REPORT 1: Characterising the ‘role model’ farmer

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TASK REQUIREMENTS

Report 1: 'Characterising the role model farmer' is one of three reports (*Report 2: Enabling farmers to transition to role model farming* and *Report 3: Transferable Lessons for Role Model Farming)* that respond to the requirements of *Task 5 – The 'Role Model' Farmer* of the *Co-BioEcon* project (2021-2027). These reports stand alone but it is recommended they are read consecutively for context.

Task 5 *'Characterising the 'role model farmer'* contained three subtasks detailed below:

1. To define the characteristics of the role model farmer.
2. To map the bioeconomy networks of the role model farmer.
3. To understand innovation and incentives at the scale of the farm household.

1. INTRODUCTION

This report identifies the characteristics of the 'role model' farmer, operating within the agri-food sector (Matthews, 2021). Farmers are identified as central to building capacity in the bioeconomy, as they implement necessary change and develop innovations at the local level, in transitions to more sustainable food systems (Hofer et al., 2026; O'Connor et al. 2025). However, they are also identified as hard to reach (Whitton and Carmichael, 2025; Kinsella, 2018), marginalised from the bioeconomy, and denied a 'just transition' (Brawley-Chesworth et al. 2026; Just Transition Commission of Ireland, 2026; Martin et al. 2025; Faulkner et al. 2024; Harrihill et al. 2023). Understanding the characteristics of the role model farmer is essential therefore to 'draw farmers in' to the bioeconomy, allowing agri-food policy and agricultural extension to be aligned (Mahon et al. 2010) and coherent (Kelleher et al. 2019), whilst simultaneously rooted in farmer narratives (Brawley-Chesworth et al. 2026), and farmer typologies (Huber et al. 2024).

Using a qualitative approach which included semi-structured interviews and farmer-facilitated workshops, 31 farmers were interviewed or participated in an activity-specific innovation workshop. The results revealed multi-faceted and inter-related characteristics divided into four sub-types: practices, skills, motivations and attitudes. Understanding Irish farmers' characteristics has critical importance because it can enhance policy creation by allowing for heterogeneity with targeted policy communication, thereby avoiding the policy gap.

This research departs from previous research by adopting a broad interpretation of role model farmer characteristics tied to an emerging bioeconomy, which identifies practices (actions and behaviours), skills (hard skills, such as farming qualifications, further education, lifelong learning and technical proficiency, and soft skills, such as self-management, teamworking and interpersonal skills and business soft skills), motivations (intrinsic and extrinsic); attitudes (affective, behavioural and cognitive) in an Irish context. There is no application of farmer characteristics to Irish policy creation currently.

2. FARMERS AND THE BIOECONOMY

Farmers are identified as central in the transition to the bioeconomy as they produce and manage the biological resources that allow the bioeconomy to replace some fossil-based resources with renewable, biological alternatives. However, their role extends far beyond this singular interpretation as set out by Bühler et al. (2026).

1.1 Farmer roles in the bioeconomy

- **Farmers as implementers of sustainable agricultural practices**

Achieving a balance between the economic objectives of farming and its social and environmental responsibilities largely depends on farmers' knowledge, skills and willingness to implement sustainable agricultural practices and develop their knowledge base whilst doing so.

- **Farmers as drivers of a sustainable and circular bioeconomy (food) system**

Farmers can also integrate circularity into their operations by engaging in short food value chains in their immediate localities.

- **Farmers as custodians of local knowledge and innovators**

Local farmers have adapted sustainable agricultural practices to their local conditions, which supports the development of localised solutions. Farmers, therefore, have valuable traditional knowledge on regionally adapted farming practices. Sharing this knowledge and integrating that knowledge into modern bioeconomy strategies can enhance sustainability and resilience (Schmid et al. 2012), especially when co-created with other stakeholders.

- **Farmers as managers of landscapes**

Landscapes are significantly shaped by agricultural systems. These systems are the

result of a long evolution which have deep cultural value. Farmers are not only able to maintain these cultural landscapes, but they can also change them. In the Irish context this can be seen both positively and negatively with the change in agricultural land use, for example from food production to energy renewal in recent times.

- **Farmers as contributors to rural development**

Farmers have an important role to play in rural development as they can bring innovation and new green businesses to rural regions, whether in the areas of agriculture, food and biomass processing, or the provision of ecosystem services.

- **Farmers as enablers of the nexus between nature and industry**

Farmers are the managers and custodians of the natural resources that provide the biomass feedstock for the bioeconomy and have engaged with industry to successfully achieve this.

While it is important to identify these roles for farmers in the bioeconomy, it is also necessary to understand from farmers how they perceive the bioeconomy.

1.2 Farmers and the bioeconomy narrative

Farmers' perceptions, awareness, attitudes and understanding of the bioeconomy are fundamental to the development of the bioeconomy and to the process of transitioning. It is essential to know how farmers see themselves in the bioeconomy narrative interpreted through these collective insights. Literature on farmers' perceptions, awareness, knowledge, understanding and attitudes towards the bioeconomy typically are focussed on countries, regions or farming activity type. Focussing on Europe, Stern (2018) highlights that the bioeconomy in Austria is associated with diverse themes, ranging from sustainability and responsible consumption to criticisms related to the practical feasibility of the concept, with farmers expressing a higher degree of scepticism especially in relation to potential economic inequities and the risks associated with change. Balan and Zealdea (2023) investigate farmers' bioeconomic knowledge in Romania, specifically is the concept of the bioeconomy known and

understood by Romanian farmers. The authors identified that farmers' attitudes towards the bioeconomy are generally positive and their data showed higher knowledge of the term bioeconomy with rural, active and professionally mature (agricultural) workers. The research methodology was quantitative, based on a sample consisting of 101 respondents in rural areas, who completed a self-administered questionnaire containing 22 questions. Moving to Poland, Pink et al. (2025) adopt a qualitative approach and interviewed 100 farmers using 10 metric questions, the answers to which were rated on a 5-point Likert scale, specifically farmers were asked if they were familiar with the circular bioeconomy, 87% of the respondents declared they are familiar with and understand the concept of the bioeconomy, and 62% have positive associations with the term. In Southern Sweden, Pettersson et al. (2024) analyses contract farmers' perceptions and practices related to the circular bioeconomy in relation to pea cultivation, drawing on 11 semi-structured telephone interviews. The authors identify knowledge and awareness was a recurring theme throughout and correlate this with the implementation of sustainable methods. They note the contribution of different media and news sources as aiding the transition to the circular bioeconomy. In the Region of Western Macedonia in the Western Macedonia Region of Greece, Paltaki et al. (2023) identifies that while farmers understand the bioeconomy, they are not confident it will benefit them personally, the authors note this perception could be linked to education and demonstrates how farmers' attitudes toward the bioeconomy might develop.

An attitude is a psychological construct that has three interconnected elements, affective (feelings), behavioural (actions) and cognitive (beliefs). Farmers' attitudes refer to intrinsic frames of mind produced by several types of beliefs that significantly influence their thoughts and behaviours towards sustainable agricultural practices ('SAPs'). These attitudes impact motivation, engagement, and the intention to adopt or change practices on their farms. Farmers hold a complex set of beliefs connected to the bioeconomy. In Romania, for example, Polimeni et al. (2022) focusses on the environmental attitudes of farmers selling in Romanian farmers markets. The authors identify that having knowledge of farmer attitudes selling at farmers markets is important to the development of the agricultural sector and the development of the bioeconomy. It also enables policy to be developed to encourage the development of

sustainable agricultural techniques. Their results indicate that there is a disconnect between the beliefs and the attitudes farmers have about their environment and their agricultural practices in various scenarios. In Ireland, Sadeghzadeh et al. (2025) locate the attitude of 'social acceptance' of the bioeconomy focussing on two bioeconomic innovations, grass biorefineries and anaerobic digestion. The authors identify that farmers can move through distinct behavioural changes from willingness (passive acceptance) to intention and ultimately to active support. For grass biorefineries, farmers' willingness to accept it is driven by how capable they feel in supplying biomass, showing that empowerment is key to participation. For anaerobic digestion, engagement follows a more deliberate process that depends heavily on trust and justice. Because farmers view each innovation differently, engagement strategies must be aligned with the behavioural logic unique to each technology (Teagasc, 2026). Whilst these studies give insights as to how the bioeconomy is being received by farmers – the 'role model farmer' approach presents a bridge to intensive farmers to transition to the agri-bioeconomy.

1.3 The 'role model' farmer

Given the multiple roles a farmer can undertake in the bioeconomy, it follows that the 'role model farmer' is highly significant in the promotion of the bioeconomy between farmers. The role model farmer is a model of knowledge exchange and transfer that includes the reciprocal sharing of information, farming techniques, research, created through several different mediums and networks usually through the prism of social learning (Bandura, 1977). Social learning is rooted in psychology and can be acquired through knowledge, attitude and behaviours by observing and interacting with others. There are several ways in which farmers can engage with knowledge transfer, these include peer to peer through trusted social networks, hands on demonstrations (in Ireland, these are known as 'demonstration initiatives'), farm walks and discussion networks. In a country such as Ireland, these pathways are formalised through the AKIS framework (EU, 2026). The AKIS framework consists of different stakeholders that implement activities and practices to support the generation and use of knowledge and innovation for sustainable agriculture and rural development (CAP Ireland, 2026). Ireland's CAP Strategic Plan committed to the establishment of an AKIS Coordination Group (CG) to manage and improve the AKIS in Ireland, boosting knowledge and

innovation flows for food and biobased systems and rural society. It was formed in late 2023 and comprises representatives from across agricultural sectors and rural communities, such as farmer representative groups, industry, advisory services, education, research, and media.

The role model farmer model is used widely in developing world agricultural extension (Taylor and Bhasme, 2018). In Ireland, agricultural extension is primarily driven by Teagasc and a growing number of private advisors (O'Fathartaigh et al. 2025) through the mechanism of the role model farmer approach. In simple terms, a role model farmer is an agricultural producer (or primary producer) who successfully demonstrates innovative, sustainable, or community-focused farming methods. 'Role model farmers support agricultural advancement and community connection by taking on several responsibilities which involve practical mentorship, environmental stewardship, knowledge co-creation and community building' (Farming for Nature, 2026). The importance of the role model farmer is well established in the Irish context (Macken-Walsh, 2013) and is used to enhance knowledge transfer and exchange through advisory and farming services, which allows for 'community-centric, farmer-centred and participatory approaches that enhance rural change through a social learning lens' (Ochieng et al. 2022, p7).

2. METHODOLOGY

2.1 Introduction

A qualitative research design (Strikjer et al. 2020) was selected as appropriate for the aim and objectives of the task and reflects an attempt to secure an in-depth understanding of the characteristics of the role model farmer. The task addressed several key questions:

1. What are the characteristics of the role model farmer in the Irish bioeconomy?
2. What is the extent and interconnectedness of the role model farmer's social bioeconomy network?
3. What is the degree of centrality of the farmer in his bioeconomy network?
4. What strategies can enable farmers to transition to the circular bioeconomy?
5. What are the barriers to participating in the circular bioeconomy from the perspective of a tillage/sheep/dairy farmer?
6. What recommendations can these farmers make so they can more easily transition to the circular bioeconomy?

2.2 Data collection

Data collection involved two instruments, semi-structured interviews and innovation workshops designed using a focus group methodology (Krueger, 2002) and based on the Hazard et al. (2022) facilitation method, and discussion group model (Manolova et al. 2025), through a process of social learning (Bandura, 1977). Semi-structured interviews have become an important part of the tradition of using qualitative research approaches with farmers and were used in this research to reveal and explain farmers' characteristics (practices, skills, motivations and attitudes). Purposive sampling was used to access farmer participants for interview as this is widely adopted in bioeconomy research (Tassinari et al., 2021). Data collection was undertaken in two parts. In Part One, 16 farmers were interviewed, in Part Two data collection, an additional 15 farmers were recruited to participate in one of three innovation

workshops (tillage, sheep and dairy) facilitated by a Farmer Facilitator identified from Part One.

As farmers are 'a sub-cultural group located in a particular landscape' (Kuehne, 2016, p1), rather than 'reaching out' a 'drawing in' approach was adopted in all communications with them. This included using 'snail mail' or direct phone calling to introduce the *CoBioEcon* project in general terms. This 'drawing in' was supported throughout all communications with an emphasis on the fact their expertise was needed, and their contribution would impact local, regional and sectoral policy. In addition, it was also specified that the workshop would be facilitated by another farmer. An intentional communication style was adopted with farmers, for example, it was made clear to farmers that the author was not an expert in their farming activity and the role in the innovation workshop was as co-ordinator and note-taker only. A relaxed and informal approach was adopted when liaising with farmers about the interviews and innovation workshop (Kuehne 2016), this included meeting some farmers 'at the farm gate' when it suited them. This process also included scheduling of the innovation workshops at times when farmers were more likely to attend given their work schedule (for example, the dairy innovation workshop took place after morning milking at 11.00 am, the tillage innovation workshop took place late in the evening at 7.30 pm).

Sixteen interviews took place in total, five were in person and eleven interviews were conducted online using *Zoom* (Boland et al. 2022) software. Thirteen farmers were male and three were female. All participants were anonymised and informed consent was obtained for data collection, storage and for use in academic publications (including conferences). Interviews lasted on average 45 minutes and were recorded on three devices in case of device failure. Data saturation (Lowe et al. 2018) was reached by the nineth interview. Given the relatively small number of farmers interviewed geographical representation was not possible. An interview schedule was developed (Appendix 1). Questions were divided into two distinct sections: characteristics of the role model farmer and identification of his social bioeconomy network. In Part Two of the data collection, three innovation workshops were held via *Zoom*. The innovation workshops were based on a facilitation method to foster collective action in transitions to sustainable agriculture devised by Hazard et al.

(2022). This method identifies that supporting farmers in their change to more sustainable practices requires dealing with the singularity of their situations which ultimately defeats the 'one size fits all' approach. Preparation for the innovation workshops included identifying the characteristics of three role model farmers from Part One data collection using their interview transcripts. A meeting (Farmer Facilitator Training) was then set up with the role model farmer to train him/her for the innovation workshop. This training session took on average 15-30 minutes. The aims of the training session were to:

1. Reiterate the aim and expected outcomes of Task 5 of the project in plain English (that is, to enable farmers to transition to more sustainable pathways using approaches that protects farming livelihoods and that ultimately the project will be developing regional bioeconomy strategies with the farmers voices embedded along with other stakeholders in the bioeconomy).
2. Explain the aims of the Innovation Workshop.
3. Explain the role of the Farmer Facilitator in the Farmer Innovation Workshop referring to the Farmer Facilitator Training Pack.
4. Explain the role of the Note-Taker also referring to the Farmer Facilitator Training Pack.
5. Explain the format for the Innovation Workshop.
6. Explain how the attending farmers have been recruited and from where.
7. Agree the time of the Innovation Workshop.
8. Review the interview transcript and identify to the Farmer Facilitator the practices/motivations/attitudes he/she himself identified in the interview and create a draft slide for the Farmer Facilitator's agreement.
9. Agree a set of co-created activity sensitive questions for discussion.
10. Explain how to manage conflict or overbearing farmers during the innovation workshop.

For ease, all the foregoing information was set out in the Farmer Facilitator Training Pack (Appendix 2). This also included information on the project and the bioeconomy,

the aims of the workshop, the guiding questions overarching the innovation workshop and a series of activity related questions co-created with the Farmer Facilitator along with a suggested script to open the meeting. Some relevant resources were also provided. In addition, the characteristics of each role model farmer was set out on a *Powerpoint* slide for sharing in the innovation workshop that was approved by each Farmer Facilitator. Each Farmer Facilitator was contacted either the day before or morning of the innovation workshop for any last-minute queries. Farmer Facilitators were thanked and debriefed at the end of the innovation workshop.

The aims of the innovation workshop set out to the Farmer Facilitators were:

1. To reveal sustainable agricultural practices adopted by them to the attending farmers.

2. To identify and investigate barriers in the transition to the circular bioeconomy from the perspective of (tillage/sheep/dairy) farming in discussion with the attending farmers.

3. To identify their characteristics (practices, skills, motivations, attitudes) that may enable other farmers within their activity to transition to the circular bioeconomy using the co-created slide.

4. To find solutions for transitioning to more sustainable agricultural practices and translate these into baseline strategies and recommendations in conversation with other farmers.

The guiding questions for the innovation workshop were:

1. What strategies can enable farmers to transition to the circular bioeconomy?

2. What are the barriers to participating in the circular bioeconomy from the perspective of a (tillage/dairy/sheep) farmer?

3. What recommendations can farmers make so they can more easily transition to the circular bioeconomy?

Invitations to attend the innovation workshops were issued via gatekeepers in several different organisations, including the *Irish Farmers Association* (drawing on national and sectoral committees), *Base Ireland* and through the *Dúlra Project* (*Forum Connemara GLG).* Farmers were also invited from the newly formed *Kepak Young Farmers Forum* and *The Irish Tillage and Land Use Society*. Purposive sampling was chosen because it allowed for a targeted approach to select participants who are particularly knowledgeable and experienced around their farming interest, thus providing rich and relevant data (Palinkas et al. 2015). In total, 13 farmers attended (tillage (4), sheep (4), dairy (5)). Geographical spread was attempted. All farmers were issued with a *Participant Information Sheet* and invited to return the *Informed Consent Form* and *Socio-demographic Information Form*.

Qualitative social analysis was deemed more appropriate to meet the main objectives of the project and sub-tasks of T5, where it was considered more important to know the 'how' and 'why' of farmer bioeconomy networks. Developing the farmers' social bioeconomy network within a qualitative framework permitted a unique interpretation of farmer characteristics in the Irish context (practices, skills, motivation and attitude), and meant that networking in the social bioeconomy emerged as a key practice by role model farmers. Farmers at the project kickstart were identified as a stakeholder group without differentiation to farming activity or enterprise. A decision was made prior to data collection to access farmer participants in the three main farming activities (dairy, sheep and tillage) in order to nuance the transferable lessons in Report 3. A further decision was made to identify role model farmers who were Irish national or European award winners.

2.3 Data analysis

All interviews and the innovation workshops were transcribed *verbatim* using *Microsoft Word* and the 'Dictate' function and/or *Zoom* text transcript. In addition, a qualitative social network analysis (Wood et al. 2014) was undertaken to identify the 'why' and 'how' of farmer social networks. Transcripts were interpreted for semantic and latent

meaning, drawing together contextual, relational, temporal and spatial aspects of the farmers' narratives about their experiences of the emerging bioeconomy and then coded (Saldana, 2025) with a view to revealing the broad characteristics of role model farmers, barriers and pathways (Report 2) to the development of the bioeconomy as experienced by farmers and to identify baseline strategies and recommendations (Report 3). The first stage of analysis involved precoding. Initial codes were generated from these precodes. These initial codes were then reduced by discarding some, collapsing and expanding others to render the final focussed codes. These codes were then collated into sub-themes and finally into main themes that informed each report (practices, skills, motivations and attitudes; barriers and pathways; baseline strategies and recommendations) to complete the thematic analysis (Clarke and Braun, 2017).

3.4 Ethics

Ethics approval for this research was granted by the Research Ethics Committee at the University of Galway in 2023.

3. CHARACTERISTICS OF THE ROLE MODEL FARMER

This section sets out the characteristics of the role model farmer in the emerging bioeconomy in Ireland, following the sub-typologies of practices, skills, motivations, attitudes and skills. Several farming management systems (traditional, organic, biological) were identified accommodating multiple farming activities and enterprises, which included beef and dairy production, sheep production, horticulture (market and industrial) and tillage. This section begins with the identification of the main practices revealed by the role-model farmers. Practices in this sense also means any actions or behaviours that fall under the umbrella of sustainable agricultural practices ('SAPs'). Next, attention is placed on role model farmers' skillsets, revealing key hard and soft skills and the combination of these, in the form of experience and indigenous agricultural wisdom. The adoption of SAPs and the acquisition of education and training do not occur without motivation, and the next section follows to explain both intrinsic and extrinsic motivation. Both motivation and attitude are highly linked, the results then turn to examine the main attitudes revealed by the participants in their narratives with the recognition of two bioeconomy identities emerging in the bioeconomy.

3.1 PRACTICES

Sustainable agricultural practices are the foundation of the bioeconomy transforming farms from resource consumers into circular systems that produce food, renewable energy and bio-based materials. A sustainable agricultural practice is a farming method designed to produced food without depleting natural resources, polluting the environment, or harming ecosystems. It focusses on long-term soil health, water conservation, biodiversity, and economic viability so that future generations can continue to meet their food needs. Sustainable agricultural practices are centred around soil management and health, water and resource conservation, pest and eco-system management and animal welfare.

- **Adoption of sustainable agricultural practices**

Adopting SAPs is a key signal of willingness to transition to the bioeconomy. Sustainable agricultural practices in agri-food production are methods that meet current global food needs without compromising the ability of future generations to do the same. These systems conserve natural resources, minimize environmental degradation, and support long-term economic viability and ecosystem health (Teagasc, 2024). While Chauhan et al. (2026) identify that adoption of SAPs globally remain low, farmers in this study evidenced the adoption of several SAPs, one of which included the conversion from intensive farming to organic farming. Organic farming is widely considered a highly sustainable agricultural practice (Raj et al. 2024) and production management system, and the Irish organic sector has experienced rapid growth in recent years (Teagasc, 2026). A major factor distinguishing organic farming from other approaches to sustainable farming is the existence of internationally acknowledged standards and certification procedures. A two-year conversion period is required before a farm is given organic status. Leduc et al. (2023) connect the decision to convert to organic as linked to 'farmers' perceived values'. In the case of Ireland, the authors identify prominent attributes that characterise organic farming such as being 'environmental'. In this research, the notion of 'being environmental' was a driver for conversion to organic farming was corroborated by Farmer 15:

> *"I love looking after the way the farm looks from an environmental point of view"*

On the other hand, another farmer explained is decision to convert to organic farming was motivated by the *Organic Farming Scheme* (Government of Ireland, 2026) as advised to him by another farmer and his agricultural advisor.

Aside from the significant decision to convert to organic or remain intensive, several other SAPs were identified. One of which included utilising selective breeding and genomics to breed dairy cows for specific traits is widely considered a highly sustainable practice when focused on overall efficiency. By breeding cattle that convert feed to milk more effectively and require fewer health interventions, farmers can significantly reduce the carbon footprint per litre of milk produced (Starloski et al.

2025). This SAP was exemplified by Farmer 16, in the management of her dairy farm. Whilst her farm is not organic, the value of the herd is sustained by optimisation of the herd through genetic cattle and milk production (monitoring of the somatic cell count) and close management of the grassland (use of multi-species swords) and protection of the farm waterways, and the management of road runoff. Farmer 16's protection of the quality of waterways and enhancing biodiversity was especially notable and creative.

Turning towards sheep farming, the decision to convert to organic sheep farming was largely motivated by financial incentives and a decrease in labour attached to managing the herd. Other SAPs included the use of wool in creative and innovative ways on their farms. This included using wool in the form of 'wool logs' and burying them in drains and 'wool bridges' for sheep for access. This finding connects to an emerging practice in Ireland and the UK first developed by *Ulster Wildlife*, which formed part of successful trial with farmers to reuse a 'waste product' and a turn towards recognising wool as product in the bioeconomy (Murphy, 2025).

In relation to tillage farming, several SAPs were identified and these including the planting of 'tolerant' crops, sowing earlier in response to weather variability and the use of 'chopped straw' (chopped straw refers to the shredded stalks of cereal crops (like wheat, barley, or oats) that are cut into small pieces (usually 2 to 5 cm) by a combine harvester during the grain harvest, instead of being baled for animal bedding, it is spread across the field and tilled into the soil.

- **Farmer mobility for knowledge transfer and exchange for use in Ireland**

The adoption of SAPs has been linked to international experiences such as international travel (Friedrichsen et al. 2024) and international travel has been identified as transformative for farmers leading to behaviour change. International travel experiences can van be varied in purpose, length of time abroad, cultural immersion, structured travel and independent study. Transformation and behaviour change occur as part of two processes. Farmers who travel can experience 'disorientating events that force them to reconsider and reject their current mental models of their agricultural system' (Ibid. p1139), secondly, experiential learning

through visiting farms, meeting producers and spending time reflecting on what they were experiencing with their peers allowed farmers to rebuild their mental models and be inclusive of the broader agricultural system. The importance of travel for knowledge transfer and knowledge exchange for application in Ireland was identified by several farmers. Some of this travel was incidental (for example, attending an agricultural machinery fair, such as The LLAMMA Show in Birmingham, UK) as part of a family holiday and was therefore short. Longer term travel was associated with the acquisition of further academic qualifications. Incidental travel was exemplified by Farmer 1, who had had coincided holidays with agricultural and technology fairs mainly in the UK. The results of this were the installation of an automated milking system and identification of anaerobic digestion as a possibility for his farm. Farmer 8 similarly identified travelling to London in the early 1990s, he had also travelled to Germany in pursuit of information about anaerobic digestion and this helped him to foresee the difficulties in bringing an anaerobic digester to his own farm. A difference in the reason for travel for knowledge transfer and exchange was linked to some of the younger farmers in the main. Longer-term international experiences that involved independent study, cultural immersion, and global network development are identified as supporting the adoption of SAP, through perceived attitudes, social norms, and behavioural control. This was evidenced by Farmer 9, who had undertaken a master's degree in the Netherlands.

- **Rejection of 'expert advice' to pursue their vision for their farming 'business'**

Professional advice to farmers can come from a variety of sources. In the case of Irish farmers this can be formalised through private agricultural advisors/consultants, the Department of Agriculture, Food and the Marine, Teagasc or agricultural/sector specific farming/agricultural organisations. Not all advice was accepted by the cohort with the practice of rejecting 'expert advice' identified. This result connects to the findings of Rust et al. (2021) who identify that farmers may have 'had enough of expert advice' and link this to the exponential rise of information which also increases the challenge of knowing which information to trust. They identify that farmers, when learning about agricultural innovations have historically relied on in-person advice from

traditional ‘experts’ such as agricultural advisors, to inform farm management. Drawing on data from the UK and Hungary, the authors sought to understand how farmers in both countries learned about sustainable soil innovations and more importantly, who influenced them to innovate. Farmers placed most trust in other farmers to learn about soil and were less trusting of traditional experts, particularly agricultural researchers from academic and governmental institutions, who they believed were not empathetic to farmers’ needs. This corroborates the findings in this study, with participants identifying the necessity to bypass or circumnavigate such expertise to achieving their vision for their farm. For example, Farmer 1 identified this practice drawing on his experience when liaising with local and national entities who did not have the same knowledge or experience base as himself. Linked to the ability to reject expert advice is the willingness to ‘stand out from the (farming) crowd’.

- **Willingness to ‘stand out from the (farming) crowd’**

This research revealed that farmers were willing to ‘stand out from the crowd’ within the local farming community and this was exemplified in a few distinct ways. For example, two female dairy farmers one part-time (leased land), one full-time (landowner), placed great importance on creating the appropriate architecture for their farms to be environmentally and financially sustainable. Whilst this may be understandable in the case of the full-time farmer who owns her farm, it is somewhat unusual to invest capital in this way as a part-time, leasee farmer. Farmer 15 justified this decision as “*part of the bigger picture*” and this practice fed her vision for the farm that would outlive her current lease. She identified that others were surprised at this investment which makes sense if you consider her vision of farming as one that is not tied to any one farm. Farmer 16 on the other hand, also made strong architectural decisions albeit much more creatively given the size, location and her ownership of her farm. The process of reviewing and altering the architectural infrastructure of the farm had been a long endeavour with multiple changes including construction and reconstruction of aspects of the farm to enhance biodiversity and conservation. This practice led to others identifying them personally as being “*too green”* or being viewed as an “*odd ball*” in their local farming communities.

- **Risk-taking (calculated)**

The willingness to 'stand out from the crowd' is connected to 'smart' or 'calculated risk taking' and in the agricultural sector important societal and individual decisions are taken in the context of risk and uncertainty' (Iyer et al. 2020). Begho (2022) identifies that the willingness to take risks is a credential for a role model farmer. In this research, and connecting to the previous practice, Farmer 1 was very quick to insist that rejection of expertise did necessarily amount to risk-taking, rather this was a "*calculated risk*", with expertise used that was much closer to him drawn from within his agricultural and family networks. Therefore, rejecting expertise and exercising reasonable risk-taking meant that farmers were more likely to develop a willingness to 'stand out from the crowd' within their local farming community.

- **Networking in the social bioeconomy**

Knowledge exchange was highly evidenced in familial networks. Using 'family resources' is especially useful for small-holder farms. Familial networks in farming include labour, shared knowledge (and experiences). Ochago et al. (2021) identify this practice in relation to coffee farmers and found that farmers rely on information, labour, emotional support, coffee production inputs, linkages to training avenues, and supportive actors by family members. These resources help to engage in learning activities that lead to the development of challenges-solving knowledge. Farmers learned how to properly space coffee plants, apply fertilizers, and spray against pests and diseases through observing and interacting with fellow family members during regular farming tasks (e.g. planting, pest and disease scouting and control). This use of family networks was exemplified in two separate examples. In developing self-sufficiency in terms of energy and the installation of an anaerobic digester, the idea for this was developed from Farmer 1's immediate family who were all professionally qualified. In another partnership, Farmer 5, who was in a relationship with Farmer 6, was consulted on all decisions in relation to her partners' farm and he on hers. Farmer 1 also identified his 'agricultural friends' network – this was entirely supportive and included other farmers in Ireland and abroad and suppliers of farm machinery and services (including advisory services). Agricultural friends in this sense also extended

to farmer discussion groups which can sometimes comprise of one or several role model farmers.

- **Farmer Discussion Groups**

The practice of knowledge transfer to other farmers was evidenced by several of the participants attending farmer discussion groups in their locality. Farmer discussion groups are primarily arranged by Teagasc (and occasionally by agricultural consultants/planners) and consist of a farmer-led network who meet regularly on farms to see, discuss and learn about technologies and practices that may be applied on their own farms. Typically, discussion groups consist of 10 to 15 farmers who meet between 6 and 12 times per year. Some of the benefits include increasing profitability, developing a social network, personal development, receive technical information at the right time, developing public responsibility (as part of a group), farm planning and management, positivity, benchmarking farm performance, awareness of schemes and problem solving (Teagasc, 2026). Farmer discussion groups have been identified as having a role in promoting sustainable farming practices (Adenuga and Jack, 2025; Dooley, 2020). Drawing on statistical data collected from Northern Ireland relating to Environmental Business Development Groups, their results indicate that the farmers age, higher educational qualifications, agricultural education, land area farmed, and farm diversification, are positive statistically factors influencing participation in Environmental Business Development Groups. In the context of this research, several farmers were connected to their local Teagasc Discussion Group, although the experiences of benefit differed. For example, Farmer 3 identified the benefits of his local discussion group as well as attending his local discussion group he was a designated *Signpost Farmer*. A *Signpost Farmer* is a participant in the *Teagasc Signpost Programme (Farmers for Climate Action)*, an Irish multi-annual initiative designed to lead climate action in the agricultural sector. These farmers act as demonstration leaders, testing and showcasing sustainable, climate-smart farming methods. There are roughly over 100 dedicated demonstration Signpost Farmers spread across Ireland representing various sectors (dairy, beef, sheep, and tillage). Their role is to act as a living lab and educate peers. Farmer 11, one of the younger participants was also involved in his local Teagasc Discussion Group on the

recommendation of his PhD supervisor. While the adoption of SAPs is highly important for transition to the bioeconomy, this cannot occur without requisite skills.

3.2 SKILLS

Grama and Batrina (2024) explore the evolving skill requirements in the agricultural sector drawing on the European Skills/Competences, Qualifications and Occupations framework (EC, 2026) and acknowledge the highly dynamic and adaptive skill set now required by those in the farming profession. The results of this research indicate a strong and complementary mix of hard and soft skills, as well as some skills which are a combination of both skill sets (such as experience and tacit knowledge).

Hard Skills

- **Farming qualifications, further education, lifelong learning and technical proficiency**

O'Donoghue and Heanue (2016) state that knowledge transfer in agriculture is typically based on two activities, the delivery of education and the provision of advisory services. In this research, all farmers had completed second level education. Two were educated to doctoral level. In addition, earlier adopters of innovations or best management practices are more likely to have formal agricultural education which the authors attribute to reduced risk aversion, higher skills and better decision-making. In the case of Farmer 1, who had installed the first farm-scale anaerobic digester, his educational trajectory matched this scenario, with a degree, the 'Green Cert' (formally the Certificate in Agriculture) (see Teagasc, 2026) and additional qualifications in renewable energy. However, the necessity of a third level education was challenged by one farmer who had not attended a college degree course but rather had relied on his experience and knowledge of his land for which he had identified as an expert. While technical knowledge and proficiency are essential, they are supported largely by soft skills.

Soft Skills

Soft skills are a core part of agricultural innovation (FAO, 2026). Mayor et al. (2022) identify the skills agricultural professionals need to engage in the transition to sustainable agriculture which the authors sub-classify into five soft skill sets within a European context: fundamental soft skills, self-management skills, teamworking and interpersonal skills, business soft skills and education skills. Both hard and soft skills are crucial, but it is also increasingly recognised that experience and indigenous agricultural wisdom are especially important regionally.

- **Experience and indigenous agricultural wisdom**

Both experience and tacit knowledge or 'tacit knowing' (Polyani, 1958) are combinations of hard and soft skills, with experience viewed as component of tacit knowledge. The key to acquiring tacit knowledge is experience. In an Irish context, this concept is known as 'indigenous (agricultural) wisdom' (Macken-Walsh, 2013) also known as or 'traditional knowledge' (Rao, 2025). Curry and Kirwan (2014) define tacit knowledge as 'intuitive knowledge that cannot be formalised' drawing data from a local food partnership. They draw on Gerholm's (1990) six typologies to identify customs, *savoir-faire*, folklore, identity, roles and discourse. These are evaluated in the context of negotiating sustainable agriculture values in the development of a sustainable food strategy. In the context of this research, customs map neatly onto the practice of *meitheal (*an old Irish term that describes how neighbours would come together to assist in the saving of crops or other tasks*); savoir-faire* (knowing how to act), a '*cúis mhaith*' (good motive or reason) or '*cén le hiompar*' (knowing how to behave) as in the 'good farmer' identity (Burton et al. 2020).

3.3 MOTIVATION

In simple terms, motivation may be defined as the psychological force that initiates, guides and maintains goal orientated behaviours, motivation may be intrinsic or extrinsic. In the case of farmers, intrinsic motivation represents the inherent personal rewards a farmer feels from practicing SAPs, these could include deep-seated

concerns for environmental (pro-environmental behaviour) and public health, autonomy and legacy.

Extrinsic Motivation

- **Economic incentive**

Extrinsic motivation is represented by an economic incentive. For example, farmers in Ireland can get paid through a variety of schemes funded by the Common Agricultural Policy (CAP), the Irish Government, and the EU (Government of Ireland, 2026). These payments cover basic income support, environmental and ecological practices, animal welfare, and capital investments. In this research, extrinsic motivation was largely developed through payments and schemes which were either direct income supports or agri-environment and organic schemes. This finding is supported by Leduc et al (2023) who identify the payments from schemes as a key motivation for Irish farmers. In the context of this research, whilst it may be a key incentive offered by the Government of Ireland, this research identified a practice whereby farmers may indeed receive the payment for converting to organic meat production, the organic status is removed by the finisher or the market where all meat is treated as if produced traditionally, that is, the market value of organic meat is devalued.

Intrinsic Motivation

- **Emotional geographies**

Several intertwined intrinsic motivations were identified linked to emotional geographies (Kearney, 2009) contained within sentiments such as ‘love of the land’ (Baldwin, 2017), farmers’ place attachment (Quinn and Halfacre, 2014) and farmland or landscape stewardship (Raymond et al. 2023). Farmers were motivated to adopt SAPs for their ‘love of the land’ which is identified as closely linked to farmers place attachment. Several farmers identified this sentiment regardless of their position, be it as a first-generation farmer, or part of larger lineage of farmers stretching back multiple generations.

- **Farmland or Landscape Stewardship**

The concept of agricultural stewardship emerged in the results. Raymond et al. (2015) identify four types of stewardship understandings (1) an environmental frame which emphasised the farmers' role in conserving or restoring wildlife; (2) a primary production frame which emphasized the farmers' role in taking care of primary production assets; (3) a holistic frame focusing on farmers' role as a conservationist, primary producer, and manager of a range of landscape values; (4) an instrumental frame focusing on the financial benefits associated with compliance with agri-environmental schemes. In the context of this research, farmers aligned to the third type of landscape stewardship, i.e. a holistic frame focusing on farmers' role as a conservationist, primary producer, and manager of a range of landscape values.

- **'Good farming' and the 'good farmer' identity**

The 'good farmer' theoretical framework (Burton et al. 2020) is a sociological concept explaining that farmers' decisions are driven by cultural identity and social recognition, rather than purely economic logic. It posits that farmers gain symbolic capital by displaying skilled practices that are visually recognisable by their peers and community. The framework is deeply rooted in Bourdieu's theories of habitus, capital, and field (Akkaya et al. 2026) which hold specific interpretations in relation to farming set out below:

- **Habitus:** The deeply ingrained habits, skills, and dispositions that dictate how a farmer thinks and acts in their environment.
- **Capital:** The accumulation of resources. While *economic capital* is money, farmers in this framework also seek *symbolic and cultural capital*—respect, pride, and community validation for having 'tidy fields' or 'high yields'.
- **Field:** The social arena where farmers compete for status, which defines what the local community currently considers a 'good farmer' (Burton, 2020).

Farmers identified that it was now difficult to know what comprised a 'good farmer' currently given the conflicting guidance they had received in recent times, although most agreed that it involved producing food profitably whilst also harnessing

biodiversity and conserving nature. This finding links to Veisi et al. (2021) who provide a cross-cultural analysis to compare the knowledge of organic producers and agricultural experts in Iran concerning the concepts of good farming, good farmer, and organic farming in the field of sustainable agriculture. Their findings showed that farmers had knowledge of the key concepts discussed by experts but differed in the emphasis placed on these ideas. Results reveal tensions between how farmers and experts think about and understand how farmers ought to practice organic farming. Linking organic farming to the ‘good farmer’ identify, Westernick et al. (2021) explores how cultural norms and perceptions of 'a good farmer' influences the adoption of nature-inclusive farming practices there. They focus on Dutch policy concept of ‘nature-inclusive farming’, involving biodiversity-enhancing forms of agriculture, can become part of ‘good farming’ norms in Dutch farming culture. Based on a qualitative analysis, the presence of production-oriented conceptions of ‘the good farmer’ and ‘a good landscape’, which, in general, discourage biodiversity-friendly behaviour. They also found indications that pursuing biodiversity objectives is becoming part of what it means to be ‘a good farmer’ and to cultivate ‘a good landscape’. This connects to Farmer 3 who embodied the ‘good farmer’ identity entirely in this way, exemplifying and combining sustainable agricultural practices, in tandem with biodiversity and conservation measures.

3.4 ATTITUDE

An attitude is a psychological construct that has three interconnected elements, affective (feelings), behavioural (actions) and cognitive (beliefs). Farmers' attitudes refer to intrinsic frames of mind produced by several types of beliefs that significantly influence their thoughts and behaviours toward SAPs. These attitudes impact motivation, engagement, and the intention to adopt or change practices on their farms.

Farmers demonstrated an experimental attitude (including the acceptance of loss as a natural consequence of their experimentation in implementing different SAPs). This attitude was also closely linked to their willingness to look at the 'overall picture' or their vision in a future-focussed way. Additionally, all farmers were more than willing to offer expertise and experience through the medium of '*meitheal'* and viewed themselves as a collective entity. Two main attitudes were identified, and these are now linked to two separate farmer identities emerging in the bioeconomy.

- **'Growth attitude' – the bioeconomy farmpreneneur**

All farmers demonstrated a 'growth' attitude or mindset, and this was exemplified in how they identified themselves professionally. The 'farmpreneur' or 'agri-preneur' (McDonagh et al. 2026) refers to a modern agricultural approach where farmers treat their farms as tech-driven, sustainable business enterprises rather than just production-based operations. The term also highlights leadership initiatives that help established growers scale their operations and create systemic change in local food economies. This research revealed several farmpreneurs who had added enterprises to their primary producer function to remain financially stable and protect against deficits within their primary enterprise. While on one hand this may have been the overall business plan that matched consumer demand, some of these additional enterprises emerged serendipitously as the local market changed. Farmer 4 was an example of an individual who did not identify as farmer *per se* but rather as an farmpreneur with a four pillared business enterprise, who happened on egg production noting a gap in the local regional market. He had singularly transformed his local food system with the hope of both feeding and connecting locals. His unique selling point was identifying to consumers where their food had come from thereby building

community-based food sovereignty (Stekley, 2025). Furthermore, farmpreneurship (McDonagh et al. 2026) was also evidenced by Farmer 13. While organic sheep farming was the central business, a further business enterprise was built around other farm experiences, such as gold panning, turf cutting and seismology the aim of which was to pre-empt any unforeseen deficits in income from organic sheep production.

- **'Can do' attitude – the multi-hyphenate careerist female farmer**

Women's roles on farms have changed (Shorthall, 2017) and are emerging as innovators (Ní Fhlatharta and Farrell, 2017) who receive lower levels of support within the farming sector than their male counterparts (Curtin et al. 2026). Notwithstanding, the multi-hyphenate careerist female farmer was identified in two participants. Farmer 15 managed a full-time role as an educator and part-time dairy farmer who leased land to support her farm 'vision' and business. Linking to Líeduc et al. (2023) she considered herself an environmentalist and attributed her success as a farmer to this rooted attitude. Farmer 16 exemplified this attitude in a similar way by developing another formal aspect to her farming career as an educator, highly involved in outreach, engagement and the education of others.

Next: Report 2 'Enabling farmers to transition to circular farming practices'

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APPENDICES

Appendix 1: Interview Schedule

I. Characteristics of the role model farmer

1. Can you tell me your interpretation of the bioeconomy?
2. Can you explain your farm activities and any changes over recent times?
3. How would you self-identify as a farmer?

   (**Prompts**)
   Traditional farmer
   Agri-business farmer
   Conservationist
   Entrepreneurial
   Innovator
   Trail-blazer

4. What are the opportunities have you encountered in the bioeconomy?
5. What are the challenges you have experienced and overcome in your type of farming in the bioeconomy?

II. Farmers' Bioeconomy Networks

1. As a member of the bioeconomy can you explain how important your network is to your success?
2. Who is in your bioeconomy network?

   (Prompts)
   Other farmers (who are primary producers)
   Co-operative members
   Members of farming organisations (IrBea, IFA, ICOS, etc)
   Advisory organisations (such as Teagasc)
   Agricultural Consultant
   Researchers (Teagasc and/or universities)
   Mart members (livestock)
   'Agricultural friends'

3. How did these relationships establish and develop?
4. How would you characterise your relationship with others in your network (Granovetter, 1973)?
5. What did you gain from these relationships?
6. Where do you situate yourself in the network (and the relationship)?

TRAINING PACK FOR FARMER FACILITATORS

INNOVATION WORKSHOP 3:

DAIRY

Dr Frances Carter

1. INTRODUCTION

The aim of the CoBioEcon project, which is funded by the Department of Food, Agriculture and the Marine (DAFM) is to co-produce a regionally based bioeconomy strategy with a particular focus on land use and agricultural activities drawing from several stakeholders including farmers.

In Ireland, the bioeconomy has many interpretations across agriculture. It is the part of the economy which uses renewable resources such as crops, forestry, and fisheries to produce food, products and energy, while also reducing waste. Developing the bioeconomy means diminishing reliance on fossil based fuels and carbon intensive resources and boosting the use of renewable biological resources. The most recent formal definition of the bioeconomy is contained in the *Strategic Framework for a Competitive and Sustainable EU Bioeconomy* (European Commission, 2025, p.1) and defines the bioeconomy as:

> 'activities that deliver sustainable solutions based on biological resource to create added value. These include products, services, science and technologies benefiting sectors ranging from agriculture, forestry, fisheries and aquaculture to value chains based on biomass processing, biomanufacturing and biotechnologies such as food, health, energy, industry, ecosystem and other services.'

In simple terms, the bioeconomy is system based on using renewable biological resources – such as plants, animals, microbes, and organic waste-to produce food, materials and energy. It aims to reduce reliance on fossil fuels, enhance sustainability, and promote a circular economy by turning waste streams into high-value, eco-friendly products (Government of Ireland, 2026).

Dairy farmers can become more sustainable by adopting precision farming, optimizing manure and fertilizer management, extending the grazing season, and investing in herd genetics. These practices reduce greenhouse gas (GHG) emissions, lower input costs, and improve long-term profitability. Dairy farmers can transition into the bioeconomy by adopting circular practices that turn traditional waste and byproducts (like manure and grass) into renewable energy, organic fertilizers, and high-value biochemicals. This shift transforms farms into sustainable, diversified businesses that reduce fossil fuel reliance and improve environmental compliance.

Farmers have been identified as crucial to the process of transition to the bioeconomy, yet they are also identified as being marginalised in what is known as the 'Just Transition' to the bioeconomy. A Just Transition for farmers is a framework designed to ensure that the shift to sustainable, low-carbon agriculture protects farmers' livelihoods, income, and communities. It aims to move away from intensive, high-emission practices by providing financial incentives, technical support, and inclusive planning to ensure no farmers are left behind.

In Part One of the data collection process, you were invited to be interviewed because you were identified as having the necessary characteristics (practices/skills/motivations/attitudes) of a role model farmer who is active in the circular bioeconomy. You explained this by way of identifying your social bioeconomy

networks and by giving information about innovation and incentives at the scale of the farm household in relation to your farming activity. In your interview you also indicated that you would be interested in taking part in the Farm Practitioner Innovation Workshop. Other farmers working within your activity range have been identified and invited to attend the workshop which will be facilitated by yourself with a series of set questions designed specifically for your farming activity. You will not be alone in this – the workshop will be conducted online via Zoom and Frances will be in attendance. You might be wondering why we have chosen to conduct the Workshop in this way. Research shows that farmers are much more open to hearing and learning from other farmers. The process of training and engaging farmer facilitators is a unique aspect of this project.

Role of the Farmer Facilitator

1. To reveal your characteristics as a 'role-model farmer' operating in dairy to other farmers in slide form (the contents were agreed previously).

2. To ask a pre-agreed set of questions to the farmers whilst also cognisant of the guiding questions set out later in this document (agreed previously).

3. Actively listen, this will allow you to probe effectively and at appropriate points in the workshop. Active listening can include noticing body posture and facial gestures and responding by leaning forward slightly, looking directly at the farmers when they are talking, nodding at appropriate times, etc.

4. Display neutrality – whilst also showing interest you may need to remain neutral at times. Use phrases such as '*thank you – I hadn't thought of it that way'* or '*thank you that is helpful'.*

5. Welcome silences! This can feel uncomfortable but can be broken by a probing question such as "*Would you explain further?" " Would you give an example?" "I don't understand, can you tell me a little be more about that please?"*

6. If someone is dominating the conversation, you might want to respectfully acknowledge their contribution, and thank them, saying something like*, "I really appreciate your comments"* and then ask to the workshop *"I'm very interested in hearing how other farmers are feeling about this issue"* or *"your perspective is very interesting".*

Roles of the Note-Taker

1. Open the meeting.

2. Monitor time-keeping.

3. Write up notes.

4. Record the meeting/access the transcript/photo a screenshot of the farmers.
5. Close the meeting.
6. Conduct a short debrief with the farmer facilitator.

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2. AIMS OF THE WORKSHOP

The aim of each workshop is:

5. To reveal sustainable farming practices adopted by yourself to the attending farmers in slide form.
6. To identify and investigate barriers in the transition to the circular bioeconomy from the perspective of dairy farming in discussion with other dairy farmers.
7. To identify your characteristics (practices, motivations, attitudes) that may enable other farmers within your activity to transition to the circular bioeconomy.
8. To find solutions for transitioning to more sustainable farm practices and translate these into baseline strategies and recommendations in conversation with other farmers in relation to dairy farming.

3. GUIDING QUESTIONS

What strategies can enable dairy farmers to transition to the circular bioeconomy?

What are the barriers to participating in the circular bioeconomy from the perspective of a dairy farmer?

What recommendations can dairy farmers make so they can more easily transition to the circular bioeconomy?

4. FORMAT

You will be made a co-host in *Zoom*; this is necessary for you to take over the discussion and ask the questions once Frances has done the preliminaries and pleasantries. There will be five types of questions with times allocated. These are set out later in this section.

You might adopt the following script to open the meeting (or devise your own):

> "*Hello – my name is … and I have been invited by Frances to be a farmer facilitator today. Thank you for agreeing to be part of this discussion which relates to the CoBioEcon project. Frances will have sent you information prior to discussion and you can access the website for some of the projects outputs so far. What we are hoping to achieve by this meeting is more in depth insights from dairy farmers and to identify some of the barriers to innovation at a more local level and from the perspective of the farmer.*
>
> *This meeting will take about an hour and will be recorded and transcribed via Zoom. There will be a series of 5-6 questions. Remember, this is a discussion around the questions, and these questions are derived from data collected in an earlier part of this project in which I was interviewed.*
>
> *Remember, there are no right or wrong answers just differing points of view, please feel free to share your point of view even if it differs from what others have said. Keep in mind that we're just as interested in negative comments and at times the negatives comments are the most helpful. We will be on a first name basis today. So, let's get going with the introductions and move onto the questions…*

1. Can each person introduce themselves to the group? **(opening question) (5 minutes)**

2. You will know this discussion relates to the bioeconomy – can you say what the bioeconomy means to you and your farming activities **(introductory question) (10 minutes)**

3. I am going to share with you some findings in slide form, from Part 1 of the research carried out by Frances, you can see from this that some farmers (such as myself) who successfully transition to the bioeconomy have shown to have adopted some practices, is there anything that would prevent you from adopting some of the practices identified? **(transition question) (15 minutes)**

4. Multi-species swards have been shown to increase forage which reduce rates of N fertiliser – what factors enable this type of grassland management on your farm **(key question 1) (7 minutes)**

5. What are the main steps you are using to reduce gaseous emissions on your farm? (use protected urea; apply lime, build or maintain soil fertility, use 100% LESS, reduce chemical N by 10kg/ha, better general grassland management, improve animal health, improve quality, increase daily liveweight gain, reduce age at slaughter by 1 month) **(key question 2) (7 minutes)**

6. What digital technologies do you use to maintain the health and efficiency of your herd? **(key question 3) (7 minutes)**

7. What are the barriers to transitioning to the bioeconomy for dairy farmers? **(key question 4) (7 minutes)**

8. What recommendations would you make that may support your transition to the bioeconomy? **(final question) (7 minutes)**

5. TIPS FOR FACILITATING

- Remember to use everyday language (conversational, relaxed, use of slang and/or plain English) that the other farmers will understand.

- Don't worry if there are technical issues!

6. RESOURCES

Practical:

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Dairy specific:

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