to €139,999	1
€140,000 to €149,999	2
€150,000 to €159,999	1
€160,000 to €169,999	1

Note: For the purposes of this disclosure, short-term employee benefits in relation to services rendered during the reporting period include salary, overtime, allowances and other payments made on behalf of the employee, but exclude employer's PRSI.

Aggregate employee benefits

	2021 €'000	2020 €'000
Staff short-term benefits	77,083	74,120
Termination benefits	-	-
Retirement benefit costs	33,215	32,240
Employer's contribution to social welfare	7,134	6,770
	<u>117,432</u>	<u>113,130</u>

The total number of staff employed (WTE) at year end was 1,330 (2020: 1,313). There were no termination benefits in 2021 (2020: nil).

Staff short-term benefits

	2021 €'000	2020 €'000
Basic pay	73,780	71,313
Overtime	1,013	999
Allowances	2,290	1,808
	<u>77,083</u>	<u>74,120</u>

Termination benefits

	2021 €'000	2020 €'000
Termination benefits charged to income and expenditure	-	-
	<u>-</u>	<u>-</u>

Teagasc Consolidated Financial Statements

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NOTES TO THE FINANCIAL STATEMENTS

9. Staff (continued)

Key management personnel

Key management personnel in Teagasc consist of the members of the Authority, the Director and three divisional directors reporting to the Director. The total value of employee benefits for key management personnel is set out below:

	2021 €'000	2020 €'000
Salaries and other short term benefits:		
Key management remuneration	713	744
	<u>713</u>	<u>744</u>

This does not include the value of retirement benefits earned in the period. The key management personnel, except for those on the Authority, are members of the Teagasc pension scheme and their entitlements in that regard do not extend beyond the terms of the model public defined benefit superannuation scheme.

Director's salary and benefits

The Director's remuneration for the financial period was as follows:

	2021 €'000	2020 €'000
Basic pay	170	167
	<u>170</u>	<u>167</u>

Professor Gerry Boyle completed his term as Director in September 2021 and was replaced by Professor Frank O'Mara. The Director is a member of the Teagasc pension scheme and his entitlements in that regard do not extend beyond the model public sector defined benefit superannuation scheme. The value of retirement benefits earned in the period is not included above.

10. Retirement benefit plans

Section 9 of the Agriculture (Research, Training and Advice) Act, 1988 provides for the establishment of schemes for the granting of retirement benefits in respect of staff appointed by Teagasc and staff transferred to Teagasc from An Chomhairle Oiliúna Talmhaíochta and from An Foras Talúntais.

Pending the approval of draft pension schemes by the Minister for Agriculture, Food and the Marine, the Minister for Finance and the Oireachtas, Teagasc operates pension schemes on an administrative basis. At 31 December 2021 this approval remained outstanding.

Teagasc also administers two pension schemes (the Agricultural Colleges Staff Pension Scheme 1985 and the Agricultural Colleges Spouses' and Children's Contributory Pension Scheme 1985) in respect of certain staff employed by privately owned Colleges of Agriculture and Horticulture, the cost of whose salaries is borne by the Exchequer through the agency of Teagasc.

The above schemes are defined benefit pension schemes. No separate fund is maintained, and no assets are held, to finance the payment of retirement benefits and gratuities. The actuarial estimate of future liabilities accruing in regard to future benefits is shown on the Statement of Financial Position.

The average number of monthly retirement benefits paid during the year was 1,751 (2020: 1,753).

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NOTES TO THE FINANCIAL STATEMENTS

10. Retirement benefit plans (continued)

i. Analysis of total retirement benefit costs charged to income and expenditure account

	2021	2020
	€'000	€'000
Current service cost	28,437	25,977
Interest on scheme liabilities	11,436	12,781
Staff contributions	(4,020)	(3,908)
Additional Superannuation contributions	(2,638)	(2,610)
	<u>33,215</u>	<u>32,240</u>

ii. Movement in net retirement benefit liability during the financial year

	2021	2020
	€'000	€'000
Net retirement benefit liability at 01 January	1,366,697	1,299,840
Current service cost	28,437	25,977
Benefits paid	(46,648)	(47,322)
Interest on scheme liabilities	11,436	12,781
Actuarial loss	54,458	75,420
Net retirement benefit liability at 31 December	<u>1,414,380</u>	<u>1,366,697</u>

iii. Deferred funding asset for retirement benefits

Teagasc recognises as an asset an amount corresponding to the unfunded deferred liability for retirement benefits on the basis of the set of assumptions described below and a number of past events. These events include the statutory basis for the establishment of the pension schemes, and the policy and practice currently in place in relation to funding public service pensions including contributions by employees and the annual estimates process. While there is no formal agreement regarding these specific amounts with the Department of Agriculture, Food and the Marine, Teagasc has no evidence that this funding policy will not continue to meet such sums in accordance with current practice.

Net deferred funding for retirement benefits in the year

	2021	2020
	€'000	€'000
Funding recoverable in respect of current years retirement benefits	39,873	38,758
Resources applied to pay retirement benefits	(46,648)	(47,322)
	<u>(6,775)</u>	<u>(8,564)</u>

The deferred funding asset for retirement benefits as at 31 December 2021 was €1,414m (2020: €1,367m).

NOTES TO THE FINANCIAL STATEMENTS

10. Retirement benefit plans (continued)

iv. History of defined benefit obligations

	2021	2020	2019	2018
	€'000	€'000	€'000	€'000
Experience (loss)/ gain	-	(59,697)	(18,834)	70,948
Percentage of present value of scheme liabilities	0.0%	4.4%	1.4%	6.2%
Changes in assumptions	(54,458)	(15,723)	(137,908)	65,728
Percentage of present value of scheme liabilities	3.9%	1.2%	10.6%	5.7%
Actuarial (loss)/ gain recognised in other comprehensive income	(54,458)	(75,420)	(156,742)	136,676

The cumulative actuarial loss recognised in the Statement of Comprehensive Income amounts to €310.529m (2020: €256.071m).

v. General description of the scheme

The pension schemes are defined benefit final salary pension arrangements with benefits and contributions defined by reference to current "model" public sector scheme regulations. The schemes provide a retirement benefit (one eightieth per year of service), a gratuity lump sum (three eightieths per year of service) and spouse's and children's retirement benefits. Retirement age for pre 01 April 2004 members will be compulsory on reaching age 70. These members also have an entitlement to retire without actuarial reduction from age 60. Public servants appointed on or after 01 April 2004 to the 01 January 2013 have a minimum retirement age of 65. Retirement benefits in payment (and deferment) normally increase or decrease in line with general public sector salary inflation.

Teagasc operates the Single Public Service Retirement Benefits Scheme (Single Scheme) which is the defined benefit scheme for pensionable public servants appointed on or after 01 January 2013. The scheme is based on a career averaging model, retirement for those entrants will be compulsory on reaching age 70.

The valuation used for disclosures has been based on an actuarial valuation by a qualified independent actuary on 10 January 2022 in order to assess the scheme liabilities at 31 December 2021.

The principal actuarial assumptions used to calculate liabilities are as follows:

	2021	2020
	% per annum	% per annum
Inflation rate	2.20	1.30
Salary rate	3.70	2.80
State pension	3.70	2.80
Pension rate – Main Scheme	2.95	2.05
Pension rate – Single Scheme	2.20	1.30
Scheme liabilities discount rate	1.40	0.85

Teagasc Consolidated Financial Statements

Financial Year Ended 31 December 2021

NOTES TO THE FINANCIAL STATEMENTS

10. Retirement benefit plans (continued)

The mortality basis adopted allows for improvements in life expectancy over time, so that life expectancy at retirement will depend on the year in which a member attains retirement age (age 65). The table below shows the life expectancy for members attaining age 65 in 2021 and 2041.

Year of attaining 65	2021	2040
Life expectancy - males	86.5	88.0
Life expectancy - females	89.0	90.5

On the basis of these and other assumptions and applying the projected unit method the present value of pension scheme liabilities is as follows:

	2021 €'000	2020 €'000
Total accrued retirement benefit liability	1,414,380	1,366,697

11. Tax on profit on ordinary activities

	2021 €'000	2020 €'000
Based on results for the year:		
Current tax charge	-	-
Deferred tax (Note 22)	(26)	(56)
	(26)	(56)
Provision in respect of prior years:		
Corporation tax	-	(9)
	(26)	(65)

The tax charge for the year is lower than the charge that would result from applying the standard rate of Irish corporation tax to the profit on ordinary activities. The differences are explained as follows:

	2020 €'000	2019 €'000
Profit/ (loss) on ordinary activities before taxation	1,987	2,626
Profit/ (loss) on ordinary activities multiplied by Standard rate of corporation tax in Ireland -12.5%	248	328
Effects of:		
Excess of capital allowances over depreciation	(25)	(22)
Higher tax rate on profits	3	4
Unutilised trading losses	51	85
Parent (profit)/ loss on ordinary activities multiplied by 12.5%	(277)	(395)
Current tax charge for the year	-	-

The tax charge arises in the operations of the subsidiary Moorepark Technology Limited.

Teagasc Consolidated Financial Statements

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NOTES TO THE FINANCIAL STATEMENTS

12. Property, plant and equipment

GROUP

	Land €'000	Buildings €'000	Assets under construction €'000	Plant and equipment €'000	Total €'000
Cost or valuation					
At 1 January 2020	6,127	156,887	3,990	96,474	263,478
Additions	11	1,770	8,730	5,156	15,667
Buildings completed	-	-	-	-	-
Disposals	(1)	(73)	-	(1,138)	(1,212)
Reclassification	-	22	-	(22)	-
At 31 December 2020	6,137	158,607	12,720	100,470	277,933
Additions	567	3,297	2,848	10,059	16,771
Buildings completed	-	8,773	(8,783)	10	-
Disposals	(7)	(2,041)	-	(598)	(2,646)
Reclassification	-	-	-	-	-
At 31 December 2021	6,697	168,636	6,785	109,941	292,058
Accumulated depreciation and impairment losses					
At 1 January 2020	-	67,256	-	75,011	142,267
Charge for year	-	3,980	-	4,312	8,292
Impairment loss	-	-	60	-	60
Disposals	-	(30)	-	(1,108)	(1,138)
At 31 December 2020	-	71,206	60	78,215	149,480
Charge for year	-	4,148	-	4,746	8,894
Impairment loss	-	-	-	-	-
Disposals	-	(1,803)	-	(568)	(2,371)
At 31 December 2021	-	73,551	60	82,393	156,003
Carrying value					
At 31 December 2021	6,697	95,086	6,725	27,547	136,055
At 31 December 2020	6,137	87,410	12,660	22,255	128,453

Teagasc Consolidated Financial Statements

Financial Year Ended 31 December 2021

NOTES TO THE FINANCIAL STATEMENTS

12. Property, plant and equipment (continued)

TEAGASC

	Land €'000	Buildings €'000	Assets under construction €'000	Plant and equipment €'000	Total €'000
Cost or valuation					
At 1 January 2020	6,127	144,388	2,418	90,136	243,069
Additions	11	1,705	8,629	4,906	15,251
Buildings completed	-	-	-	-	-
Disposals	(1)	-	-	(971)	(972)
Reclassification	-	22	-	(22)	-
At 31 December 2020	6,137	146,115	11,047	94,049	257,348
Additions	567	3,228	2,748	9,515	16,058
Buildings completed	-	8,773	(8,773)	-	-
Disposals	(7)	(1,982)	-	(543)	(2,532)
Reclassification	-	-	-	-	-
At 31 December 2021	6,697	156,134	5,022	103,021	270,874
Accumulated depreciation and impairment losses					
At 1 January 2020	-	63,829	-	70,472	134,301
Charge for year	-	3,564	-	4,030	7,594
Impairment loss	-	-	60	-	60
Disposals	-	-	-	(942)	(942)
At 31 December 2020	-	67,393	60	73,560	141,013
Charge for year	-	3,736	-	4,451	8,187
Impairment loss	-	-	-	-	-
Disposals	-	(1,760)	-	(519)	(2,279)
At 31 December 2021	-	69,369	60	77,492	146,921
Carrying value					
At 31 December 2021	6,697	86,765	4,962	25,529	123,953
At 31 December 2020	6,137	78,722	10,987	20,489	116,335

Certain fixed assets entrusted to Teagasc are protected by statute, and may not be sold.

Teagasc has a total of 55 offices/ centres of which 50 are owned by Teagasc and the remaining 5 are under rental agreements. One of the rental agreements expires in less than one year, three between two and five years and the remaining agreement is a long term lease with an end date of greater than five years.

NOTES TO THE FINANCIAL STATEMENTS

12. Property, plant and equipment (continued)

Disposal of property, plant and equipment

	Proceeds/ costs	Proceeds/ costs
	2021	2020
	€'000	€'000
Proceeds from sale of property:		
Property sales during year	4,436	8
Transfer to exchequer	(3,436)	-
Cost of sales	(44)	-
	<u>956</u>	<u>8</u>
Proceeds from sale of other assets	111	42
	<u>1,067</u>	<u>50</u>
Net book value of fixed assets disposed:		
Property assets	(244)	(43)
Other assets	(30)	(29)
	<u>(274)</u>	<u>(72)</u>
Gain/(Loss) on disposal of fixed assets	<u>793</u>	<u>(22)</u>

There was a transfer of asset sales proceeds to the exchequer in 2021 of €3.436m (2020 - nil).

Teagasc completed the sale of land and buildings in Kinsealy, Co. Dublin to the Department of Education and Science for €4.436m in 2021. The valuation of the property was made by the State Valuation Office in 2019 under Circular 11/15 – 'Protocols for the transfer and sharing of State Property Assets'. Sanction approving the sale was received from the Department of Agriculture, Food and the Marine in 2020, which included the condition that €3.436m of the sale proceeds be transferred to the exchequer.

13. Heritage assets

Group and Teagasc

Period houses in Kildalton College, Ballyhaise College and Oak Park Research Centre are part of the working infrastructure of Teagasc, and are as such capitalised on the Statement of Financial Position at original cost.

Certain heritage assets at Johnstown Castle Research Centre, including the castle, Agricultural Museum and walled garden were not originally recognised in the Statement of Financial Position as information on the cost or value of these heritage assets could not be obtained at a cost which was commensurate with the benefits to users of the financial statements. These assets were subsequently developed as a tourist and heritage attraction. The development project involved renovation of the castle and construction of a visitor centre which became operational in 2019. The centre is managed and operated by Irish Heritage Trust. All construction costs have been capitalised and are depreciated in line with Teagasc's property, plant and equipment accounting policy.

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NOTES TO THE FINANCIAL STATEMENTS

14. Investments

	Group		Teagasc	
	2021	2020	2021	2020
	€'000	€'000	€'000	€'000
Investment in quoted shares	405	354	405	354
Investment in unquoted shares	271	244	272	245
	<u>676</u>	<u>598</u>	<u>677</u>	<u>599</u>

Investments in quoted shares

	Group		Teagasc	
	2021	2020	2021	2020
	€'000	€'000	€'000	€'000
Fair value at 1 January	354	346	354	346
Gain on fair value movement in the year	51	8	51	8
Fair value at 31 December	<u>405</u>	<u>354</u>	<u>405</u>	<u>354</u>

Investments in unquoted shares

	Group		Teagasc	
	2021	2020	2021	2020
	€'000	€'000	€'000	€'000
Value at acquisition date				
At 1 January	244	270	245	271
Additions	1	-	1	-
Share redemption	-	-	-	-
Revolving fund reduction	16	(15)	16	(15)
Gain / (loss) on fair value movement in the year	10	(11)	10	(11)
At 31 December	<u>271</u>	<u>244</u>	<u>272</u>	<u>245</u>

Net book value

	Group		Teagasc	
	2021	2020	2021	2020
	€'000	€'000	€'000	€'000
At 1 January	244	270	245	271
Movement in unquoted shares	27	(26)	27	(26)
At 31 December	<u>271</u>	<u>244</u>	<u>272</u>	<u>245</u>

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NOTES TO THE FINANCIAL STATEMENTS

14. Investments (continued)

Analysed as:

	Group		Teagasc	
	2021	2020	2021	2020
	€'000	€'000	€'000	€'000
Glanbia plc	346	292	346	292
Kerry Group plc	59	62	59	62
Moorepark Technology Limited	-	-	1	1
Wexford Milk Producers Limited	1	1	1	1
Lakeland Dairies	10	10	10	10
Aurivo	2	2	2	2
Glanbia Co-Op Ltd	14	14	14	14
Carbery Creameries Ltd	89	81	89	81
Barryroe Creameries Ltd	4	3	4	3
Dairygold Co-Op Society Ltd	69	69	69	69
Dairygold Co-Op Society (Revolving fund)	82	64	82	64
	<u>676</u>	<u>598</u>	<u>677</u>	<u>599</u>

Details of investments:

Company name	Country of incorporation	Registered number	Number of shares	Nominal value per share at 31.12.2021	Dividend received	Nature of business of company
Glanbia plc	Ireland	129933	28,119	€12.30	2021 - €3,659 2020 - €3,863	Global nutrition company
Kerry Group plc	Ireland	111471	522	€113.25	2021 - €465 2020 - €423	Provider of taste and nutrition technologies
Moorepark Technology Ltd	Ireland	168270	5,102	€0.13	2021 - €nil 2020 - €nil	Provision of services for R&D
Wexford Milk Producers Ltd	Ireland	2640R	767	€1.00	2021 - €nil 2020 - €nil	Milk production and supply
Lakeland Dairies Co-Operative Society Ltd	Ireland	4622R	208,742	€0.05	2021 - €489 2020 - €104	Milk production and supply
Aurivo Co-Operative Society Ltd	Ireland	5113R	1,715	€1.00	2021 - €34 2020 - €34	Milk production and supply
Glanbia Co-Operative Ltd	Ireland	4928R	13,742	€1.00	2021 - €1,110 2020 - €1,917	Milk production and supply
Kerry Co-Operative Ltd	Ireland	3618R	87	€1.25	2021 - €331 2020 - €331	Milk production and supply
Carbery Creameries Ltd	Ireland	2899R	19,605	€4.37	2021 - €nil 2020 - €nil	Milk production and supply
Carbery Creameries Ltd	Ireland	2899R	3,698	€1.00	2021 - €nil 2020 - €nil	Milk production and supply
Barryroe Co-Operative Ltd	Ireland	1736R	3,689	€1.00	2021 - €nil 2020 - €nil	Milk production and supply
Dairygold Co-Operative Society Ltd	Ireland	4621R	69,271	€1.00	2021 - €nil 2020 - €nil	Milk production and supply

Teagasc Consolidated Financial Statements

Financial Year Ended 31 December 2021

NOTES TO THE FINANCIAL STATEMENTS

14. Investments (continued)

Teagasc has invested €650 in Moorepark Technology Limited and has a 57% holding in the paid up share capital of the company.

The percentage shareholding in all of the other organisations listed is negligible and does not give Teagasc a controlling interest.

15. Inventories

	2021	2020
	€'000	€'000
Livestock	5,827	4,775
Farm produce, fertilisers and feeding stocks	733	713
General supplies	216	161
	<u>6,776</u>	<u>5,649</u>

Stocks are stated after provision for impairment of €nil (2020: €nil).

Reconciliation of movements in livestock:

	2021	2020
	€'000	€'000
Balance at start of year	4,775	4,590
Purchases	745	490
Sales	(3,037)	(2,957)
Births	1,206	1,231
Deaths	(137)	(159)
Fair value adjustments	2,275	1,580
Balance at end of year	<u>5,827</u>	<u>4,775</u>

16. Assets held for sale

At 31 December, included in the carrying value of assets are the following assets held for sale:

		Carrying value at 31 December 2021	Carrying value at 31 December 2020
	Note	€'000	€'000
Kinsealy East, Co. Dublin	12	-	374
		<u>-</u>	<u>374</u>

Teagasc Consolidated Financial Statements

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NOTES TO THE FINANCIAL STATEMENTS

17. Receivables

	Group		Teagasc	
	2021	2020	2021	2020
	€'000	€'000	€'000	€'000
Trade receivables	7,804	9,877	7,282	9,516
Other receivables	220	195	197	165
Accrued operational income	10,640	8,494	10,640	8,494
Accrued Oireachtas grant income	5,026	4,217	5,026	4,217
Prepayments	2,183	1,824	2,152	1,802
VAT and other taxes	-	17	-	-
	<u>25,873</u>	<u>24,624</u>	<u>25,297</u>	<u>24,194</u>

All amounts included above fall due within one year.

Trade receivables are stated after provision for impairment of €142,138 (2020: €190,559).

18. Cash and cash equivalents

	Group		Teagasc	
	2021	2020	2021	2020
	€'000	€'000	€'000	€'000
Cash at bank and in hand	30,728	27,842	28,177	24,942
Short-term deposits	20,434	15,500	20,434	15,500
	<u>51,162</u>	<u>43,342</u>	<u>48,611</u>	<u>40,442</u>

Teagasc Consolidated Financial Statements

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NOTES TO THE FINANCIAL STATEMENTS

19. Payables – amounts falling due within one year

	Group		Teagasc	
	2021	2020	2021	2020
	€'000	€'000	€'000	€'000
Trade payables	763	645	753	566
Other payables and accruals	17,258	13,554	16,316	12,603
Legal provisions	237	212	237	212
PAYE/ PRSI	2,777	2,717	2,746	2,692
Value added tax	551	1,546	543	1,528
Withholding tax/ RCT	232	197	232	197
Other payroll deductions	923	3,373	923	3,373
	<u>22,741</u>	<u>22,244</u>	<u>21,750</u>	<u>21,171</u>
Payables for taxation and social welfare included above	<u>3,560</u>	<u>4,459</u>	<u>3,521</u>	<u>4,418</u>

Included in Teagasc's other payables and accruals of €16.316m are: repairs and maintenance costs €4.17m, equipment and capital items €3.61m, wages, salaries and other payroll related costs €3.08m (including an annual leave accrual of €2.11m), professional fees including legal and analytical services €1.75m, ICT costs €0.97m, general operating costs including utilities €0.96m, farm running costs €0.69m, other accruals €0.34m, public relations and advertising €0.29m, grants/ seminars €0.29m and travel and subsistence €0.11m.

The payment of trade payables varies between on demand and thirty days. Prompt payment interest and compensation of €35,798 was payable on trade payables in 2021 (2020: €49,668).

PAYE/ PRSI, value added tax and withholding tax are subject to terms of relevant legislation. Interest accrues on late payment of taxes in line with the terms of relevant legislation. No interest was due at the end of the financial year for late payment of taxes.

Other amounts included with payables not covered by specific note disclosures are unsecured, interest free and repayable on demand.

20. Payables – amounts falling due after more than one year

	Group		Teagasc	
	2021	2020	2021	2020
	€'000	€'000	€'000	€'000
Other payables and accruals	406	406	-	-
	<u>406</u>	<u>406</u>	<u>-</u>	<u>-</u>

Teagasc Consolidated Financial Statements

Financial Year Ended 31 December 2021

NOTES TO THE FINANCIAL STATEMENTS

21. Deferred income

Teagasc carries out public funded research in collaboration with partner research performing organisations in accordance with contracts with other State Institutions, principally the Department of Agriculture, Food and the Marine. Grants in respect of such research are taken into account as income when the corresponding expenditure has been incurred under each contract. Teagasc makes payments to partners when advance grant income received by Teagasc is due to collaborating partner research organisations. Those advances are deferred until payments are made to the partner organisations. At 31 December 2021 the source and amount of deferred income in respect of research and other projects was as follows:

Grant/ other deferrals	Government Funding Department		Opening Deferred	Cash Received	Taken to income	Third party payments	Deferred within 1 year	Deferred > 1 year
		Note	€'000	€'000	€'000	€'000	€'000	€'000
Agricultural Catchments Programme	Dept of Agriculture, Food and the Marine		-	2,500	2,500	-	-	-
FIRM, Stimulus, Coford	Dept of Agriculture, Food and the Marine		4,437	5,910	4,934	-	3,481	1,932
Era Net	Dept of Agriculture, Food and the Marine		179	144	244	-	70	9
Marine Institute	Dept of Agriculture, Food and the Marine		20	-	20	-	-	-
National Carbon Observatory	Dept of Agriculture, Food and the Marine		2,032	1,009	-	-	1,521	1,520
National Prepared Consumer Foods Centre	Dept of Agriculture, Food and the Marine		1,018	565	-	-	1,583	-
US Ireland	Dept of Agriculture, Food and the Marine		30	71	82	-	-	19
Sub total			7,716	10,199	7,780	-	6,655	3,480

Teagasc Consolidated Financial Statements

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NOTES TO THE FINANCIAL STATEMENTS

21. Deferred income (continued)

Grant/ other deferrals	Government Funding Department		Opening Deferred	Cash Received	Taken to income	Third party payments	Deferred within 1 year	Deferred > 1 year
		Note	€'000	€'000	€'000	€'000	€'000	€'000
Sub total			7,716	10,199	7,780	-	6,655	3,480
Enterprise Ireland	Dept of Enterprise, Trade and Employment		3,733	4,357	3,267	573	3,259	991
Science Foundation Ireland	Dept of Enterprise, Trade and Employment		6,339	10,861	3,775	3,270	5,093	5,062
Environmental Protection Agency	Dept of Environment, Climate and Communications		353	357	363	203	12	132
Health & Safety Authority	Dept of Enterprise, Trade and Employment		21	-	-	-	21	-
Irish Aid	Dept of Foreign Affairs		145	750	64	182	-	649
Safefood	Dept of Health		35	173	42	166	-	-
Sustainable Energy Authority of Ireland	Dept of Environment, Climate and Communications		168	12	39	-	90	51
European Union			8,181	4,365	3,067	174	3,693	5,612
General research and other deferrals			3,113	3,672	333	3,436	2,438	578
Course and accommodation fees			2,420	2,497	2,213	12	2,299	393
Amounts received in advance for work associated with the completion of sale of land at Athenry			510	-	-	510	-	-
Group total			<u>32,734</u>	<u>37,243</u>	<u>20,943</u>	<u>8,526</u>	<u>23,560</u>	<u>16,948</u>
Teagasc			<u>32,582</u>	<u>37,101</u>	<u>20,897</u>	<u>8,526</u>	<u>23,372</u>	<u>16,888</u>

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NOTES TO THE FINANCIAL STATEMENTS

22. Provision for liabilities

Deferred tax	Group		Teagasc	
	2021 €'000	2020 €'000	2021 €'000	2020 €'000
At beginning of year	63	120	-	-
Charged to income and expenditure account	(26)	(57)	-	-
At end of year	37	63	-	-

Components of deferred taxation	Group		Teagasc	
	2021 €'000	2020 €'000	2021 €'000	2020 €'000
Unutilised trading losses	(163)	(112)	-	-
Accelerated capital allowance	200	175	-	-
	37	63	-	-

23. Capital Account

The balance on this account of €123.953m (2020: €116.335m) represents the unamortised value of funds used to purchase property, plant and equipment, increasing by €7.618m in 2021 (2020: €7.567m).

24. Revenue reserves

The revenue reserves represent cumulative comprehensive income recognised as at reporting date.

25. Non-controlling interest

The non-controlling interest comprises the other shareholders' equity investment together with their capital contribution to expand facilities in Moorepark Technology Limited.

26. Leases

Operating leases

At 31 December Teagasc had future minimum lease payments under non-cancellable operating leases as follows:

	Group		Teagasc	
	2021 €'000	2020 €'000	2021 €'000	2020 €'000
Leases which expire:				
Within one year	645	703	645	703
Between two and five years	664	1,013	664	1,013
After five years	941	1,022	941	1,022
	2,250	2,738	2,250	2,738

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27. Reconciliation of surplus to cash flow from operating activities

	2021	2020
	€'000	€'000
Surplus for the year before taxation	1,987	2,627
Depreciation expense	8,894	8,292
Impairment loss	-	60
Fair value adjustments on biological assets	(2,275)	(1,580)
Fair value adjustments on investments	(77)	18
(Gain)/ loss on disposal of tangible fixed assets	(793)	22
Interest paid	183	88
Interest income	(1)	(2)
Transfer to capital account	7,618	7,567
Total operating cash flows before movements in working capital	15,536	17,092
Decrease in inventory	1,150	1,474
(Increase)/ decrease in receivables	(1,250)	2,518
Increase in payables	8,271	2,723
Cash flow from operating activities	23,707	23,807

28. Private colleges

Teagasc provides support to three private colleges, Gurteen Agricultural College, Mountbellew Agricultural College and Salesian Agricultural College Pallaskenry, as follows:

	2021	2020
	€'000	€'000
Grants to private colleges	2,922	2,868
Salary costs of staff seconded to private colleges (included in the total pay expenditure in Note 7 above)	393	407
External service provider costs for teaching services provided to private colleges (included in the general operating expenditure in Note 8 above)	178	162
	3,493	3,437

In addition to grants outlined above Teagasc provided workbooks to private colleges to the value of €58,600 (2020: €59,750). Income of €576,476 (2020: €287,271) was received from private colleges for course resources provided by Teagasc and the agreed share of Rural Development Programme course learner fees.

29. Commitments

Capital commitments

Teagasc had capital commitments outstanding at 31 December 2021 amounting to €1.505m which relate to construction of buildings and facilities at Kildalton College €0.651m, Moorepark €0.517m, Grange €0.276m, Athenry €0.030m, Oak Park €0.019m and Ballyhaise €0.012m (2020: €3.204m).

Grant commitments

Teagasc had grant commitments outstanding at 31 December 2021 amounting to €9.929m which relate to Walsh Scholars €5.911m, Private College Grants €3.087m and Other Grants €0.931m (2020: €10.251m).

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NOTES TO THE FINANCIAL STATEMENTS

30. Authority members – disclosure of transactions

The Authority has adopted procedures in accordance with the guidelines issued in 2016 by the Department of Public Expenditure and Reform in relation to the disclosure of interest by Authority members and the Authority has adhered to these procedures. There were no transactions in the year in relation to the Authority's activities in which the Authority members were involved.

31. Contingent liabilities

The Authority has made provision in the financial statements reflecting its best estimate of the liability arising. The Authority is of the view that there are no contingent liabilities.

32. Related party transactions

The following transactions were carried out with related parties:

Sales of goods and services:

	Group		Teagasc	
	2021	2020	2021	2020
	€'000	€'000	€'000	€'000
Subsidiary	-	-	9	12
	-	-	9	12

Purchases of goods and services:

	Group		Teagasc	
	2021	2020	2021	2020
	€'000	€'000	€'000	€'000
Subsidiary	-	-	791	824
	-	-	791	824

Payable to related parties:

	Group		Teagasc	
	2021	2020	2021	2020
	€'000	€'000	€'000	€'000
Subsidiary	118	20	118	20
	118	20	118	20

The receivables and payables arise mainly from sales and purchase transactions, respectively. The receivables and payables are unsecured in nature and bear no interest. No provisions are held against receivables from related parties during the year (2020: €nil).

Under the terms of the Moorepark Technology Promoter's Agreement, Teagasc has undertaken to provide from its own resources specified staff requirements to include the General Manager, the Company Secretary and one technician.

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NOTES TO THE FINANCIAL STATEMENTS

33. Financial instruments

The Group and Teagasc have the following financial instruments:

	Group		Teagasc	
	2021	2020	2021	2020
	€'000	€'000	€'000	€'000
Financial assets that are equity instruments measured at fair value through consolidated statement of income and expenditure				
Listed non-current asset investments	405	354	405	354
Unlisted non-current asset investments	271	244	272	245
Financial assets				
Trade receivables	7,804	9,877	7,282	9,516
Other receivables	220	195	197	165
Cash in hand (including short-term deposits)	51,162	43,342	48,611	40,442
Financial liabilities measured at amortised cost				
Trade payables	763	645	753	566
Other payables	17,256	13,554	16,316	12,603

34. Events after the reporting period

The Authority has considered the impact of Covid-19 on the projected performance of Teagasc for 2022 and expects that management can meet the risks presented by this, accordingly no revision of the figures included in the financial statements for the year ended 31 December 2021 has been made. There have been no other events since the balance sheet date, which necessitate revision of the figures included in the financial statements, or inclusion of a note thereto.

35. Approval of the financial statements

The Authority approved the financial statements on 02 March 2022.