

Title	Leveraging the potential of co-operative agri-advisory services in the transition to sustainable and landscape-based agriculture
Authors	Byrne, Noreen;McCarthy, Olive;Ryan-Doyle, Martina
Publication date	2024-11-10
Original Citation	Byrne, N., McCarthy, O. and Ryan-Doyle, M. [2024] 'Leveraging the potential of co-operative agri-advisory services in the transition to sustainable and landscape-based agriculture', International Food and Agribusiness Management Review, 27(1), pp.117-145. https://doi.org/10.22434/IFAMR2023.0076
Type of publication	Article (peer-reviewed)
Link to publisher's version	10.22434/IFAMR2023.0076
Rights	© 2023 Byrne et al. Open Access. This is an open access article distributed under the terms of the CC BY 4.0 license, https://creativecommons.org/licenses/by/4.0/ - https://creativecommons.org/licenses/by/4.0/
Download date	2026-08-31 14:44:14
Item downloaded from	https://hdl.handle.net/10468/15369

Leveraging the potential of co-operative agri-advisory Services in the transition to sustainable and landscape-based agriculture

RESEARCH ARTICLE

Noreen Byrne^a, Olive McCarthy^b and Martina Ryan-Doyle^c

^aLecturer, ^bSenior Lecturer, ^cResearch Assistant, Centre for Co-operative Studies and Department of Food Business and Development, University College Cork, Cork, Ireland

Abstract

Agricultural Advisory Services (AAS) have always had a central role to play at each juncture in agricultural development and innovation. A transition to sustainable agriculture requires an agri-advisory response which draws on the agency and knowledge of the farmer(s), is more tailored to a particular local context and encourages the sharing of knowledge and experimentation across farms in a landscape. Co-operatives, as collaborative, farmer-owned and embedded entities, would seem to be well placed to play a greater role in this evolving agri-advisory space. However, there would seem to be little recognition of the current or potential role of co-operatives in agri-advice either in academic literature or policy discourse. This paper explores the current agri-advisory offering of Irish dairy co-operatives and their potential to offer an enhanced collaborative and landscape-based offering. It concludes that many of the elements are in place for such an approach but there is a greater need to leverage this potential, appreciate the benefits and enable a more farmer-centred and tailored agri-advisory orientation in co-operatives.

Keywords: Agricultural Advisory Services, dairy co-operatives, landscape-based approaches, sustainable agriculture

JEL codes: J54; Q01, Q10

[Ⓐ] Corresponding author: n.byrne@ucc.ie

1. Introduction

Agriculture is seen as one of the significant contributors to greenhouse emissions and biodiversity degeneration (Malhi *et al.*, 2021; Ortiz *et al.*, 2021). The sector is being called upon to radically transform to reduce this environmental impact. At the same time, farming is facing economic and social sustainability challenges (Détang-Dessendre *et al.*, 2018). With commodity price volatility, rising input costs (Loughrey *et al.*, 2021), a relatively small proportion of consumers willing to pay higher prices for sustainably produced food (Zander and Feucht, 2018), retailer dominance and overall increased debt on farms (Läpple and Thorne, 2019), farmers face challenges in Ireland and across the world. Social sustainability challenges include an older demographic profile of farmers, particularly in Ireland and many EU countries (European Commission, 2021^o,b), an increasingly negative public narrative towards farming (in particular dairy farming) and stress levels arising from increased debt and workload (Leitheiser, 2022; Pilgeram, 2011). Hence, farming is pressurised, with little time or resources for the necessary reflection, research and experimentation required for a transition to sustainable agriculture.

To effectively address these vulnerabilities, policy approaches to agricultural development must be different from the previous growth-driven policies. At EU level, key strategies including Farm to Fork and Biodiversity and Soil strategies (as part of Europe's Green Deal) and CAP (2023–2027), aim to address the sustainability challenges within European food systems (European Commission, 2020; Department of Agriculture Food and the Marine, 2020). These policies promote a re-design of environmental programmes with a greater collaborative, landscape and results-based focus (Food Vision, 2030). It is recognised that Agricultural Advisory Service (AAS) will play a key role in the delivery of these policy and environmental programmes (Food Vision, 2030). However, to be effective in this role, AAS will need to become more farmer-centred (Ingram *et al.*, 2019, 2022). Enabling this approach requires a more tailored, context-specific (O'Riordan, 2022) service that enables on-farm experimentation (Bijman and Höhler, 2023; Giagnocavo *et al.*, 2022; Lamine *et al.*, 2019; Pigford *et al.*, 2018; Sutherland *et al.*, 2014). It also requires a service that is not restrained or co-opted by the lock-ins of the broader food system (Leitheiser *et al.*, 2022; Pigford *et al.*, 2018).

As embedded farmer-owned organisations, co-operatives seem to have particular potential to contribute to this new agri-advice context. As the dairy sector is under the greatest environmental strain, this paper will focus on dairy co-operatives. We based our study in Ireland, as it has well-established dairy co-operatives with a variety of governance models and level of scale (Carroll *et al.*, 2023; Höhler and Bijman, 2023). The paper explores the current agri-advisory offering from the dairy co-operatives, the extent to which co-operative agri-advice is designed for a transition to sustainable agriculture and the potential for the development of an increased collaborative and landscape-based agri-advisory service. The paper begins with a discussion on transitioning to sustainable agriculture, followed by an exploration of the role of AAS in this transition and the particular role of co-operatives. The paper then draws on a series of surveys and interviews with co-operatives, agri-advisors and farmers. The findings have relevance both within and beyond Ireland.

2. Transitioning to sustainable agriculture

It is now widely recognised that agriculture, particularly intensive agriculture, has an impact on climate change, biodiversity, air and water quality (Malhi *et al.*, 2021; Ortiz *et al.*, 2021). This agricultural system is not easily transformed, with established supply chains, vested interests and long standing mindsets and norms (Bijman and Höhler, 2023; Leitheiser *et al.*, 2022; McCarthy *et al.*, 2012). Drawing on transition theory, Bijman and Höhler (2023) highlight that such entrenched systems, labeled as regimes (Geels, 2005), change slowly and significant transitions are usually only achieved through niche entrepreneurial innovations or through systemic pressure such as war, climate change, economic crisis, and so on, which create space for niche or interstitial (Wright, 2012) innovations.

Applying this thinking to the agri-food sector, Bijman and Höhler (2023), drawing on Sutherland *et al.* (2014) and Lamine *et al.* (2019), argue for the importance of on-farm experimentation, collaboration and dialogue between multiple stakeholders. They also highlight the importance of a contextual response. In fact, on-farm experimentation, dialogue and networking all require a contextual framing. Otherwise, attempts at transitioning remain abstract (Antweiler, 1998). In addition, biodiversity, water and air quality are all rooted in a geographical context. Hence, the societal enabling mechanisms (experimentation, dialogue and networking) and the environmental indicators of sustainability (biodiversity, air, water quality and so on) both require a geographical grounding. This aligns with the thinking of sustainability transition researchers in a Sustainability Transitions Research Network (STRN), who point to the importance of experimentation, situated attempts at transition and the interventions of intermediaries. Co-operatives have been highlighted as one such intermediary (Bijman and Höhler, 2023; Groot-Kormelinch *et al.*, 2022; Iyabano *et al.*, 2022).

This helps to explain the increasing recognition of the importance of landscape-based approaches across the literature, policy and practice in the transition to greater sustainability in agriculture. This focus on landscape approaches to land management and environmental challenges has also emerged because sectoral or high-level approaches have had limited success (Arts *et al.*, 2017). A landscape approach can be defined as a “framework to integrate policy and practice for multiple land-uses, within a given area, to ensure equitable and sustainable use of land while strengthening measures to mitigate and adapt to climate change” (Reed *et al.*, 2015: p. 3). It integrates existing interventions and multi-stakeholders to simultaneously meet regional environmental and socio-economic challenges (Minang *et al.*, 2015; Sayer *et al.*, 2013). Landscape within this context is generally geographically bound while conceptualised in various ways such as a political district, river basin, economic market, ecologically protected area or cultural heritage site (McGonigle *et al.*, 2020).

Landscape approaches are attractive conceptually but challenging in practice (Vermunt *et al.*, 2020). Key factors that hinder successful landscape practice are engagement from stakeholders, access to financial and data resources, and overall institutional governance (Sayer *et al.*, 2013; Vermunt *et al.*, 2020). Many stress the importance of ‘co-ordinating institutions’ (Arts *et al.*, 2017; De Graaf *et al.*, 2017; Kusters *et al.*, 2020; O’Riordan *et al.*, 2022; Vermunt, *et al.*, 2020) and local institutional embeddedness (Sayer *et al.*, 2013) along with stakeholder and institutional capability (Arts *et al.*, 2017) for a sustained and successful landscape approach. Co-operatives, as embedded entities with stakeholder engagement, could have the potential to act as co-ordinating institutions within landscapes.

In addition to highlighting the role of co-ordination to the success of landscape approaches, emphasis is also put on the role of an “existing and functional” institutional framework (Reed *et al.*, 2015). The co-operative, as an embedded entity, is one such existing institution with co-ordination ability and access to both farmers and community stakeholders. However, while co-operatives tend to be embedded and landscape based - a fact that enables them to play this co-ordinating institutional role - they may be less proficient in thinking and acting from a landscape perspective, as advocated by the Wageningen model (Arts *et al.*, 2017). Arts *et al.* (2017: p. 454) define this as, “the capacity to “think” landscape, not only to understand the natural-ecological characteristics of a landscape but also its socio-cultural identity and sense of place”. The productivist framing (Ingram *et al.*, 2022) and traditional focus on commercial inputs (Ingram *et al.*, 2022; Bijman and Höhler, 2023) may hinder co-operatives in adopting an orientation of ‘thinking landscape’. Farmer-centred agri-advisory services may offer a point of leverage for enabling landscape thinking at co-operative and farm level.

3. The role of AAS in transitioning to sustainable agriculture

AAS were first developed as an ‘extension’ service from universities in the late 1800s. This extension service emphasised transfer of knowledge from expert to farmer. Theoretical thinking around how knowledge and innovation in agriculture occurs has evolved, moving from the top-down linear innovation model towards an innovation systems perspective (Klerkx *et al.*, 2012: p. 457).

Adopting a systems perspective places a strong emphasis on mutual learning between various actors and a collective contribution to knowledge and innovation. While the Agricultural Knowledge Information System (AKIS) framework still acknowledges formal expertise, it also regards processes of knowledge exchange between agricultural stakeholders as imperative to sustaining innovation capacity. Thus, its emphasis is on this *system* of knowledge exchange and its linkages and feedback loops between knowledge actors, key being the user (farmer) decision maker (Anderson, 2008; Faure *et al.*, 2018; Labarthe *et al.*, 2013). Within the AKIS framework, a multitude of participatory and group-based agri-advisory service strategies have emerged globally (Black, 2000). However, even within this framework, it is recognised that, in AKIS, the farmer still plays a relatively passive role (Pigford *et al.*, 2018; Sutherland *et al.*, 2023).

To enable a transition to sustainable agriculture, the farmer needs to move from being a passive to an active agent in any agri-advisory model (Leitheiser *et al.*, 2022; Pigford *et al.*, 2018; Sutherland *et al.*, 2023). Such active farmer agency requires a model which enables on-farm experimentation and encourages dialogue and collaboration between farmers and multiple stakeholders if it is to support farmers' transition to sustainable agriculture (Bijman and Höhler, 2023). Sutherland *et al.* (2023) stress the importance of a micro-AKIS focus where learning is emerging from the situated context. While environmental programmes are now increasingly landscape and collaborative based, agri-advice is often delivered to the farmers on an individual basis rather than in a landscape context, which Ingram *et al.* (2022) suggest results in fragmented delivery and outcomes across Europe. While the central role of AKIS and AAS in enabling transition to sustainable agriculture is regarded as “absolutely essential” by the EU Soil Strategy for 2030 (2021: p. 13), less detail exists on what AKIS and AAS might look like in practice.

3.1 AKIS and AAS in Ireland

In this paper, the emphasis is on the advisory dimension of the AKIS and, specifically, the agri-advisory services provided by the agricultural co-operative sector to members. There were 135 037 farms in Ireland in 2021 (DAFM, 2022), 82% of which were reported to utilise formal advisory services (Power, 2019). Informal sources of advice and information are also important. A 2015 EU study found that interviewed farmers identified other farmers as a key informal source of advice and information, followed by farmers' associations and agricultural consultants and advisors (European Commission, 2016).

Teagasc is Ireland's public agri-advisory organisation and the national provider of advisory services (Teagasc, 2020), with 250 advisors regionally based across 55 locations (Cawley *et al.*, 2023; Maher, 2020). It has over 100 demonstration farms and has annual advisory contracts with over 4500 farms (Maher, 2020). In addition to Teagasc, 169 independent private advisory organisations exist in Ireland with circa 498 private advisors' networks. It is estimated that Ireland has 10 000 professionals serving over 130 000 farms (Maher, 2020). Private agri-advisors are a fast-growing feature of European AAS governance structures (Ingram *et al.*, 2022; Knierim *et al.*, 2017) including in Ireland (Dunne, 2019) and they have evolved to provide direct whole farm or technical advice, competing with and complementing the services of the public model (Prager and Thomson, 2014).

Ireland is viewed as having a strong and integrated AKIS system (Maher, 2020 (i2Connect); Prager and Thomson, 2014 (ProAKIS)) but will need to expand its scope to meet the needs of stakeholders and the objectives of EU climate change policies (Maher, 2020). Figure 1 illustrates the advisory sources within Ireland's AKIS (Prager and Thomson, 2014) and the wide range of agricultural value chain actors (individuals and organisations), including knowledge users who contribute within the advisory dimension of the AKIS, essentially shaping the advisory culture of Irish agriculture.

The main advisory actors are categorised as Public Sector, Private Sector, Research and Education, Farming Based Organisations (FBOs), and other non-governmental organisations. ProAkis categorises co-operatives as private entities rather than as farmer-based organisations.

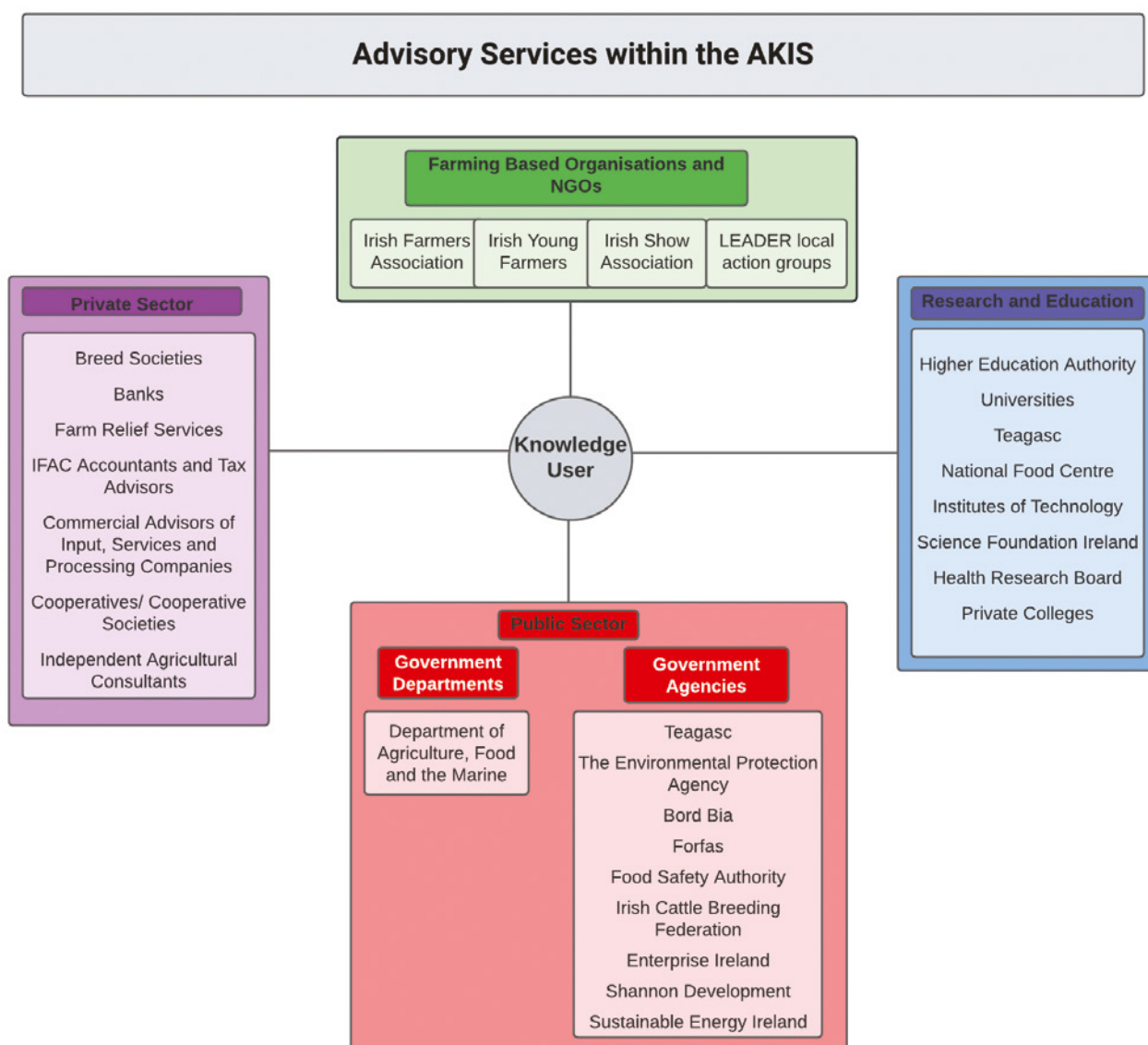


Figure 1. Advisory services in European AKIS (PRO AKIS) Republic of Ireland. Source: Proakis country reports inventory of the AKIS and advisory services in the EU 27.

Knierim *et al.* (2015: p. 33) also categorised Irish co-operatives within the AKIS as being in the private sector, stating that:

“In Ireland, for example, cooperatives would intuitively be classified as farmer-based organisations, but due to their commercial nature they are mostly private sector organisations”.

Although economic activities are a core feature of co-operatives, creating a commercial/private dimension, the values upon which co-operative business models are based suggest a distinctive economic identity that differentiates co-operatives from other private sector actors within the AKIS. For example, member economic participation and education and training of members are unique principles of the co-operative model. Hence, an agri-advice function is central to the purpose of agricultural co-operatives. The academic and institutional literature discussing Ireland’s AKIS and their/its contributions to the advisory system does not appear to take these characteristics of co-operative structure into account.

In a recent report on the contemporary agri-advice sector in Ireland, co-operatives are not mentioned and are implicitly grouped with other private advisors (Power, 2019). In an historical analysis of agri-advice in Ireland, co-operatives are only tangentially mentioned (Ó Fathartaigh, 2021). The framing of co-operatives as either private entities or marginal players in AKIS would seem to be a missed opportunity to fully leverage their potential.

The national AKIS map tells us little of what happens at the microAKIS levels. This creates a gap when we confine our discussions at a national level. There is now increasing recognition of the importance of consideration of the microAKIS of the individual farm situated within a social context (Madureira *et al.*, 2021; Sutherland *et al.*, 2022). While co-operatives have a role to play in enabling the microAKIS systems (Sutherland *et al.*, 2022), it is noted that collaboration across a plurality of providers (public, private, co-operative) and knowledge sources (formal and informal) is central to microAKIS (Madureira *et al.*, 2021).

3.2 AAS and co-operatives

In Ireland, although processing (dairy) and sales (livestock) are the principal activities of agricultural co-operatives, they are also involved in other activities (for example, grain purchase and processing, farm input sales, auctioneering) (Carroll *et al.*, 2023; Cogeca, 2014). An estimated 98% of milk processing is carried out by agricultural co-operatives, while the livestock marts manage 66% of the throughput of live animals (Cogeca, 2014). The sector has a combined membership of 87 433 (Dairy 71%; Livestock 29%) and combined employment numbers of over 40 000 (ICOS, 2020).

Despite the extensive reach of Ireland's agricultural co-operatives as farmer-owned organisations, and their close connection to farmers, Durić *et al.* (2019: p. 102) note that the sector "... does not play an important role in the distribution of advisory services".

This deserves further exploration. Co-operatives, as collaborative, landscape-based organisations with long-standing advisory functions, could have the potential to meet the environmental, economic and societal challenges facing farming and help to deliver on the new agri-environmental and climate measures (AECM) in CAP (2023-2027). Given their local presence and farmer membership, they have the ability to gather and map data on a regional level to enable landscape approach projects. Their co-operative governance structure enables the collective implementation of such projects. However, as pointed out earlier, although the focus is increasingly on the role of co-operation in policy and political narrative, the real and tangible co-operative infrastructure is missing from much of the narrative. Hence, this paper explores the type and nature of agri-advice that is currently offered by agricultural co-operatives and investigates how this could be further leveraged for the benefit of Irish farming, rural economies and the environment.

De Herde (2019, 2023) has highlighted a number of lock-ins that focus on mindsets and norms of dairy intensification, along with substantial sunk investments, which lock both the dairy co-operative and the farmer into on-going intensification and shapes the agri-advice offered by co-operatives. Some call for a shift in orientation in co-operatives from providing 'production-orientated to more holistic advice' (Ingram *et al.*, 2022) and a shift from being a supplier of commodity inputs to sustainability inputs (Bijman and Höhler, 2023). Our study explores orientation of the agri-advice offered in Irish dairy co-operatives.

4. The study and methods

This study explores the role of Irish dairy co-operatives in the provision of agri-advice, in terms of both content and delivery, and the extent to which this agri-advice holds potential to enable a transition to sustainable agriculture. This is explored by investigating the extent to which co-operative agri-advice is

structured to enable farmer dialogue, encourages on-farm experimentation, draws on collaborations with external stakeholders and is landscape-based. The study is focused on three research questions:

- (1) What is the content and delivery of agri-advice services offered in dairy co-operatives?
- (2) To what extent is this agri-advice structured to enable a transition to sustainable agriculture?
- (3) What is the potential for enhancing the agri-advisory service in dairy co-operatives?

The research adopts a mixed method approach carried out in 3 stages: firstly, a survey of Irish dairy co-operatives, secondly, a survey with young dairy farmers and thirdly, interviews with key witnesses within the sector.

4.1 Stage 1

A survey with Irish dairy co-operatives focused on the content, delivery and future concerns of agri-advisory services in co-operatives, and was completed by key witnesses who were familiar with the co-operative's advisory offering. These ranged from the CEO in smaller co-operatives to operational managers in the larger co-operatives. The surveys were sent to 21 co-operatives and were completed by 14 co-operatives. Table 1 outlines the respondent co-operatives.

Each category of co-operative is represented in the survey responses which gives a good basis to discuss AAS across the dairy co-ops.

Table 1. Dairy co-ops: survey responses by categorisation

Co-op category	Asset size (total assets less current liabilities €) (2019 ICOS returns)	Operational focus	Structural orientation	Geographic spread of operations	Geographic spread of membership base	Survey responses
Very large Co-operatives	>2 billion	Own processing of dairy and manufacture of related dairy and food products	Part PLC/global	Global	Very large, with some fragmentation	1
Large Co-operatives	<500 million	Own processing of dairy and manufacture of related dairy and food products	Merger and organic growth	National and UK	Large	3
Medium	<60 million	Own processing of dairy	Primarily organic growth	Local	Small and embedded	2
Small co-operatives	<15 million	Limited or no processing	Remained small	Local	Small and embedded	3
Co-ops that operate as part of a federated structure	n/a	Own processing of dairy and other products.	Federation	Global and local	Small and embedded	5

4.2. Stage 2

A second survey was carried out with young dairy farmers ranging in age from 19 to 25. The sample was chosen from students of the BSc in Agricultural Science at University College Cork (UCC) who come from dairy farms. These students are active farmers and most plan on taking over the farming operation on their family farms. This survey focused on their farm's use of agri-advice services and their perspective of their needs into the future as dairy farmers.

Four farmers who are experimenting with environmental measures on their dairy farms were also interviewed. These farmers ranged in herd size from 90 to 350 cows. Snowball sampling was chosen in the selection of these farmers.

4.3. Stage 3

Finally, one-to one interviews were carried out with key witnesses in a smaller sample of the surveyed co-operatives (ranging from the CEO in 1 small co-operative, a board member of a federated co-operative, an operations manager in a large co-operative); and other key stakeholders outside of dairy, including other co-operatives (2 Livestock Mart CEOs, advice personnel in Farm Development Co-operative (FDC), Irish Farm Accounts Co-operative (IFAC), a senior manager in Farm Relief Service (FRS Network), and development personnel in Cultivate).

We also interviewed key witnesses from the following organisations: Department of Agriculture, Food and Marine, Teagasc, EIP-Agri farmer participant, Local Development expert and an Agri-Tech expert. Purposive sampling (Mack *et al.*, 2005) and snowball sampling was used. The sample was chosen to capture different perspectives from participants in AKIS who are outside the dairy co-operative system but have a development interest in co-operative agri-advisory services. The profile of research participants is presented in Table 2.

Prior to any data collection, ethical approval was obtained from the Social Research Ethics Committee at UCC (No. 2020-205). All co-operatives are anonymised in the presentation of findings.

4.4. Measures used

Orientation of agri-advice service

The survey presented a list of agri-advice services from which participants could choose as being offered in their co-operative. These were then categorised as sales (inputs), regulatory support (SDAS, Origin Green Programme) and farm development (farm level assessment and action planning, farm level efficiency/productivity practices and so on) type services. Whilst each dimension may be interrelated and leverage off one another, it is useful to think about each service relative to its core objective. For example, typically services with a sales component emphasise the features of a product or service and advice is given in the context of the product or service the buyer is receiving. On the other hand, advice linked to farm development services is more likely to be contextualised and tailored to the circumstances of the farmer and the needs of their enterprise, suggesting a more adaptable approach and interactive relationship. Such services are more likely to be co-created with the farmer, where the services emerge out of the farmer context and are more tailored to the development needs of the farm (Hockert and Ljun, 2009). A percentage weighting was applied to each category and, from this, the dominant orientation of the co-operative was calculated.

4.5. Study limitations

The research was carried out during the COVID 19 pandemic, during 2020 and 2021. It was not possible to carry out face to face interviews and hence most were carried out by telephone. Possibly face to face

Table 2. Profile of research participants

Research participants	Profile	Method	Delivery	Personnel interviewed/surveyed
Dairy co-operatives Survey ($n=14$) Interview ($n=3$)	Small ($< €15$ M*, $n=3$) Medium ($€15–60$ M, $n=2$) Large ($€500$ M– 2 Bn, $n=3$) Very large ($>€2$ Bn, $n=1$) Federated ($n=5$)	Survey/ Interview	Online/Qualtrics Telephone	CEOs, smaller co-ops Operations/agri-advice function managers, larger co-ops
Next generation dairy farmers ($n=24$)	Age range 19–25 years Gender one-third female	Survey	Online/Qualtrics	Students of the BSc Agricultural Science, University College Cork, Ireland.
Dairy farmers who are involved in on-farm environmental experimentation ($n=4$)	Dairy farmers with herd sizes ranging from 90–350 cows	Interview	Telephone interview	Dairy farmers
Key witnesses connected with the sector ($n=5$)	5 key witnesses	Interview	Telephone interview	1 from Government Department Food, Agriculture and Marine, Teagasc, EIP-Agri farmer participant, Local Development expert, Argi-Tech expert
Other co-operatives with a direct or indirect role in agri-advice provision	Farm Relief Services (FRS), Farm Development Co-operative (FDC), Irish Farm Accounts Co-operative (IFAC), Cultivate credit union agri- loans and livestock mart	Survey/ Interview	Livestock Marts (Online/ Qualtrics) Remainder telephone interview	Management

*Total assets less current liabilities in € (2019 ICOS returns).

interaction may have yielded richer data. While surveys were used, the sample size is small and did not allow for advanced statistical methods. Hence, we primarily rely on qualitative analysis for this study.

5. Findings

This section first presents the findings of the survey with the dairy co-operatives, exploring the current content of agri-advice in Irish dairy co-operatives. We categorise the various services according to an overall orientation. We then explore the extent to which the co-operative agri-advice service enables farmer dialogue and on-farm experimentation, is engaged in external collaborations with external stakeholders and draws on a landscape-based approach.

5.1. Current content and orientation of agri-advice in the dairy co-operatives

The most active agri-advice services are milk advisory, animal health/nutrition, farm supplies/inputs, farm level efficiency/productivity and conservation/environmental practices. The less active agri-advice service areas are farm business/financial planning, scheme advisory and services with a targeted focus on younger

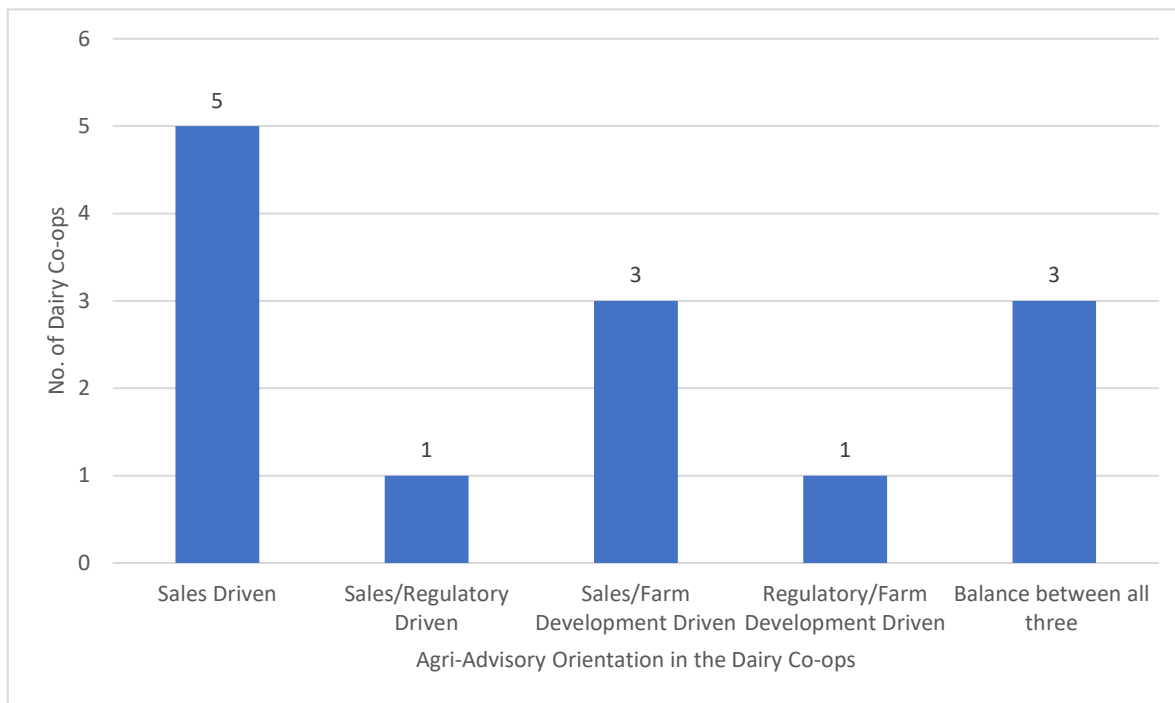


Figure 2. Dairy co-ops: dominant orientation of agri-advice services. This figure represents 13 of the co-operatives as 1 of the co-operatives did not supply sufficient data for this question.

Source: Dairy Co-operative Survey.

farmers. In order to explore orientation (stressed as important by Ingram *et al.*, 2022 and Bijman and Höhler, 2023), the list of agri-advice services was grouped into the three categories described above and explored which category, or combination of categories, is the most dominant in each of the dairy co-operatives. This is presented in Figure 2.

As can be seen from Figure 2 above, the agri-advice services in five of the co-operatives are primarily sales dominant. Four of the co-operatives combine their sales focus with an equal focus on regulatory support or farm development service offerings. One co-operative had a regulatory support and farm development service orientation with a limited focus on sales. Three of the co-operatives have a balance between all three advisory dimensions (sales, regulatory support and farm development). Hence, it could be said that seven of the co-operatives have some focus on farm development services. These co-operatives tend to be the larger co-operatives or co-operatives that are part of a regional federated co-operative structure. We now explore the perspective of key witnesses on the orientation of AAS in the co-operatives.

5.2. Key witnesses' perspective on orientation of AAS in co-operatives

We asked the co-operative key witnesses about the range of agri-advice services and the role played by such services in enabling sustainability on farms. They indicated that the focus is primarily on income-generating services. A key witness from one of the dairy co-operatives indicated that there is an:

“expectation of income from agri-advisory services and farmers are often not willing to pay for other more educational services”. (Co-operative key witness 1)

However, at the same time another indicated that, from a historical point of view,

“agri-advisory services were central to the development of the co-operative and dairy farming”.
(Co-operative key witness 2)

Beyond advice, the co-operative could support the farmer with their sustainability efforts through ‘discounts’ on certain sustainability products or a ‘sustainability bonus’ added to milk price (Co-operative key witness 1). In our survey, we found that some of the co-operatives had a balanced orientation (between sales, farm development and regulatory support) in their agri-advisory service, suggesting that there may be a transition away from a sales-driven orientation alone.

Farmers experimenting with environmental measures on their farms said that co-operative agri-advice was primarily focused on ‘sales and advice on inputs’ and they look elsewhere for environmental advice:

“The co-op always seems to be selling. During the fodder crisis, the co-op came down and did a public talk. First it was selling grain to the farmers to supplement, then if you did not have the money to buy, it was offering credit, but at all times it was selling”. (Farmer experimenting with environmental practices 1)

Another farmer indicated that:

“Agri-advice function in the co-operatives is all about selling always selling me something.. ... and often something I don’t need”. (Farmer experimenting with environmental practices 3)

This ‘always selling’ perception may have the unintended consequence of creating a disconnect between the co-operative and its members and may undermine trust. This potential impact of ‘always selling’ led a farmer to state that there was a need to:

“completely re-build trust; that trust is not there at the moment”. (Farmer experimenting with environmental practices 3)

However, another farmer highlighted that the issue could be the incentive structure for the agri-advice team:

“The advisor or co-operative rep is measured on sales targets or performance and so is tied to making sales”. (Farmer experimenting with environmental practices 2)

This farmer indicated that there is a need to consider a variety of performance indicators for advisors and concluded that, perhaps, it would be very difficult for the co-operative to offer independent advice at the technical level required and suggested that it should bring in this “speciality, independent from sales”. However, even in terms of sales and providing the best price, there seemed to be some issues. The survey and discussions with young farmers revealed that, while they recognised the value of the co-operative to dairy farming, in terms of inputs, “the co-operative is not competitively priced and sometimes we go elsewhere”. These younger farmers stressed the importance of farm development advice but seem to consider other providers for this as outlined in Table 3.

Another key witness from the dairy co-operatives highlighted the conflict between sales (e.g. sales of farm inputs such as fertilizers) and the need for farmers to reduce such inputs, a conflict that was also highlighted by Bijman and Höhler (2023) and could act as a barrier to defining farm environmental services in a substantive way. This trade-off between sales of inputs and environmental services is likely to become increasingly relevant in the context of enhanced environmental requirements. However, this doesn’t appear to be a straightforward endeavour. One of the key witnesses from the dairy co-operatives indicated that:

“Nobody wants to pay for the farm development or regulatory type services”. (Co-operative key witness 1)

This results in difficulty in developing these type of services. Hence, a more balanced approach would seem to lend itself best to shaping a future-oriented agri-advice service in the co-operatives with farmer needs around farm development at its centre.

One of the farmers (farmer experimenting with environmental practices 4) stressed the need for a “sea change”, that cannot be merely “tipping around the edges”. They also indicated that co-operatives, like other proponents of becoming “carbon neutral”, are not matching this with support on the ground. They indicated that there is a “greater need for leadership”, but at the moment, “very little leadership is coming from any sector”.

5.3 Co-operatives vis-à-vis other providers

To explore the position of co-operatives vis-a-vis other providers, the young farmers were asked what advice they were likely to source from each provider — co-operatives, public (Teagasc) and private advisors. This was an open question and the results are presented in Table 3. Table 3 shows that younger farmers source farm development services, such as business and financial planning, from private advisors. Younger farmers primarily associate co-operatives with the sales of inputs and advice in relation to these products.

5.4 Exploration of dimensions of agri-advice in Irish dairy co-operatives for enabling a transition to sustainable agriculture

This section explores the extent to which dairy co-operatives are encouraging peer to peer learning through farmer dialogue, on-farm experimentation, collaboration with external stakeholders, and a landscape-based approach.

Table 3. Provider source of agri-advice to young/next generation farmers ($n=24$)

Agri-advice service	Most likely provider		
	Co-operative	Public	Private
Sales			
Input sales	✓	✓	
Input advice	✓		
Environmental			
Soil	✓	✓	✓
Water quality		✓	✓
Biodiversity			✓
Regulatory			
Derogation		✓	✓
Schemes		✓	✓
Carbon navigator			✓
Farm development			
Farm buildings design			✓
Business/financial planning			✓
Crop/grass management		✓	✓

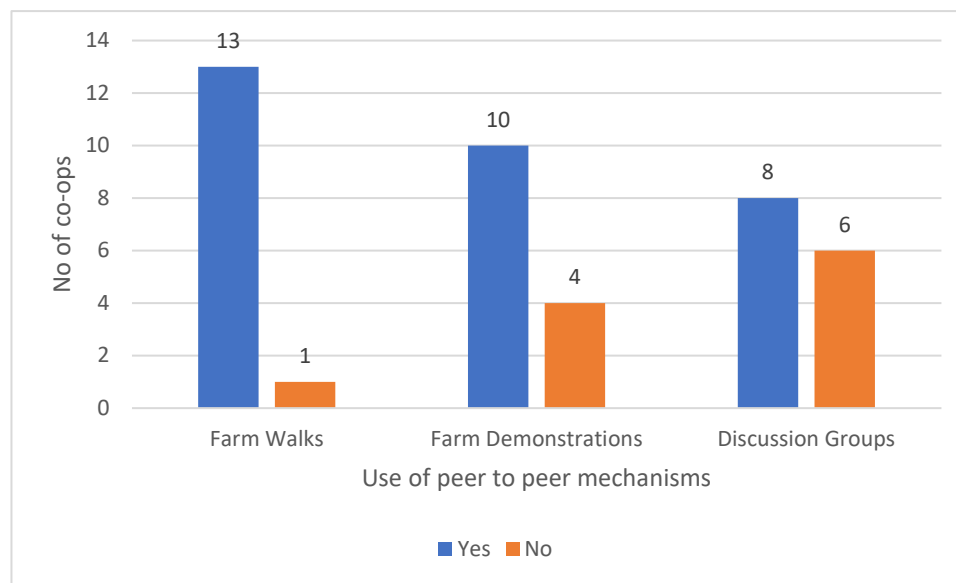


Figure 3. Use of peer to peer mechanisms of agri-advice delivery in the surveyed dairy co-operatives.

Co-operative infrastructure encouraging peer-to-peer learning through farmer dialogue

The researchers explored the provision of three peer-to-peer learning mechanisms by co-operatives to encourage farmer dialogue, namely farm walks, farm demonstrations and discussion groups. The results are presented in Figure 3.

As can be seen, almost all dairy co-operatives offer farm walks, while 10 out of 14 offer farm demonstrations. Discussion groups are less popular, with 8 out of 14 offering this mechanism of peer to peer learning. Sales driven co-operatives are more likely to use discussion groups. Hence, one would have to question if the discussion group is driven more by sales than an agri-advice agenda.

The researchers also explored to what extent younger/next generation farmers use farmer dialogue or peer-to-peer learning as a source of agri-advice. It was found that 83% of these farmers seek advice from neighbouring and other farmers and 58% would attend discussion groups.

This might explain why discussion groups among peers seem to work well as a source of advice and knowledge transfer. However, it was found that over 40% of the surveyed co-operatives do not operate discussion groups. This would seem to be a missed opportunity to engage with the general membership, but in particular with the younger farmer. A key witness close to the sector indicated that greater attention needs to be given to the younger farmer in agri-advisory/educational services as:

“it is this group specifically that can contribute the most to fostering the innovation and resource efficiency, co-operatives have the knowledge infrastructure that can support this”. (Key witness close to the co-operative sector)

This key witness also stressed the importance of peer-to-peer learning and that co-operatives should leverage their position to engage more with members, such as through:

“an outreach strategy..... ‘farm walks/visits and discussion groups....very important for morale boosting, networking and building positive mindsets”. (Key witness close to the sector)

Co-operative support for on-farm experimentation

Farmers, to a certain extent, are always experimenting and improvising on their farms. However, for a transition to sustainable agriculture, that on-farm experimentation needs to be environmentally based and needs to go beyond this every-day farm improvisation. In order to explore the co-operative contribution to this type of on-farm experimentation, we interviewed four dairy farmers who are each trying to enhance the environmental running of their farms, including reducing nitrogen, introducing clover and mixed swards, improving soil biological health, investing in water quality improvement measures, and enhancing biodiversity on their farms.

All four are members of dairy co-operatives with herd sizes ranging from 90 to 350 cows. None feel supported by their co-operative in their on-farm experimentation and tend to rely more on networking and their own research, as sources of information and support. They use the co-operative for advice on price of milk or input-related questions.

They also pointed out the value of “learning from doing” and experimentation, where “you find out one thing and then this leads to something else”. Most feel that they’re “ahead of much of the advice available”. Through experimentation, they ‘fell into’ regenerative farming and have acquired a significant body of knowledge. Some of the farmers also highlighted the value of “open days on signpost or model farms.”

Three of the farmers felt that, while online research and networking is very beneficial, their farm has a unique context requiring extensive on-farm experimentation. They said this can be ‘lonely’ and ‘risky’ and suggested that farmers need context-specific support. Co-operatives have access to context specific data and are, perhaps, ideally placed (compared with other agri-advice providers) to play a far greater role here.

Co-operative collaboration with external stakeholders

The dairy co-operative survey found that half of the co-ops have *significant collaborations* with external stakeholders while the others have some but far fewer. The collaborations identified tend to be predominantly with the public sector provider (Teagasc) and Bord Bia, followed by Dairy Sustainability Ireland, colleges/universities, Local Authorities, the Environmental Protection Agency (EPA), private advisors and other private enterprises. The level of collaborations and agri-advice orientation of the co-operatives were cross-tabulated. This is presented in Figure 4.

Figure 4 shows that co-operatives with a regulatory support/farm development or balance are more likely to have more external collaborations. The Agricultural Sustainability Support Advisory Programme (ASSAP) — a joint water quality programme between the Department of Agriculture, Food and Marine, co-operatives, public agri-advisory body (Teagasc) and Local Authority — is a good example of this collaboration. The programme works with farmers who farm in regions identified as priority catchments by the EPA. It takes an advice-led and collaborative, rather than sanction or regulatory, approach with the farmer.¹

We also explored the extent of collaboration between the dairy co-operatives and other co-operatives supporting dairy farmers, such as Farm Relief Services Network (FRS), Farm Development Co-operative (FDC), Irish Farm Accounts Co-operative (IFAC), Cultivate Credit Union Agri-Loans and Livestock Co-operative Marts. This is presented in Table 4.

¹ While the programme is in its early stages of introduction, ASSAP’s first interim report released in June of 2020 showed promising results: 1168 farm assessments had been completed by the end of 2019, with a recorded 96% of farmers engaging with the programme and 89% of farmers agreeing to implement advised actions (Teagasc, 2020).

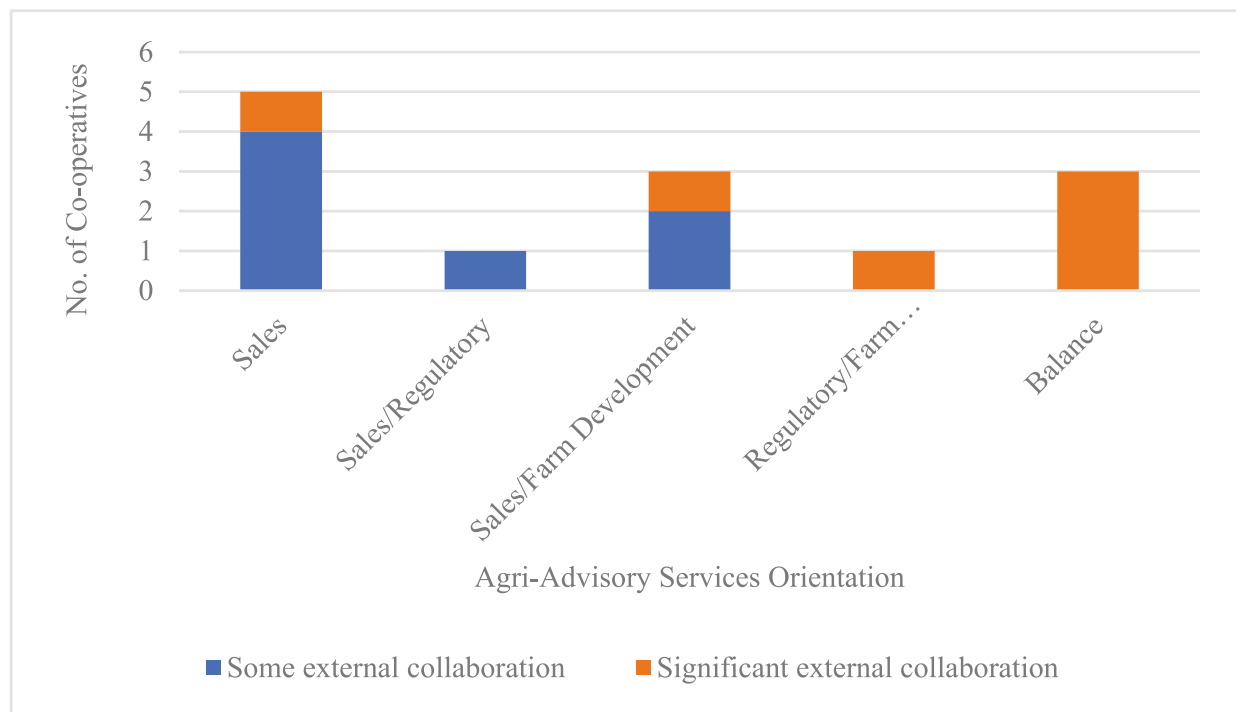


Figure 4. Crosstabulation between level of external collaboration and agri-services orientation in the co-operatives.

Table 4. Collaborations between dairy co-operatives and other co-operatives

Other co-operatives	Collaborations with dairy co-operatives
Livestock co-operative marts	Limited, some links between personnel in the dairy and livestock co-operatives, no formal collaborations
FDC	Limited, but some personnel links between dairy co-operatives and FDC personnel
IFAC	Collaborations on arrangements of farm walks and monitor farms
FRS	Was supported by dairy co-operatives in its set up in the 1980s through the development of the National Development Fund
Cultivate credit union agri-loans	Entails a model of involving all stakeholders in a region (including dairy co-operatives) in the set-up of Cultivate agri-loans in a region

In general, limited collaboration between the dairy and other co-operatives exists, although there has been strong historical ties in some cases and some relationships between dairy and other co-operatives. A keen interest was expressed by many key witnesses in more formal collaborations showing potential for further development.

One way of operationalising the co-ordinating capacity of the dairy co-operative and other co-operatives, would be to consider their presence within a water catchment. With this in mind, we mapped the presence of co-operatives (dairy, livestock mart, FDC, IFAC, FRS and Credit Union Cultivate) within water catchment areas, presented in Figures 5 and 6.

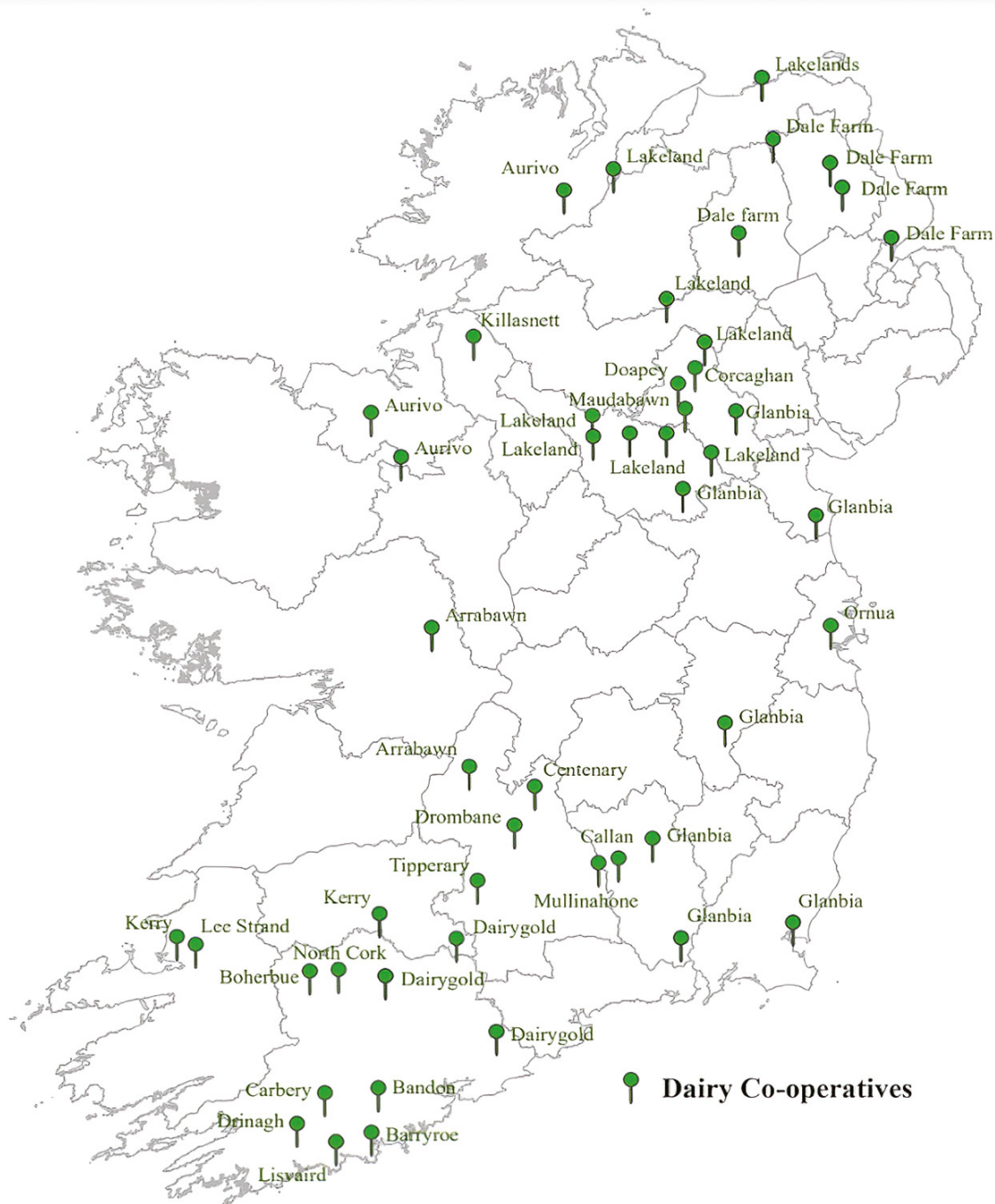


Figure 5. Geographical spread of dairy co-operative operating presence in Ireland. Map produced by Tim Bohan and Noreen Byrne, UCC.

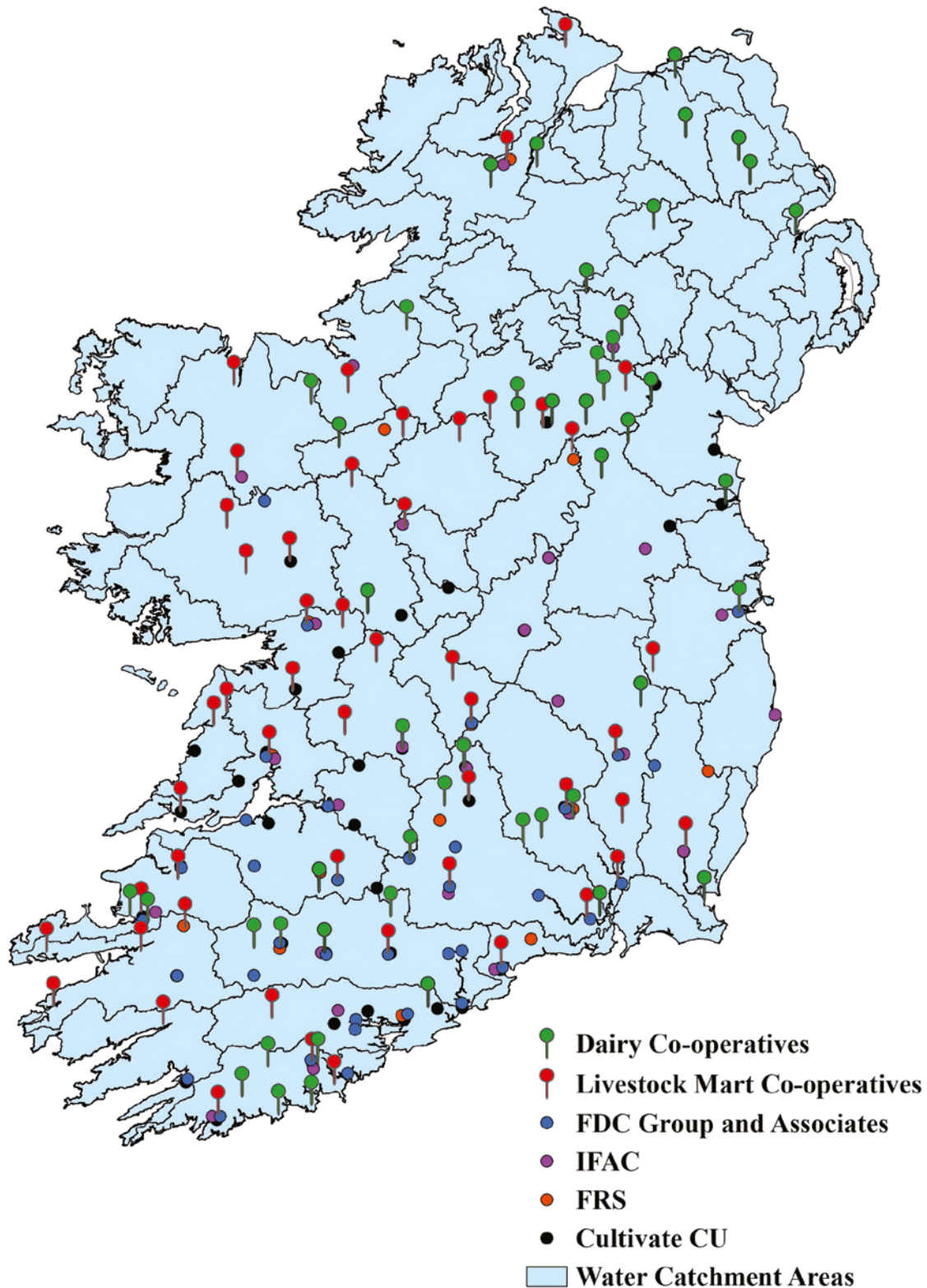


Figure 6. Geographical distribution of agri-based co-operatives and water framework directive catchment areas. Map produced by Tim Bohan and Noreen Byrne, UCC.

There is co-operative presence in almost all water catchment areas across Ireland. The dairy co-operatives or any of the other co-operatives could act as co-ordinating institutions within these catchment areas to enable a landscape response to environmental challenges. This allows for a collaborative and contextualised response to agri-advice needs. National bodies (environmental, government and co-operative) could collate data and offer national or regional leadership to a collective of landscapes.

6. Discussion

In this paper, we argue that co-operatives, as embedded and farmer-owned entities, are well placed to provide an agri-advisory service that enables greater sustainability in agriculture. However, we also argue that the realisation of such an agri-advisory service requires a shift in orientation (Ingram *et al.*, 2022) from a pre-dominant focus on the sale of inputs to a more integrated emphasis on context-based environmental regulation and farm development. This shift in orientation will better enable on-farm experimentation, multi-stakeholder collaboration and peer-to-peer dialogue as advocated by Bijman and Höhler (2023), for a transition to sustainable agriculture.

However, it is likely that such on-farm experimentation will create some disruption to the current functioning and governance of dairy co-operatives in terms of the operation of agri-advisory services and the resultant activity on the farm. It is likely that such on-farm experimentation will lead to some form of diversification at the farm level, which will require access to the market either through value-add or branding of the resultant diversification. This is evident from the thought process of the interviewed farmers who are currently experimenting on their farms and are thinking ahead in terms of market reward for their efforts. However, the work of De Herde *et al.* (2019, 2022) highlights the lock-ins that such farmers will confront if trying to use the traditional dairy co-operative supply chains system for diversified product.

We can see the difficulty of such lock-ins in the Irish dairy co-operative system. With the lifting of milk quotas in 2015, dairy farmers and their co-operatives have invested heavily in the production and processing of this extra milk supply (Carroll *et al.*, 2023). This has resulted in sunk or lock-in costs for both with the need to at least maintain the current level of growth. In a new EU climate change policy context, this situation is problematic and, as one of the farmer interviewees said, resulted in a “right mess”. Stryjan’s metaphor of a difficult to turn around ‘super-tanker’ (Stryjan, 1993) comes to mind. The current system is also facing a number of vulnerabilities. The likely stricter regulations on nitrogen fertiliser, new technologies in micronutrients and increasing demands for greater evidence behind sustainability claims, could change the farm input side of the industry quickly (Carroll *et al.*, 2023). Carroll *et al.* (2023: p. 204) indicate that:

“Any denting of the image of Irish dairy could result in shocks on the output side of the global market. While the cooperative business, through its non-member activities, may be somewhat protected from such input and output shocks, farmers themselves would seem to be fully exposed”.

In addition, the universal approach to the milk pool restricts the opportunities for farmer diversification of their milk product within the current dairy co-operative system (de Herde *et al.*, 2019, 2020). This increases the farmer’s exposure to shocks and limits a systematic transition to a sustainable agriculture. A number of authors (Stryjan, 1993; De Herde *et al.*, 2019) highlight that, with a certain level of re-framing and openness to member innovation (Stryjan, 1993; Byrne *et al.*, 2023), transition is possible within the agricultural co-operative system. Both de Herde *et al.* (2019, 2022) and Stryan (1993) present cases of co-operatives with spin-off co-operatives run by their farmer members which are linked to the main co-operatives through logistics or some other support mechanism. Stryjan (1993) argues that this involves a reframing from the ‘super-tanker’ governance metaphor to one of a ‘flotilla of autonomous fishing boats’, each responding to their immediate context and resourced by the mother ship co-operative in some way. Stryjan (1993) indicates that such developments are an emergent strategy which arise out of member innovation.

Co-operative agri-advisory services which enable on-farm experimentation and collaborations may create the necessary space within the co-operative for experimentation in new business and governance models, whereby the co-operative is actively shaping farm development towards sustainable agriculture, and the emergent activity from the on-farm experimentation is, in turn, shaping the co-operative. In Stryjan's case of the Jämtspira in Sweden, the co-operative re-framed the collection and processing of goats' milk from a burden to a source of innovation for both the co-operative and the farmers (Rytönen and Oghazi, 2022; Stryjan, 1993). The role of agri-advisory as nodal intervention (Sanford, 2017) in the regeneration of both co-operatives and agricultural systems is certainly worth further reflection and research.

Dairy co-operatives have particular advantages in the area of agri-advice provision because of their collaborative and landscape-based structure and their access to data. Dairy co-operative agri-advisory services need to position themselves to unlock these resources for the betterment of the co-operative and their farmer members. However, to do this, they need to *unlock* themselves from the *sales of inputs* focus as indicated by Ingram *et al.* (2022) who call for a mindset change away from “production-orientated to more holistic advice”. Agri-advice which is grounded in a landscape-based approach would go a long way towards enabling a mindset change in both advisory and farmers alike and better support a transition to a more sustainable agriculture.

7. Practical implications

Currently, the historical and contemporary role of co-operatives as agri-advice providers has received only very limited recognition. This has consequences in terms of policy, future funding, co-op relevancy for farmer members and the development of the agri-advice business model in co-operatives. There is a need for co-operatives to strategically communicate on the current role and contribution of co-operatives to AKIS in Ireland. There is also a need to call out the key strengths of co-operatives in the provision of relevant agri-advice, such as a long historical record in this space, trust of the farmers, access to farmers and farm-level data, being landscape-based and having strong relationships with other stakeholders and co-operatives. Few other providers have these key strengths.

However, this paper shows that there is a need to develop a more integrated agri-advice service that is less dominated by the sales of inputs. A focus on sales of inputs alone will become a less profitable income stream in the future. As the prices of such inputs continue to increase, and regulation introduces restrictions on their use, farmers will be looking for alternatives. This could possibly be achieved through, firstly, creating some separation between the agri-advice and sales of inputs function in co-operatives; secondly, creating greater linkages between the sustainability and agri-advice teams; thirdly, developing performance metrics for agri-advice staff (other than sales); and fourthly, considering the development of a business model which supports a more integrated agri-advice offering. Advice which is based on profit rather than yield per hectare on the farm may support this re-orientation and allow for the emergence of a new business model to support agri-advice.

In addition, co-operatives should consider increased resourcing of this function in terms of personnel and training. While this will involve increased costs in the short to medium term, it will set the foundation for the enhanced relevance of co-operatives into the future. Furthermore, to enhance nature-based skills within the agri-advice team, co-operatives could consider hiring an ecologist in-house or as a consultant to enhance the development of environmental and ecological skills within the agri-advice team. Co-operatives could further enhance their external collaborations as part of the delivery model for agri-advice, as such collaborations seem to increase the level of expertise in the co-operatives and encourage farm development and environmental service and the development of the business model in terms of income stream and service.

Co-operatives also have access to rich on-farm and landscape data. They could enhance the use of data as part of the agri-advice function. Agricultural co-operatives have a particular advantage here in terms of their access to data which could be used for the creation of farm development support and advice services and to

enable soil and biodiversity mapping on a landscape basis. GDPR issues would need to be considered here and the possibility of creating data management contracts between the co-operatives and farmers would need to be explored.

Co-operatives also have the potential to be leaders in a landscape approach to agri-advice and agricultural development for greater impact. They possibly could facilitate the creation of stakeholder groups within the Water Directive Framework Catchment areas to enable collaboration on the development of a landscape-based approach to the provision of agri-advice. They could also enable local farmer-led environmental initiatives as part of the agri-advice function. Co-operatives are well placed to enable such initiatives and could perhaps be seen as conduits for funding, like the Dutch Co-operative Payment model (Terwan, 2016). Co-operatives could also have a role to play in the Agri-Environment Climate Measure (AECM) and Co-operation Projects (CPs) under Pillar 11 of the New CAP, coming into effect from 2023.

The Corporate Sustainability Reporting Directive (CSRD) will come into effect throughout the EU on 1 January 2024. Dairy co-operatives will have to align their financial and sustainability reporting. An agri-advisory service which is enabling the social, environmental and economic well-being of their farming and surrounding communities will be of value in meeting the CSRD and ESG reporting requirements of dairy co-operatives. This Directive may act as a burning platform or key driver of strategic change for sustainability in co-operatives and will highlight the centrality of farmer-centred agri-advisory services in meeting all the dimensions of sustainability — environmental, economic, social and cultural.

Acknowledgements

This research was funded by the Golden Jubilee Trust, ICOS, Dublin, Ireland. The authors would like to thank the reviewers for their constructive feedback for the improvement of this paper.

References

- Antweiler, C. 1998. Local knowledge and local knowing: an anthropological analysis of contested “cultural products” in the context of development. *Anthropos: International Review of Anthropology and Linguistics* 93 (4): 469–494.
- Arts, B., M. Buizer., L. Horlings., V. Ingram, C. van Oosten and P. Opdam. 2017. Landscape approaches: a state-of-the-art review. *Annual Review of Environment and Resources* 42: 439–463.
- Anderson, J.R. 2008. *Agricultural Advisory Services*. World Bank, Washington, DC. Available online at <https://openknowledge.worldbank.org/handle/10986/9041>.
- Bijman, J. and J. Höhler. 2023. Agricultural cooperatives and the transition to environmentally sustainable food systems, In: M. Boland and M. Elliot (eds) *Handbook of Research on Co-operatives and Mutuals*. Edward Elgar, Cheltenham, pp. 313–332.
- Black, A.W., 2000. Extension theory and practice: a review. *Australian Journal of Experimental Agriculture* 40 (4): 493–502.
- Byrne, N., O. McCarthy and D. O’Loughlin. 2023. An exploration of the relationship between member openness and perceived organisational openness at a particular point in the co-operative lifecycle. *Journal of Co-Operative Organization and Management* 11 (2): 100218. <https://doi.org/10.1016/j.jcom.2023.100218>.
- Carroll, B., O. McCarthy, N. Byrne, M. Boland and M. Ward. 2023. Role of the farmer and their co-operative in supply chain governance: an Irish perspective. In: Boland, M. and Elliot, M. (eds). *Handbook of research on co-operatives and mutuals*. Edward Elgar, Cheltenham, pp. 193–207.
- Cawley, A., K. Heanue, R. Hilliard, C. O’Donoghue and M. Sheehan. 2023. How knowledge transfer impact happens at the farm level: Insights from advisers and farmers in the Irish agricultural sector. *Sustainability* 15 (4): 3226. <https://doi.org/10.3390/su15043226>.

- Central Statistics Office. 2020. *Farms and Farmers*. CSO, Cork. Available online at <https://www.cso.ie/en/releasesandpublications/ep/p-syi/psyi2018/agri/farmsandfarmers/>.
- De Herde, V., K. Maréchal and P.V. Baret. 2019. Lock-ins and agency: towards an embedded approach of individual pathways in the Walloon dairy sector. *Sustainability* 11 (16): 4405.
- De Herde, V., Y. Segers, K. Maréchal and P.V. Baret. 2022. Lock-ins to transition pathways anchored in contextualized cooperative dynamics: Insights from the historical trajectories of the Walloon dairy cooperatives. *Journal of Rural Studies* 94: 161176.
- Department of Agriculture Food and the Marine. 2021. *Common Agricultural Policy (CAP) post 2020*. Government of Ireland, Dublin. Available online at <https://www.gov.ie/en/publication/76026-common-agricultural-policy-cap-post-2020/>.
- Department of Agriculture Food and the Marine. 2021. *Food vision 2030 – A world leader in sustainable food systems*, Government of Ireland, Dublin. Available online at <https://www.gov.ie/en/publication/c73a3-food-vision-2030-a-world-leader-in-sustainable-food-systems/#>.
- Department of Agriculture, Food and the Marine. 2022. *Annual review and outlook for agriculture, food and marine*. Economic and Planning Division, Agriculture House, Kildare Street, Dublin 2, Ireland. Available online at <https://www.gov.ie/pdf?file=https://assets.gov.ie/238928/75008324-6f05-4f30-a9d3-6a9259371771.pdf#page=null>.
- Détang-Dessendré C., F. Geerling-Eiff, H. Guyomard and K. Poppe. 2018. *EU agriculture and innovation: what role for the CAP?* INRA and WUR, Wageningen. Available online at <https://edepot.wur.nl/447423>.
- Dunne, A., A. Markey and J. Kinsella. 2019. Examining the reach of public and private agricultural advisory services and farmers' perceptions of their quality: the case of county Laois in Ireland. *The Journal of Agricultural Education and Extension* 25 (5): 401–414.
- EIP-AGRI Seminar. *Promoting creativity and learning through agricultural knowledge systems and interactive innovation*. 3–4 December 2015, Dublin, Ireland. https://ec.europa.eu/eip/agriculture/sites/default/files/field_event_attachments/sem-knowledge-20151203-pres02-ing_e_van_oost.pdf.
- European agri-cooperatives Cogeca. 2014. *Development of agricultural co-operatives in the EU 2014*. PUB(14)9112:2. European agri-cooperatives Cogeca, Brussels. Available online at http://cdn.nimbu.io/s/hcjwsxq/channelentries/kgzke9k/files/cogeca_report_2014_agricultural_cooperatives.pdf.
- European Commission. 2016. *Needs of young farmers : report I of the pilot project: exchange programmes for young farmers, final*. Publications Office, Directorate-General for Agriculture and Rural Development, Brussels. Available online at <https://data.europa.eu/doi/10.2762/13075>.
- European Commission. 2020. *Reinforcing Europe's resilience: halting biodiversity loss and building a healthy and sustainable food system*. Available online at https://ec.europa.eu/commission/presscorner/detail/en/ip_20_884.
- European Commission. 2021a. *EU soil strategy for 2030 reaping the benefits of healthy soils for people, food, nature and climate*. European commission, Brussels.
- European Commission. 2021b. *Ageing of Europe's farmers remains a major challenge in rural areas*. Available online at https://ec.europa.eu/info/news/ageing-europes-farmers-remains-major-challenge-rural-areas-2021-apr-08_en.
- Faure, G., Y. Chiffolleau., F. Goulet, L. Temple and J.M. Touzard. 2018. *Innovation and development in agricultural and food systems*. Cirad, Paris. Available online at <https://agritrop.cirad.fr/589862/1/ID589862.pdf>.
- Geels, F.W. 2005. Processes and patterns in transitions and system innovations: refining the co-evolutionary multi-level perspective. *Technological forecasting and social change* 72 (6): 681–696.
- Giagnocavo, C., M. de Cara-García, M. González, M. Juan, J.I. Marín-Guirao, S. Mehrabi, E. Rodríguez, J. Van Der Blom and E. Crisol-Martínez. 2022. Reconnecting farmers with nature through agroecological transitions: interacting niches and experimentation and the role of agricultural knowledge and innovation systems. *Agriculture* 12 (2): 137.
- Groot-Kormelinck, A., J. Bijman, J. Trienekens, J. and L. Klerkx. 2022. Producer organizations as transition intermediaries? Insights from organic and conventional vegetable systems in Uruguay. *Agriculture and Human Values* 39(4): 1277–1300.

- De Graaf, M.D., L. Buck, S. Shames and R. Zagt. 2017. *Assessing landscape governance: a participatory approach*. Tropenbos International and EcoAgriculture Partners, Wageningen.
- Höckert, J. and M. Ljung. 2009. When extension system fails to connect with the farmers' lifeworld. In: Paffarini, C. and Santucci, F.M. (eds), *XIX ESEE European seminar of 320 extension education: Theory and practice of advisory work in a time of turbulences*. AliandNo, Perugia, pp. 159–163.
- ICOS. 2020. *Annual report 2020*. Available online at <http://icos.ie/news/annual-reports-accounts/>.
- Ingram, J., J. Mills, J.E. Black, C.A. Chivers, J.A. Aznar-Sánchez, A. Elsen, M. Frac, B. López-Felices, P. Mayer-Gruner, K. Skaalsveen and J. Stolte. 2022. Do agricultural advisory services in Europe have the capacity to support the transition to healthy soils? *Land* 11 (5): 599.
- Ingram, J. and J. Mills. 2019. Are advisory services “fit for purpose” to support sustainable soil management? An assessment of advice in Europe. *Soil Use and Management* 35 (1): 21–31.
- Iyabano, A., L. Klerkx, G. Faure and A. Toillier. 2022. Farmers' organizations as innovation intermediaries for agroecological innovations in Burkina Faso. *International Journal of Agricultural Sustainability* 20 (5): 857–873.
- Klerkx, L., B. Van Mierlo and C. Leeuwis. 2012. Evolution of systems approaches to agricultural innovation: concepts, analysis and interventions. In: Darnhofer, I., D. Gibbon and B. Dedieu (eds) *Farming Systems Research into the 21st century: The new dynamic*. Springer, Dordrecht, pp. 457–483. https://doi.org/10.1007/978-94-007-4503-2_20.
- Knierim, A.P., C. Labarthe, K. Laurent, J. Prager, L. Kania, L. Madureira and T.H. Ndah. 2017. Pluralism of agricultural advisory service providers – Facts and insights from Europe. *Journal of Rural Studies* 55: 45–58.
- Knierim, A., K. Boenning, M.M. Caggiano, A. Cristóvão, V. Dirimanova, T. Koehnen, P. Labarthe and K. Prager. 2015. The AKIS concept and its relevance in selected EU member states. *Outlook on Agriculture* 44 (1): 29–36.
- Kusters, K., M. De Graaf, L. Buck, K. Galido, A. Maindo, H. Mendoza, T.H. Nghi, E. Purwanto and R. Zagt. 2020. Inclusive landscape governance for sustainable development: assessment methodology and lessons for civil society organizations. *Land* 9 (4): 128.
- Labarthe, P., M. Caggiano, C. Laurent, G. Faure and M. Cerf. 2013. *Concepts and theories available to describe the functioning and dynamics of agricultural advisory services. Learning for the inventory (PRO AKIS WP3): Deliverable WP2–1 (Pro AKIS: Prospect for Farmers' Support: Advisory Services in European AKIS; WP2: Advisory services within AKIS: International debates)*. Cirad, Paris. Available online at <https://agritrop.cirad.fr/570834/>.
- Lamine, C., I. Darnhofer and T.K. Marsden. 2019. What enables just sustainability transitions in agrifood systems? An exploration of conceptual approaches using international comparative case studies. *Journal of Rural Studies* 68: 144–146.
- Läpple, D. and F. Thorne. 2019. The role of innovation in farm economic sustainability: Generalised propensity score evidence from Irish dairy farms. *Journal of Agricultural Economics* 70 (1): 178–197.
- Leitheiser, S., I. Horlings, A. Franklin and E.M. Trell. 2022. Regeneration at a distance from the state: From radical imaginaries to alternative practices in Dutch farming. *Sociologia Ruralis* 62 (4): 699–725.
- Loughrey, J., D. O'Connor, T. Donnellan, T. Hennessy and F. Thorne. 2021. Income Volatility on Dairy Farms in Ireland. *Journal of the Statistical and Social Inquiry Society of Ireland* 53 (4): 53–78.
- Madureira, L., A.B. Barros and A.F. Fonseca. 2021. *Deliverable D2.5: Synthesis report innovation, farm advice, and micro-AKIS in Europe*. AgriLink, Castanet.
- Maher, P. 2020. *AKIS and advisory services in Ireland report for the AKIS inventory*. Task 1.2 of the i2Connect Project (Horizon 2020 Funded Project).
- Malhi, G.S., M. Kaur and P. Kaushik. 2021. Impact of climate change on agriculture and its mitigation strategies: a review. *Sustainability* 13 (3): 1318.
- McCarthy, J.F., P. Gillespie and Z. Zen. 2012. Swimming upstream: local Indonesian production networks in “globalized” palm oil production. *World Development* 40 (3): 555–569.
- Minang, P.A., L.A. Duguma, D. Alemagi, M. van Noordwijk. 2015. Scale considerations in landscape approaches. In: Minang, P.A., van Noordwijk, M., Freeman, O.E., Mbow, C., de Leeuw, J. and

- Catacutan, D. (eds), *Climate-Smart Landscapes: Multifunctionality in Practice*. World Agroforestry Centre (ICRAF), Nairobi, pp. 121–133.
- Ortiz, A.M.D., C.L. Outhwaite, C. Dalin and T. Newbold. 2021. A review of the interactions between biodiversity, agriculture, climate change, and international trade: Research and policy priorities. *One Earth* 4 (1): 88–101.
- Ó Fathartaigh, M. (2021). *Developing rural Ireland: a history of the Irish Agricultural Advisory Services*. Wordwell, Dublin.
- O’Riordan, J., R. Boyle., J. O’Neill, F. O’Leary and L. Shannon. 2022. *Sharing lessons learned from water governance*. Environmental Protection Agency, Dublin.
- McGonigle, D.F., G. Rota Nodari, R.L. Phillips, E. Aynekulu, N. Estrada-Carmona, S.K. Jones, I. Koziell, E. Luedeling, R. Remans, K. Shepherd and D. Wiberg. 2020. A knowledge brokering framework for integrated landscape management. *Frontiers in Sustainable Food Systems* 4. <https://doi.org/10.3389/fsufs.2020.00013>.
- Pigford, A.A.E., G.M. Hickey and L. Klerkx. 2018. Beyond agricultural innovation systems? Exploring an agricultural innovation ecosystems approach for niche design and development in sustainability transitions. *Agricultural Systems* 164: 116–121.
- Pilgeram, R. 2011. “The only thing that isn’t sustainable ... is the farmer”: Social sustainability and the politics of class among Pacific Northwest farmers engaged in sustainable farming. *Rural Sociology* 76 (3): 375–393.
- Power, J. 2019. *Recalibrating advisory services for a new era in Irish farming*. ACA, Dublin. Available online at <https://aca.ie/wp-content/uploads/2019/10/5870-ACA-J.Power-Economist-Report-Print-8.10.19.pdf>.
- Prager, K. and K. Thomson. 2014. *AKIS and advisory services in the Republic of Ireland*. Report for the AKIS inventory (WP3) of the PRO AKIS project. Available online at <https://proakis.webarchive.hutton.ac.uk/inventory/country-reports-%E2%80%93inventory-akis-and-advisory-services-eu-27>.
- Reed, J., L. Deakin, L. and T. Sunderland. 2015. What are ‘Integrated Landscape Approaches’ and how effectively have they been implemented in the tropics: a systematic map protocol. *Environmental Evidence* 4 (1): 2. <https://doi.org/10.1186/2047-2382-4-2>.
- Rytkönen, P.I. and P. Oghazi. 2022. Bringing innovation back in – strategies and driving forces behind entrepreneurial responses in small-scale rural industries in Sweden. *British Food Journal* 124 (8): 2550–2565.
- Stryjan, Y. 1993. *Cooperatives in a changing world. Membership and adaptation in Swedish farmer cooperation*. Report 65. Department of Economics, Swedish University of Agricultural Sciences, Uppsala.
- Sutherland, L.A. and P. Labarthe. 2022. Introducing ‘microAKIS’: a farmer-centric approach to understanding the contribution of advice to agricultural innovation. *The Journal of Agricultural Education and Extension* 28 (5): 525–547.
- Sutherland, L.A., I. Darnhofer, G. Wilson and L. Zagata (eds). 2014. *Transition pathways towards sustainability in agriculture: case studies from Europe*. CABI, Wallingford.
- Sutherland, L.A., A. Adamsone-Fiskovica, B. Elzen, A. Koutsouris, C. Laurent, E.P. Stræte and P. Labarthe. 2023. Advancing AKIS with assemblage thinking. *Journal of Rural Studies* 97: 57–69.
- Sanford, C., 2017. *The regenerative business: Redesign work, cultivate human potential, achieve extraordinary outcomes*. Nicholas Brealey, Boston, MA.
- Sayer, J., T. Sunderland, J. Ghazoul, J.L. Pfund, D. Sheil, E. Meijaard, M. Venter, A.K. Boedhihartono, M. Day, C. Garcia and C. van Oosten. 2013. Ten principles for a landscape approach to reconciling agriculture, conservation, and other competing land uses. *Proceedings of the National Academy Of Sciences of the United States of America* 110 (21): 8349–8356.
- Teagasc. 2017. *Annual report 2017*. Teagasc, Carlow. Available online at <https://www.teagasc.ie/publications/2018/teagasc-annual-report-2017.php>.
- Teagasc. 2020. *Support for delivery*. Teagasc, Carlow. Available online at <https://www.teagasc.ie/about/corporate-responsibility/state-grant-in-aid/support-for-delivery/>.

- Teagasc and Dairy Sustainability Ireland. 2018–2019. *Agricultural Sustainability Support and Advisory Programme (ASSAP)*. Interim Report 1. Teagasc, Carlow.
- Terwan, P., J.G. Deelen, A. Mulders and E. Peters. 2016. *The cooperative approach under the new Dutch agri-environment climate scheme*. Technical Report. Ministry of Economic Affairs, The Hague.
- Vermunt, D.A., P.A. Verweij and R.W. Verburg. 2020. What hampers implementation of integrated landscape approaches in rural landscapes?. *Current Landscape Ecology Reports* 5 (4): 99–115.
- Zander, K. and Y. Feucht. 2018. Consumers' willingness to pay for sustainable seafood made in Europe. *Journal of International Food and Agribusiness Marketing* 30 (3): 251–275.

Appendix A

A1. Agricultural Sustainability Support and Advisory Programme (ASSAP)

ASSAP, part funded by the Department of Agricultural, Food & Marine, is a joint advisory service provided by the Dairy Co-operatives, Teagasc and Local Authority. The programme consists of 29 advisors (20 from Teagasc and 9 from the Dairy Co-ops) and 13 Local Authority Community Representatives. The programme identifies regions with difficulties which are then designated as areas of priority by the EPA. It takes an advice-led and collaborative rather than sanction or regulatory approach with the farmer. While the programme is in its early stages of introduction, ASSAP's first interim report released in June 2020 showed promising results: 1168 farm assessments had been completed by the end of 2019, with a recorded 96% of farmers engaging with the programme and 89% of farmers agreeing to implement advised actions (Teagasc, 2020). This is a very important programme in terms of water quality advice and improvement. However, as it focuses on priority areas it will only partially contribute to a landscape response to sustainability.

A2. Netherlands Co-operative Payments Approach

The agri-environment-climate measures are now delivered through a co-operative approach. Since 2016, individual applications are no longer accepted for funding purposes. The Dutch government moved from an individual to a co-operative approach for four reasons: firstly, to reverse the decline in farmland biodiversity requires a cross-farm approach; secondly, “making co-operatives the final beneficiaries of agri-environment support allows for a simpler scheme design with room for local fine-tuning”; thirdly, working with co-operatives reduces error and improves scheme compliance; and finally, it allowed the Dutch to build on their tradition of co-operatives where co-operatives have been a trusted partner of both government and farmers (Terwan *et al.*, 2016 on behalf of the Ministry of Economic Affairs). The scheme works as follows: the government signs a contract with the regional co-operative which sets out the payments, the agri-environmental targets to be achieved on a results-based approach. The co-operative then concludes contracts with individual farmers. The Dutch government has been working in close contact with the EU Commission in the development of ‘workable rules and regulations’ around this approach (Terwan *et al.*, 2016).

Appendix B: Surveys used

B1. Dairy Co-operative Survey

1. Which of the following would you consider as areas of agri-advisory provided by your co-op? Potential areas are listed below. Please select all that apply. Should you wish to list additional ones, please list under the additional option.
 - ☐ Milk Advisory – Yield/Quality
 - ☐ FAS Schemes – Advice/Applications
 - ☐ Farm level efficiency/productivity practices. Specific examples of related programmes or topics can be mentioned here _____
 - ☐ Farm level conservation/environmental practices. Specific examples of related programs or topics can be mentioned here _____
 - ☐ Young Farmers. Specific examples of young farmer related programmes or topics can be listed here _____
 - ☐ Farm Health and Safety
 - ☐ Animal Nutrition
 - ☐ Animal Health
 - ☐ Farm Supplies/Inputs
 - ☐ Farm Level Assessment & Action Planning
 - ☐ Data Recording – specific examples of these services can be listed here _____
 - ☐ Data Analysis and Reporting. Specific examples of these services can be listed here _____
 - ☐ Marketing Trends
 - ☐ Farm Business Planning
 - ☐ Farm Financial Planning
 - ☐ Origin Green Programme
 - ☐ SDAS
 - ☐ None of the above apply
 - ☐ Other/Additional, please comment here _____

2. Are there any unique farm-based initiatives/programs the co-op is currently engaging in or planning to engage in?
 - ☐ Yes
 - ☐ Specific examples can be listed here _____

3. How is Agri-Advisory structured at the Co-op?

Potential options are listed below. Please select all that apply. Should you wish to list anything additional, please list under the additional option.

Collaboration/partnership with

 - ☐ Other Co-ops
 - ☐ Teagasc
 - ☐ Board Bia
 - ☐ Private advisors

Other partners for example

 - ☐ Colleges/Universities
 - ☐ Dairy Sustainability Ireland
 - ☐ EPA
 - ☐ Local authorities
 - ☐ None of the above apply
 - ☐ Other/additional, please comment below _____

4. What are the main expertise areas of advisory personnel at the co-op? Potential expertise areas are listed below. Please select all that apply. Should you wish to list anything additional, please list under the additional option.
- ☐ Dairy
 - ☐ Beef
 - ☐ Sheep
 - ☐ Tillage
 - ☐ Piggery
 - ☐ Agronomy
 - ☐ Animal Health
 - ☐ Animal Nutrition
 - ☐ Soil Fertility
 - ☐ Emissions
 - ☐ Water quality
 - ☐ Waste Management
 - ☐ Biodiversity
 - ☐ ASSAP Advisor
 - ☐ Farm Technologies/Ag-Tech
 - ☐ Marketing
 - ☐ Business Development
 - ☐ Agri-sales
 - ☐ None of the above apply
 - ☐ Other/additional, Please comment below _____
5. Is there a farm services advisory/extension team at the co-op?
- ☐ Yes
 - ☐ No
6. How many personnel does the farm advisory/extension team have?
- ☐ 1
 - ☐ Between 2-4
 - ☐ Between 5-7
 - ☐ 8 plus
 - ☐ Prefer not to say
7. Which channels does the co-op utilise to provide advice? Potential channels are listed below. Please select all that apply. Should you wish to add additional please list under the additional option.
- ☐ One to One
 - ☐ Farm Demos
 - ☐ Workshops
 - ☐ Seminars/conferences
 - ☐ Public Meetings
 - ☐ Group Sessions/Discussion Groups
 - ☐ Farm Walks/Visits
 - ☐ Telephone
 - ☐ Text
 - ☐ Newsletters
 - ☐ Publications
 - ☐ Radio
 - ☐ Performance Reports e.g. Milk Statements
 - ☐ Online Service/record keeping platforms

- ☐ Website
 - ☐ Mobile apps
 - ☐ Social Platforms
 - ☐ Other/additional, please comment below.
8. In your opinion, of the channels you selected above what would be the top 3 utilised by the co-op in providing advice? In the space provided, please list a top 3.
- a) _____
- b) _____
- c) _____
9. What are some of the key issues/questions farmer members seek advice on via their co-op to assist them in their decision making? _____
10. Other Comments: If you have any further comments on the topic of agri-advisory services provided by your co-op, please comment here: _____

Thank you for taking the time to participate in this survey. Would you be willing to participate in a short follow up interview to discuss potential future service opportunities for marts?

- ☐ Yes
- ☐ No
- ☐ Possibly

Thank you for your time and co-operation.

B2. Younger Farmer Survey

1. What type(s) of farm enterprise are you or your family involved in? Tick all that are relevant.
- ☐ Dairy
 - ☐ Beef
 - ☐ Grain
 - ☐ Horticulture
 - ☐ Poultry
 - ☐ Pig
 - ☐ Other
2. What is the nature of your family's farm?
- ☐ Conventional – Intensive
 - ☐ Conventional – non-intensive
 - ☐ Organic
 - ☐ Regenerative
 - ☐ Other
3. How positive are you about the future of your/your family's farm?
- ☐ Extremely positive
 - ☐ Moderately positive
 - ☐ Slightly positive
 - ☐ Neither positive nor negative
 - ☐ Slightly negative
 - ☐ Moderately negative
 - ☐ Extremely negative

4. Thinking about the development of your farm, how likely are you (or your family farm) to engage in the following:

	Not likely	Maybe	Very likely
• Increase cow herd	☐	☐	☐
• Decrease cow herd	☐	☐	☐
• Diversity in value added on farm	☐	☐	☐
• Increase bio-diversity on farm	☐	☐	☐
• Technical measures to reduce emissions	☐	☐	☐
• Convert to organic	☐	☐	☐
• Convert to some of farm to regenerative	☐	☐	☐
• Diversify into other farm enterprise	☐	☐	☐

5. Thinking about the everyday operations and future development of the farm, what do you think are the key sources of information, knowledge that are required?

	Not really					Very much needed	
• Water quality/run-off advice	1	2	3	4	5	6	7
• Schemes Advice	1	2	3	4	5	6	7
• Animal Nutrition	1	2	3	4	5	6	7
• Animal feed advice	1	2	3	4	5	6	7
• Farm profit monitoring	1	2	3	4	5	6	7
• Long term financial advice	1	2	3	4	5	6	7
• Increasing biodiversity on farm	1	2	3	4	5	6	7
• Reducing emissions	1	2	3	4	5	6	7
• Collaborative farm structures	1	2	3	4	5	6	7
• Regenerative farming practices	1	2	3	4	5	6	7
• Grassland management	1	2	3	4	5	6	7
• Mixed Swarths	1	2	3	4	5	6	7
• Herd Watch	1	2	3	4	5	6	7
• EBI	1	2	3	4	5	6	7
• Milk Recording	1	2	3	4	5	6	7
• Milk Quality	1	2	3	4	5	6	7
• Advice/supply of farm inputs	1	2	3	4	5	6	7
• Farm level assessment	1	2	3	4	5	6	7
• Conservation/environmental?	1	2	3	4	5	6	7
• Efficiency/Productivity	1	2	3	4	5	6	7

6. To what extent do you (or your family) use the following for advice on the farm? Please indicate on sliding scale below

	Don't really use			Moderately use		Use to a great extent	
• Teagasc advisors	1	2	3	4	5	6	7
• Private advisors	1	2	3	4	5	6	7
• Co-op	1	2	3	4	5	6	7
• Neighbouring farmers	1	2	3	4	5	6	7
• Discussion Group	1	2	3	4	5	6	7
• Other farmers	1	2	3	4	5	6	7

7. What type of services if any do you avail of from Teagasc? _____
8. What type of services, if any, do you avail of from Private Advisors? _____
9. What type of services, if any, do you avail of from the Dairy Co-op? _____

10. To what extent are you happy with the advice you receive from the following sources?

	Extremely unhappy						Extremely happy
• Teagasc	1	2	3	4	5	6	7
• Private	1	2	3	4	5	6	7
• Co-ops	1	2	3	4	5	6	7

11. What aspect of the farm development advice are you most happy with from the co-op? _____

12. What aspect of the farm development advice are you least happy with from the co-op? _____

13. How do you think the co-operative could enhance its advice services? What would you like to see the co-op offering to help develop your farm? _____

14. I consider agricultural co-ops relevant to my future in farming?

- ☐ Strongly agree
- ☐ Agree
- ☐ Somewhat agree
- ☐ Neither agree nor disagree
- ☐ Somewhat disagree
- ☐ Disagree
- ☐ Strongly disagree

15. Agricultural co-ops are important for the future of Irish farming?

- ☐ Strongly agree
- ☐ Agree
- ☐ Somewhat agree
- ☐ Neither agree non disagree
- ☐ Somewhat disagree
- ☐ Disagree
- ☐ Strongly disagree

16. Are you involved in the board or any committees in your co-operative?

- ☐ Yes
- ☐ No

17. What would encourage you to become more involved in your co-operative? _____

18. Gender _____

19. Age _____

20. Any other comments _____