Driving Change Through Education

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Introduction

Sustainability has long been a core principle of Irish agriculture, and the educational philosophy in Teagasc is deeply connected to the institutions it works within. Both the advisory services and colleges, which play key roles in training and education, trace their origins to the establishment of the Department of Agriculture and Technical Instruction for Ireland (DATI) in 1899. This was made possible by the Agriculture and Technical Instruction (Ireland) Act of 1899. These reforms aimed to improve Ireland's social and economic sustainability, particularly in rural areas. The creation of this Department was driven by the recognition that agriculture, central to the Irish economy, needed modernisation, and that technical education could provide the skills necessary for both industrial and agricultural progress.

The DATI was responsible for promoting agricultural improvement and fostering technical education, particularly in rural areas. The functions of the DATI included:

- Providing advice and support to farmers, promoting better farming practices.
- Developing technical schools and agricultural colleges.
- Offering grants and subsidies for research and innovation in agriculture.
- Establishing experimental farms to trial new agricultural methods.

It made important strides in agricultural education, providing a foundation for the modernisation of Irish farming. The establishment of rural technical schools, agricultural colleges with experimental farms, and improved farm management techniques helped to boost agricultural productivity. The department also worked to improve the quality of livestock, dairy production, and crop yields, laying the groundwork for agricultural sustainability. It also helped introduce the idea that technical education is crucial for industrial and economic development, a principle that continues to inform Irish education policy to this day.

For more than 125 years, educational programmes and initiatives have played a crucial role in promoting economically sustainable farming practices. In recent decades, although this economic focus has persisted, the focus on environmental sustainability within educational courses and programmes has evolved and Teagasc has adapted to be able to equip farmers with the knowledge and resources they need to effectively tackle environmental challenges.

The Need for Change in Farming Practices for Environmental Sustainability in Ireland

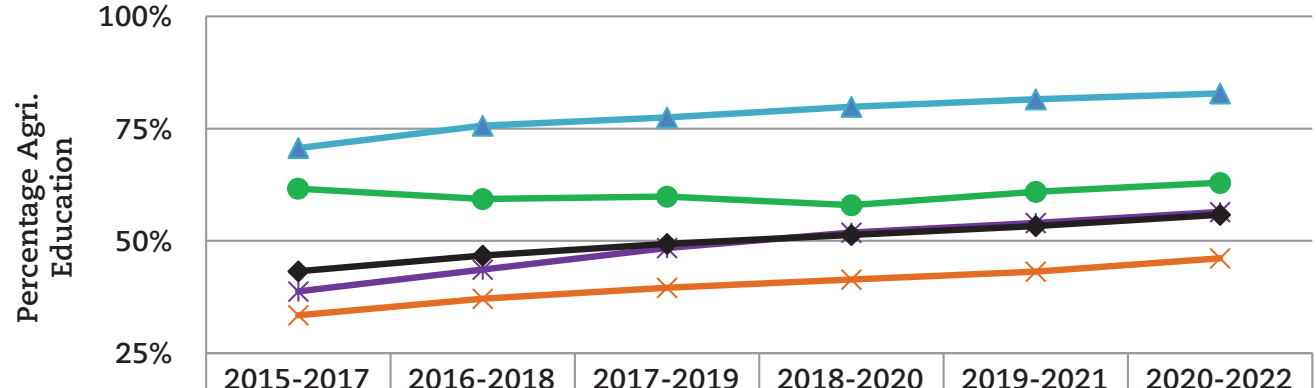
The need for change in farming practices to achieve environmental sustainability in Ireland has become increasingly urgent as the nation grapples with the effects of climate change and biodiversity loss. While traditional farming methods are integral to Ireland's agricultural heritage, there is an increasing understanding that they may also potentially create risks to soil health, water quality, and increased greenhouse gas emissions (Teagasc, 2020). The adoption of more sustainable practices can enhance soil health, reduce chemical inputs, and promote biodiversity (Department of Agriculture, Food and the Marine, 2022). By embracing these innovative methods, Irish farmers can not only contribute to the preservation of the country's rich natural landscape but also ensure the long-term viability of the agricultural sector, aligning with national and EU sustainability goals (European Commission, 2021).

Education as the Driver of Sustainable Change

In the European Union (EU), more than 50% of farm managers have no formal agricultural training (Eurostat, 2013). Similarly, in the USA, less than 6% of farmers have received formal agricultural training (Data USA, 2019).

Ireland has a notably high participation rate in agricultural education compared to other countries (Angioloni, 2024). This success can be traced back to the 1899 Act and the proactive role of the Department of Agriculture in enhancing educational access. Additionally, EU policies and national taxation strategies aimed at fostering generational renewal—including an educational component—have played a crucial role. In terms of rural development, generational renewal goes beyond simply reducing the average age of farmers in the EU; it also emphasises the importance of empowering a new generation of skilled young farmers who can utilise technology to improve sustainable farming practices throughout Europe (European Network of Rural Development, 2024).

The Teagasc National Farm Survey (NFS) tracks educational attainment annually, revealing trends among farmers. As shown in Figure 1, the proportion of farmers who have received some form of agricultural education rose from 44% in 2017 to 53% in 2022. Notably, dairy farmers exhibit significantly higher levels of formal agricultural education compared to farmers in other sectors.



	2015-2017	2016-2018	2017-2019	2018-2020	2019-2021	2020-2022
Dairy	71%	76%	77%	80%	82%	83%
Cattle	33%	37%	40%	41%	43%	46%
Sheep	39%	44%	48%	52%	54%	56%
Tillage	62%	59%	60%	58%	61%	63%
All Farms	43%	47%	49%	51%	53%	56%

Figure 1 Formal Agricultural Education: The percentage of all farmers who have received some form of agricultural education presented as 3 year rolling average 2017-2022 (average per system). Source: Teagasc National Farm Survey Sustainability Report 2022.

Teagasc, as the leading research and advisory body in agriculture, plays a crucial role in delivering agricultural education by integrating cutting-edge research with practical, on-the-ground expertise. This synergy ensures that educational programmes are grounded in the latest scientific findings and technological advancements, equipping students and farmers with the knowledge and skills necessary to address current challenges in the sector. By collaborating with industry stakeholders and incorporating real-world applications into their curriculum, Teagasc fosters a learning environment that is both relevant and responsive to the evolving needs of agriculture. Furthermore, the latest Teagasc strategy initiative, 'Teagasc Together' encourages its extensive network of advisors and researchers to give continuous feedback and suggested improvement, ensuring that educational initiatives remain effective and aligned with best practices in sustainable farming and land management.

Case Studies: Real-World Impact of Educational Initiatives

Incorporating pasture management into the curriculum

In recent years, pasture management has evolved significantly. The development of digital measurement tools and technology has greatly enhanced how pasture is managed. PastureBase Ireland is an online platform designed to help farmers manage their grasslands more effectively. It focuses particularly on pasture measurement and management, aiming to optimise grass production for livestock and ensure it is utilised efficiently.

In addition to the use of this technology, Teagasc started extensive farm wide trials of white clover inclusion on the Teagasc Clonakilty Agricultural College farm in 2012. This quickly demonstrated that incorporating clover into pasture systems offers numerous sustainable benefits that enhance soil health, improve forage quality, and support biodiversity. Clover is a nitrogen-fixing legume, which means it can naturally enrich the soil with nitrogen, reducing the need for synthetic fertilisers.

In educational institutions, significant changes, such as those mentioned relating to pasture management, usually occur gradually. First, the need for change must be identified before being incorporate into the next scheduled curriculum review, which can take a number of years to come around. However, at Teagasc, the close integration with research and the ability to update module content provide an opportunity to implement changes more quickly and demonstrate the latest research first-hand to learners. For example, Teagasc have already introduced pasture development in our Level 5 course through the Grass Production module. In the Level 6 Grassland Management module, Teagasc are further advancing sustainability concepts, focusing on decision-making and the inclusion of clover in grassland management practices.

Sustainable Farming in the Environment (Level 6) module

Economic sustainability has always been a fundamental aspect of our educational programmes. Farm production efficiency plays a crucial role in driving economic sustainability. In turn, these efficiencies contribute to the overall sustainability of the farm. With this in mind, all of our production and soil modules incorporate environmental sustainability. To further highlight the importance of environmental sustainability within our programmes, we have introduced a new "*Sustainable Farming in the Environment*" module at Level 6, aimed at learners in the second-year of their full-time programme.

The environment module specifically focuses on sustainable farming practices, environmental regulations, and protecting natural resources. In summary the module covers:

1) **Sustainable Farming Practices**
   - **Soil Health:** Understanding soil composition, fertility management, and conservation techniques.
   - **Nutrient Management:** Efficient use of fertilisers, crop rotation, and organic farming to reduce environmental impacts.
   - **Waste Management:** Handling farm waste responsibly, including recycling and reducing hazardous waste.
2) **Environmental Regulations**
   - **Irish and EU Policies:** Overview of relevant environmental laws and policies affecting farming in Ireland, such as the Nitrates Directive and the Common Agricultural Policy (CAP).
   - **Cross-Compliance Requirements:** Ensuring that farming practices meet environmental standards, including biodiversity preservation and water quality protection.
3) **Climate Action in Agriculture**
   - **Greenhouse Gas Emissions:** Impact of farming on climate change and strategies to reduce carbon footprints.
   - **Carbon Sequestration:** Methods of capturing and storing carbon, including tree planting and soil management.
4) **Water and Land Management**
   - **Water Quality Protection:** Reducing runoff and pollutants entering watercourses through good farm management practices.
   - **Biodiversity:** Encouraging biodiversity on farms, such as hedgerows, wildlife corridors, and native species planting.
5) **Practical Applications**
   - **Farm Audits:** Conducting environmental audits on farms to assess impact and improve sustainability.
   - **Agri-Environment Schemes:** Participation in government-supported schemes like past schemes such as GLAS (Green, Low-Carbon, Agri-Environment Scheme) or REPS (Rural Environment Protection Scheme) or the current Agri-Climate Rural Environment Scheme (ACRES).

This module is essential for modern farmers in Ireland, ensuring they can balance productivity with environmental stewardship, aligning with national and EU sustainability goals.

Overcoming Barriers to Educational Change in Farming

Although we can adaptively implement changes and solutions to enhance farm sustainability, challenges still persist. While Teagasc remains the primary provider of vocational education in agriculture, it is no longer the only one. In recent years, Education and Training Boards (ETBs) and private educational institutions have also begun offering agricultural education at both Level 5 and Level 6 providing additional opportunities for farmers to acquire "Trained Farmer" qualifications. Given Teagasc's emphasis on the significance of environmental sustainability in agriculture and its leadership in emerging technologies within this field, it is important that the research information available through Teagasc is used to influence the curriculum and learning outcomes provided by other institutions as well as by Teagasc programmes. Existing collaborations in place with a number of providers, including Higher Education Institutes that utilise Teagasc and private Agricultural Colleges for programme delivery is an important example of this collaboration.

Conclusion

Agricultural education in Ireland has evolved since the establishment of the Department of Agriculture and Technical Instruction (DATI) in 1899, which aimed to modernise farming practices and enhance the socio-economic conditions of rural areas. As Ireland grapples with climate change and biodiversity loss, there is an increasing and urgent need to shift towards more sustainable farming methods.

Education is pivotal in facilitating this transition, with Teagasc at the forefront, integrating cutting-edge research and technology into its training programmes. The introduction of initiatives such as improved pasture management techniques and the new "Sustainable Farming in the Environment" module underscores the commitment to environmental stewardship in agricultural education.

In addition to these advancements, new opportunities are emerging through new educational providers, such as Education and Training Boards (ETBs) and private institutions. To ensure that sustainable practices are effectively incorporated into all agricultural training, there is an important role for Teagasc to continue to support the curriculum and learning outcomes offered by these emerging institutions. This ongoing effort is vital for aligning Ireland's agricultural practices with national and EU sustainability goals.

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