REGENERATIVE DAIRY:

A PATH TO PROFIT AND SUSTAINABILITY FOR UK FARMERS

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Caution about case studies

The case studies included on this report are intended for illustrative purposes only of how these farmers have seen "A path to profit and sustainability". They are provided to demonstrate potential outcomes and should not be construed as definitive evidence. The content and reliability of these case studies are not the responsibility of NatWest Group and we make no representations or warranties regarding their accuracy. The opinions, conclusions and views expressed in these case studies are solely those of the individuals or companies who provided them and do not necessarily reflect the views or policies of NatWest Group. Readers are advised to exercise caution and to assess the relevance and applicability of these case studies and seek independent verification when relying on the case studies included in this report.

Contributors

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Working together to accelerate the transition to a sustainable UK food and agriculture system

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SUMMARY

This case study report, along with a series of short films, describes the journeys five farmers are making towards financially and environmentally resilient dairy farming. It reflects the different reasons that motivated them to transition, which range from improved work-life balance to build a resilient farming system for the next generation. However, they also reveal that transitioning to a regenerative system makes financial sense and is a business decision.

The farmers include organic and non-organic, tenants and owners, those with a multi-generational association with their farm and a relatively new entrant. This report is a companion to WWF-UK's 2025 report **Regenerative Dairy: Modelling the Transition Costs for Farmers in the UK**, which models the impacts on cash flow transitioning to more sustainable practices for three dairy farms. The findings from the case studies and the economic model work well together, showing that shifting to a regenerative system can lead to thriving and sustainable farms, provided the transition risks are fairly shared across the supply chain.

The economic model report also demonstrated that a dairy farm adopting regenerative practices would typically ensure a farm's financial profitability mostly because of a lower reliance on external inputs, and increase its resilience to factors including intense climate events such as floods and droughts.

All the farmers in this report demonstrate the financial viability and profitability of regenerative farming systems. Soil and ecosystem health benefits are felt beyond the farm and can support farmers in achieving financial stability. Farmers suggested that all actors across the supply chain, including policymakers to food companies and financial institutions, should evaluate including nature in their assessments and take action to ensure its protection and enhancement.

Farmers interviewed for this report have shared that they are happy to accept – and prepare for – an element of risk when making on-farm changes. But they ask for more support from banks and the wider supply chain (including farmers, suppliers, processors, distributors, retailers, consumers, regulators and financial institutions, advisers and consultants, and environmental and advocacy groups), so that they do not bear this risk alone. They would also like to see longer-term thinking and a better understanding of farming from these organisations.

Strategies to make farm businesses more resilient often centre on optimising the farm's resources rather than maximising production, which would require the purchase of inputs. This can be achieved in various ways, such as by having the right breed, numbers of cows, and management system for the farm. The results are direct financial savings, along with improvements to soil and animal health. These results bring additional benefits to the farm derived from better soil quality and a healthier herd, as well as benefits for climate and nature.

The findings of this report show that the main barrier for farmers is not the cost of transition per se, but financial risk. Each farm is unique, and decisions are dependent on the context, with farmers carefully evaluating potential changes. The journeys taken by the farmers vary but 'fallow years' (where production levels temporarily dip) are often noted. While farmers take significant risks to improve their farms, having debt, changing policies, and inappropriate advice can threaten their business viability and impact their farm legacy.

Success in farming is arguably more than a farm's output or carbon sequestration and should be redefined. Indeed, an overemphasis on carbon can have unintended consequences for regenerative farming and its broader aims including soil health, reduced reliance on chemical inputs and farm resilience.

More widely across the advisory sector, there is a need for understanding of the specific farming needs of those who want to farm with nature, fostering trust and respect through long-term relationships.

Farmers have shared that they are constantly innovating and seeking improvements. There needs to be greater support for knowledge exchange supporting nature-friendly practices. Evidence of what works on the farm and what doesn't are crucial. This will also help overcome stigma, with some still fearing they will be seen as the ones who ruin the legacy of their farm.

Support from policymakers, financial services providers and the entire supply chain is crucial. Policies must avoid undermining regenerative farming, emphasising a 'triple challenge' approach to balance nature, nutritional security, and climate change efforts.

To make this a reality, farmers shouldn't carry the financial burden alone; it is possible to achieve a resilient farm, which provides a living for farmers and where nature thrives. But it requires the cooperation of everyone in the food system.

INTRODUCTION

Agriculture uses more land in the UK than any other sector – some 69%.[1] Industrial farming practices have been highly successful in producing large quantities of food. This is particularly significant in dairy farming, where milk production increased by approximately 50% between 1945-46 and 2022-23, while the number of milking cows more than halved in the same period.[a]

However, the drive to increase production and improve efficiency has led to a high input-high output system that fails to account for external environmental, climate and social costs. The hidden costs of current food production methods include environmental damage, such as polluted rivers and air, greenhouse gas emissions and the loss of wildlife habitats. According to the Food and Agriculture Organization of the United Nations (FAO), these costs amounted to approximately £45 billion in the UK in 2020.[2]

The way that land is used and farmed is responsible for 12% of UK greenhouse gas emissions[3] and the UK ranks among the most nature-depleted countries on Earth.[4] Globally, the food system is a main driver of biodiversity loss.[5] This loss of biodiversity, driven by land-use changes, exacerbates climate change and may jeopardise the future of farming, which in turn is critically dependent on biodiversity and avoiding the acceleration of climate change.

UK farmers are on the frontline of these challenges, and most are concerned about the impacts that climate change and biodiversity loss are already having on their farms and their ability to produce food.[6] The way that food is produced and land is used also increasingly fails to provide consistent financial returns for farmers and growers; they often find that they need to increase production to cover rising costs, and are at risk from extreme weather events and the economic instability of globalised food supply chains. WWF analysis shows that in 2018 alone, extreme weather cost Welsh and Scottish farmers £335 million, for example in extra feed costs,[7,8] while heavy rain and flooding are affecting harvests.[9]

These challenges are particularly evident in the dairy sector, where farmers frequently feel pressured to increase herd sizes or intensify production as standard methods of boosting milk output in order to improve profitability or simply stay in business.[10] Part of the problem is that farming 'success' in mainstream agricultural systems is often measured solely by output, specifically milk volume and its constituent parts (solids, fats and protein levels).[11]

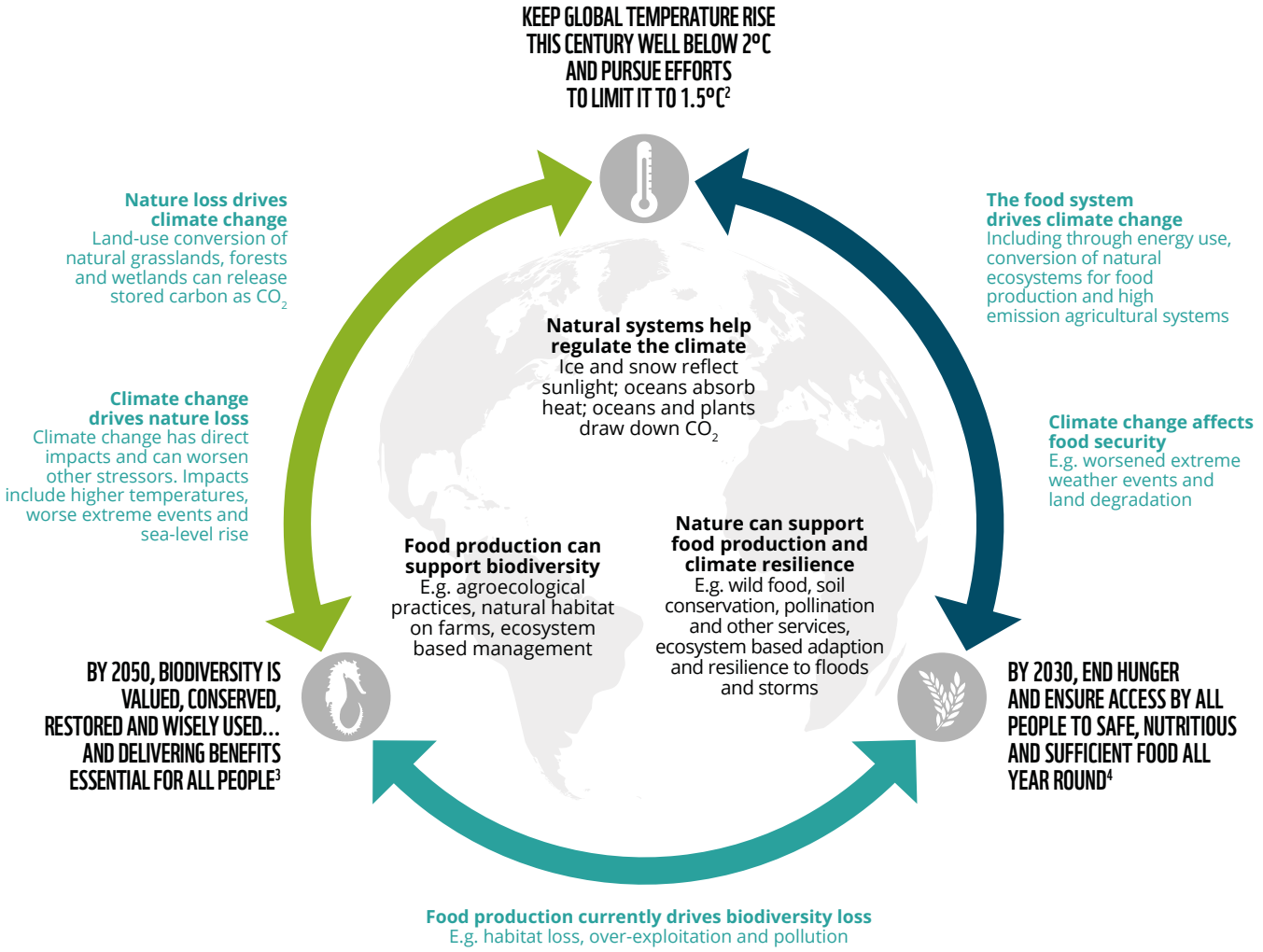
a Milk production increased from 8.13 billion litres in 1945-6 (1.79 billion gallons) to 12.4 billion litres in 2022-3, while milking cow numbers fell from 3.53 million to 1.63 million. 1945-6 figures from White, 1951. 2022-3 figures from AHDB, 2023.

To achieve these targets, farmers may house animals year-round, boost grass growth with nitrogenous fertilisers, and supplement grass with other fodder crops or concentrated feed. These actions can result in having to deal with large amounts of potentially environmentally damaging slurry, soil erosion through the intensive use of chemicals and the need to grow nutrient-hungry crops to feed cows, and the need to buy in increasing amounts of inputs such as livestock feed, artificial fertiliser, pesticides, and veterinary care and medicines. This dependency on purchased products, combined with the disturbance of soil, creates a vicious cycle that makes farms and soils more fragile and vulnerable to the adverse effects of climate change, such as flooding and droughts, and market volatility.

Farming is dependent on nature and, by working with the natural cycles of the land rather than against them, the resilience and stability of our food system can be improved[12]. This means planting or encouraging a greater diversity of plant species, reducing chemical inputs such as artificial fertilisers and pesticides, grazing livestock at levels that are suitable for local conditions, and prioritising soil health.

WWF-UK calls the meeting point between food production, tackling climate change and nature restoration the 'triple challenge'[13] (Figure 1), and believes that the three elements must be addressed together.

FIGURE 1: THE TRIPLE CHALLENGE



1 Adapted from WWF 2019, and based on IPCC 2018, IPCC 2019a,b and IPBES 2019
2 Summarised from the Paris Agreement on climate change
3 Summarised from the Vision of the Convention on Biological Diversity
4 Summarised from the Sustainable Development Goals target 2.1

(Source: WWF-UK (2022). "Land of Plenty: A Nature-Positive Pathway to Decarbonise UK Agriculture and Land Use".)

A healthy farmed environment is possible. A growing number of farmers are turning to systems that seek to reduce costs and be less harmful to – or positively improve – the environment, such as agroecology, organic, pasture-fed and regenerative (see Figure 2). These farming systems often begin with soil health, which the Intergovernmental Technical Panel on Soils at the FAO defines as "the ability of the soil to sustain the productivity, diversity, and environmental services of terrestrial ecosystems".[14]

These approaches draw on agroecological principles to varying degrees. Agroecological production ('farming with biodiversity' or 'nature-positive farming') can create more jobs in rural areas, restore biodiversity and ecosystem services, reduce the risks of economic failure on farms and provide long term stability.[15] It puts nature at the heart of development, the economy, global security and human well-being in order to achieve nature-positive production at scale. This inclusion of natural, social and economic factors helps to provide the multi-pronged solution that is needed to tackle the triple challenge – something that a widespread transition to agroecological practices could achieve.

FIGURE 2: DEFINITIONS – AGROECOLOGY, ORGANIC, PASTURE-FED, REGENERATIVE

AGROECOLOGY:

The FAO defines agroecology as "a holistic and integrated approach that simultaneously applies ecological and social concepts and principles to the design and management of sustainable agriculture and food systems." It is a science, a set of practices and a social movement,[16] and includes 10 principles:

- **Diversity**
- **Co-creation and sharing of knowledge**
- **Synergies**
- **Efficiency**
- **Recycling**
- **Resilience**
- **Human and social values**
- **Culture and food traditions**
- **Responsible governance**
- **Circular and solidarity economy.**[b]

ORGANIC:

According to the Soil Association, "organic is a system of farming and food production. Organic farmers aim to produce high-quality food, using methods that benefit our whole food system, from people to planet, plant health to animal welfare." In practice, this means that food is grown or produced with:

- **fewer pesticides**
- **no artificial fertilisers**
- **higher animal welfare standards**
- **no routine use of antibiotics**
- **no genetic modification**
- **no artificial colours and preservatives.**[17]

Farms and businesses selling organic products undergo a certification process from one of a number of organisations approved by Defra, and have a unique identification code. It is the only production system underpinned by regulation.

PASTURE-FED:

This means that products come from animals that have only been raised on pasture. This includes conserved grass such as hay and grass silage, legumes, brassicas and any flowering plants found within the pasture, but excludes sources of feed such as grains, maize and maize silage, soya, oilseed and fodder beet.[c]

As with organic products, only certified businesses can use the Pasture for Life mark.[18]

Three key elements form the foundation of Pasture for Life farming:

- **Understanding what the grass is capable of, and improving it where necessary.**
- **Matching the type of animals to the available grassland.**
- **Ensuring the end-product meets the requirements of the available markets.**

REGENERATIVE:

The definition of regenerative farming is still evolving, and use of the term does not require independent verification or certification. WWF approaches regenerative agriculture as a set of farming principles that foster healthy ecosystems, particularly within soils, rather than relying on chemical processes. This includes practices such as minimising soil disturbance, crop diversification, efficient nutrient management and livestock integration. It should focus on the five key impact areas of soil health, water, biodiversity, air quality and climate. It must also acknowledge social impact, such as on livelihoods and well-being, placing it as part of a journey towards agroecology more broadly.[19]

b For more detail, see www.fao.org/agroecology/overview/overview10elements/en

c See www.pastureforlife.org/media/2024/04/Pasture-For-Life-Standards-V5.0.pdf for a full list of requirements.

In order to tap into the huge potential of agroecological and regenerative approaches, change is needed at all levels, from the farm to landscape to food system. Along with this, conflicts between conservation, food production and other socioeconomic interests must be resolved. From implementing sustainable practices like crop rotation and managing natural resources wisely and preserving biodiversity to ensuring that food production, distribution, and consumption are all sustainable and equitable.[20]

Helping to achieve this is the co-creation and sharing of knowledge – a feature of agroecology. This still gives scientific research a role, but combines it with participatory processes to develop knowledge and practice. The inclusion of social and environmental values, in addition to economic ones, means that the way success in agriculture is measured must change to be sustainable in the medium-to-long term. In addition, the direction of research and knowledge, the distribution of subsidies and investments, and how companies are rewarded and evaluated must also be reconsidered.[21]

For farmers, the stability of their business, a market and evidence of what works and what does not are crucial. The move towards nature-friendly farming often require a change in mindset: from maximising output to optimising the use of available resources. In ruminant agriculture (i.e., dairy, beef and sheep), this typically involves making the most of grass availability. Effective grass utilisation, rather than simply increasing production, enhances profitability.[22,23,24]

It is not solely the work of farmers to effect change: a diverse range of stakeholders within and around the dairy supply chain can take steps to support farmers in producing more nature-positive milk, as shown by the Food Ethics Council's Dairy Project.[25] Actions that reduce carbon and other greenhouse gas emissions, along with protecting nature and other environmental measures, must form part of government agricultural support schemes throughout the UK.

However, an emphasis on carbon emissions as the only metric of success will likely create perverse incentives; for example, carbon-efficient but highly industrialised meat and dairy imports may be prioritised over products from nature-rich pasture-fed systems. A more holistic picture is needed that also includes metrics such as the recovery of insects, reductions in air and water pollution, animal welfare and long-term opportunities for the next generation of farmers.[26]

Changing production styles and practices is rarely straightforward. Nature-positive methods of farming pay more attention to ecosystem health and ecological systems rather than maximising production. Returning the farm to such a condition after the application of artificial fertilisers and pesticides takes time, hence the need for organic conversion grants. Even in non-organic systems, there is likely to be a reduction in grass growth and therefore milk production, with an associated fall in income, until the new system is established, after which levels of production – and profitability – usually rise.[27] Indeed, a growing body of evidence shows that agroecology can be as productive as other production models, while also enhancing ecosystem services and improving the profitability of farms by saving the cost of inputs such as fertiliser and pesticides.[28,29,30,31]

Understanding the effects and financial implications of changing the production system and developing a plan to cope with them may be key to encouraging dairy farmers to change to more environmentally friendly farming systems. As one step in this journey, in its recent report, **Regenerative dairy: modelling the transition costs and benefits for farmers in the UK**, WWF-UK shows the costs of moving towards more regenerative grazed dairy during the first five to seven years of this transition in three scenarios: fully housed, partly housed and fully grazed systems. The modelling found that:

1. **All three types of dairy farm are profitable at the end of the transition period,** with fully housed and fully grazed farming systems being more profitable than they were before. In most cases, post-transition farms had higher operation profits and appeared to be more resilient to increases in feed and fertiliser costs.

2. **Farmers need significantly more support** from the government, banks and other financial institutions, and other supply chain actors to complete the transition. The cost of transition, particularly in the early years, is substantial, and farmers will vary in their ability to afford it.[32]

The process of moving towards more regenerative agriculture, including the actions that are undertaken and how they are introduced, can take various forms. Farmers should not bear the full financial burden of this transition; all actors from the supply chain should actively support it.

The present report and associated films explore the financial journeys of five dairy farmers from across Great Britain who have transitioned to more regenerative farming systems, as summarised in the table below.

Andrew Rees
(page 17)

David Finlay
(page 23)

Sophie Gregory
(page 29)

James Robinson
(page 34)

Andrew Brewer
(page 40)

Farm and location	Type of farm	Selected actions taken to transition	Film
Moor Farm, Pembrokeshire, Wales	Regenerative agriculture	• Reduced nitrogen fertiliser application • No plough • Reduced milking • Herbal leys	youtu.be/6DvUoh9vZnw
The Ethical Dairy, Rainton Farm, Dumfries and Galloway, Scotland	Tenant, organic	• Organic • Cow-with-calf system • Pasture-fed certified	youtu.be/YKD7W4POe5g
Home Farm, Dorset, England	New entrant, tenant, organic	• Organic • Herbal leys • Mob grazing	youtu.be/rrvgBREWuPY
Strickley Farm, Cumbria, England	Organic and regenerative agriculture	• Organic • Rotational grazing • Cows outdoors for longer • Wildlife habitat creation	youtu.be/zJPRnJnPlrQ
Ennis Barton, Cornwall, England	Regenerative agriculture	• Stopped artificial fertiliser use • Herbal leys • Reduced cow numbers • Changed breed	youtu.be/7yy9hjbPdFM

They were selected to represent a variety of dairy farmers, and are a mix of organic and non-organic, tenanted and owned farms. Some have been associated with their farm for generations, while one was new to the industry. Interviews were undertaken via conference calls, and the discussions concentrated on the changes that each farmer has made in order to transition towards farming systems that are more sustainable, lower carbon and more nature friendly, with a particular focus on economic motivations and implications.

While every farm and farmer is different, these case studies provide real-life examples of some of the issues – the difficulties and the benefits – of transitioning towards working more closely with nature.

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FARMING WITH BIODIVERSITY IN THE UK DAIRY SECTOR – SYNTHESIS OF FINDINGS FROM THE CASE STUDIES

FINANCIAL RESILIENCE AND RISK MANAGEMENT ON THE FARM

STRATEGY, FUNDING AND DIVERSIFICATION

Farmers employ a variety of strategies to enable change on their farms or to start farming in a more nature-friendly way. These **strategies are often varied, imaginative and aim to be carefully considered** to minimise risks. Thorough research is typically conducted before initiating new projects, including reading and online research, and visits to other farms. Funding options include traditional loans and grants, as well as innovative methods like crowdfunding and share farming. Changes can involve significant shifts in the farm's management, such as organic conversion, or a diversification project, such as the wind turbine installed on Andrew Brewer's farm, that can have the additional benefit of earning an income without adding to the farmer's workload. Such initiatives not only provide short-term benefits but may also contribute towards long-term savings, enhancing financial resilience.

YIELDS AND BUSINESS

Following organic conversion or a reduction in inputs such as artificial fertilisers, some farms experienced a **decline in grass production (to varying extents) during the early years**.

Most case study farmers anticipated this situation and partially mitigated its impact by destocking, which means reducing the number of livestock and hence the amount of grass needed. The exception was Sophie Gregory, as she needed to purchase animals to start her farming operations. Additionally, the financial risk for organic farmers can be reduced by organic conversion grants.

However, it is significant that these 'fallow years' can vary in their length and effect. James Robinson commented that while his organic conversion grant provided crucial support during the official two-year conversion period, his most challenging years came afterward when changes in grass growth, milk prices and other external financial pressures took effect, but the farming and ecological systems had not yet stabilised. Additional, or at least more flexible, support would be beneficial while the farming system undergoes changes. This could include sympathetic repayment terms or grant conditions.

Most farmers, especially those who are further along the path towards sustainable farming practices, have observed improvements in **production levels**, typically – though not always – after five to seven years. However, farmers often report that the land has to be 'weaned off' chemical inputs; Andrew Rees suggests that he may have done this too quickly, and has not yet seen the consistent improvement in grass yield that may have been expected.

For those that do achieve this, the increase in grass production is further supported by the financial **savings made by using fewer inputs**, which enhances profit margins. This can be achieved by a system change, such as going organic which means avoiding the use of inputs such as nitrogenous fertiliser and artificial pesticides, or by the judicious use of equipment[33], such as Andrew Rees's purchase of a machine to apply fertiliser in a more targeted way to the foliage of his crop.

OPTIMISING THE SYSTEM

Financial pressures compel some of the case study farmers to prioritise **optimising profit**, which differs significantly from maximising output. The latter typically requires increased spending on inputs, often resulting in reduced profitability. When facing debt, making changes can be challenging, especially when transitioning to a system that initially appears to produce less.

A new mindset – and courage – may be needed to move away from maximum productivity towards making the best use of available resources. These resources include the natural environment and on-farm biodiversity, and the farmers featured in these case studies are successfully moving towards farming with nature. Their journey generally begins with a period of familiarisation with the new system, followed by optimising their operations to achieve greater profitability.

Even those case study farmers with significant debts to repay have managed to **rethink the traditional assumption that increasing total milk yield equals increased profits**. Some farms have introduced flexible milking schedules (changing to milking once a day during the latter part of the lactation cycle) and once-a-day milking has been introduced on a couple of farms. While these changes reduce the milk available for sale, this is partly offset by savings because of the improved health and longevity of the cows, and low reliance on external inputs, helping to return improved profits.

The key is having the **right animals and system for the farm**. The breeds of cow vary among the case studies. For instance, James Robinson attributes the success of his system to his Dairy Shorthorn cows. On the other hand, Sophie Gregory is replacing her original mixed herd, which included Dairy Shorthorns, with Irish Friesians, as they perform better on her farm without needing additional veterinary interventions or treatments. Although breeds such as Dairy Shorthorn are considered less productive, they often live longer and have fewer health problems, making them more financially beneficial in the long term.

David Finlay runs a cow-with-calf system, and has found that overall milk production exceeds expectations for a forage-based system. Over half of his herd produces more than 4,000 litres of sellable milk, in addition to what the calves consume. Having settled into a system that is more natural for the animals and the environment (including improving soil health), the farm is able to support 25% more cows than when the calves were removed from their mothers at the usual age. This is because the calves develop quicker on their mothers' milk and can be sold on sooner than the usual dairy beef animals or kept as replacements. These results defy expectations and highlight the importance of farmers being willing to take a risk, conduct research and experiments and perhaps endure losses while trialling new systems.

By farming with biodiversity, organic and regenerative farmers seek to optimise their systems for the benefit of people, the planet and nature, and these provide additional financial benefits. This approach leads to **improvements in the health of animals, the soil and the wider environment**. David Findlay, for example, has observed that the increased plant diversity in his pasture has eliminated the need to treat his animals for mineral deficiencies. The different rooting depths of different plant species, along with his organic regime, also help to improve soil structure and health, its water-holding capacity and biodiversity.

VALUING MILK

Adding value to milk is an option for potentially improving profits. This can involve processing it into other dairy products, or developing new, independent markets, such as direct sales to the hospitality sector or even individual customers, as James Robinson is doing. The public sector could also have a role here as a major consumer, as David Finlay discusses. However, processing milk usually requires substantial investment, for which external funding is generally sought, along with the need to take on additional staff with all the opportunities and responsibilities that this brings.

The price of milk, organic and industrial, remains an issue. The organic premium was an encouragement to convert for all the organic farmers consulted for this report. Unfortunately, subsequent fluctuations in price are often problematic, even potentially resulting in a reassessment of the farm's organic status.

Most of the farmers said that they had good relationships with the companies that they supply, and some of these companies encourage farmers to undertake regenerative practices. However, in general, they would like greater recognition by the public, processors, retailers and policymakers for those who produce milk in regenerative, agroecological or nature-friendly ways. First Milk – which describes itself as the "regenerative co-op" – and Yeo Valley were mentioned as companies that already do this. Downstream companies like these have an important role in creating the conditions that allow farmers to repay their debts.

RISK POLICY AND INVESTMENT IN PRACTICE

Farmers expressed their belief that all supply chain actors, from policymakers to food companies and financial institutions, need to **understand and integrate the benefits of nature in their assessment of risks**, beginning with the soil but also including other habitats, species and natural assets. Unlike the technology-heavy solutions of intensive farming, regenerative agriculture relies on nature-based solutions to restore soil balance.

In managed ecosystems, soil health can be sustained, enhanced or restored by adopting sustainable soil management practices. To preserve vital soil functions, it is essential to prevent and address all forms of soil degradation. Nature-centric soil management leads to positive outcomes in terms of biodiversity, resilience and stability. **All the farmers in this report demonstrate the financial viability and profitability of regenerative farming systems**. Soil and ecosystem health benefits are felt beyond the farm and can support farmers in repaying their loans. All actors need to include nature in their assessments and take action to ensure its protection and enhancement.

There is a shared feeling among the case study farmers that banks and grant providers are overly risk averse. Lenders may not deem certain developments viable and, as a result, thoroughly evaluate before providing loans for essential projects. Additionally, grants may not always align with the actual needs of farmers.

This situation has resulted in some farmers having to take financial risks necessary for protecting and developing their farm businesses. Farmers feel that their expertise and judgment are often not trusted. These risks are particularly significant for small to medium-sized farms: these often support multi-generational households and business partnerships, and the continuity of the farm is crucial for the families' housing, security and livelihood.

Case study farmers frequently mentioned the need for banks to enhance their **understanding of farming and individual farm businesses to improve the accuracy of risk assessments**. They expressed a desire for bank relationship managers to visit farms, develop a deeper knowledge of agriculture, and recognise that farming is different to other small businesses. Farmers would like these relationship managers to work collaboratively with them, including those who are struggling, to identify solutions that benefit both sides. This approach, according to the farmers, would help build trust.

Further, recognising farmers' concerns about the **potential impact on their farm's legacy** is important. In addition to usually providing the family's home and income, the farm is also an important part of most farmers' identity and heritage, with some being the latest in many generations to inherit the farm. Many feel this continuation of history keenly.

Addressing these concerns is essential to ensuring farmers' participation in sustainable practices and to fostering trust and collaboration. By valuing their heritage and integrating their perspectives, more effective and respectful approaches to environmental stewardship can be taken. It is also crucial to embed farmers' perspectives, risks and long-term planning into discussions on revenue, market reforms, supply chain adjustments and government proposals.

Long-term planning by financial, policymaking and other organisations was a frequent request made by the farmers interviewed. It takes about two years to produce milk, and farmers usually have to plan even beyond that. Similarly, although some changes in the natural environment may be seen quickly after a change of practice, such as new plant species appearing, it takes much longer for the wider system to settle. Plans and funding opportunities that change every few years often fail to provide the stability needed for benefits to fully develop.

Agri-environment schemes are very significant on most of the case study farms: they are important sources of additional income and enable sometimes substantial environmental and habitat creation works to be undertaken. Such schemes, along with some grants, are a long-established method of encouraging specific actions, and most of the farmers interviewed expressed appreciation at being enabled to undertake projects that they were keen to do – from essential infrastructure work such as the installation of water pipes or tracks for the cows, to tree planting and pond creation.

However, the complexity and sometimes the sheer amount of paperwork involved in making, reporting on and claiming a grant remains a problem. The requirement to buy new equipment was also a complaint, as this is not necessarily an efficient use of grant money when useable second-hand equipment may be more cost-effective and better for the local economy.

Possible consequences for sustainable farming should also be more carefully considered when new funding is introduced. One example is that tree planting schemes are not suitable in all areas, and funding for agricultural technology and innovation – which largely means robotics in dairying – can encourage cows to be housed, with associated slurry disposal and animal welfare issues, as well as the environmental and financial costs of building this additional infrastructure.

LINKING SUSTAINABLE FARMING, SOIL HEALTH AND CLIMATE MITIGATION WITH PROFITABILITY

Climate change is changing farming practice. The economic costs to agriculture in Scotland and Wales have been assessed, with extreme weather in 2017-18 costing Scottish farmers £161 million due to livestock losses and lower crop yields.[34] In Wales, the ruminant livestock sector losses are calculated to be £206.7 million in 2018, with another £4 million lost in the arable sector in 2018 and £19 million in 2020.[35]

Modelling has shown that regenerative farming practices could significantly lessen the negative effects of extreme weather.[36] The case study farmers all reported that changing weather patterns are causing changes in the grass growing season and waterlogging, which means that the numbers of animals that can be kept without damaging the soil may need to be reassessed.

To protect the natural environment on which their animals depend, farmers' practical responses include planting trees or managing hedges for shade and reducing animal access to wetter areas. Farmers have also changed calving times to ensure that cows in milk have enough nutrition, as droughts reduce the amount of grass leaf and thus the level of nutrients available.

Optimising on-farm resources (and minimising bought-in input costs), rather than maximising output, **can be good for the environment and profitability**. Several of the farmers use this strategy to reduce bought-in inputs. The specific actions vary to suit the farm and the farmer's ambition, but include moving to grass-based grazing systems to reduce reliance on purchased feed, adopting different grazing management techniques, and implementing other regenerative practices to enhance soil health and minimise the use of artificial fertilisers. In this way, **sustainable and decarbonised farming, soil health and profitability are interlinked**. Andrew Rees, for example, has reduced the amount of nitrogen fertiliser he uses by 60%, which has reduced his expenses and carbon footprint, while allowing the soil and pasture diversity to improve.

There are mixed feelings about carbon markets. For some of the farmers, there is significant potential interest in being paid for storing carbon on-farm, especially if it involves actions that farmers are already undertaking as part of good farming practice. The case study farmers have all undertaken carbon assessments, often using different calculators. However, they remain cautious about carbon schemes because of the variability and accuracy of carbon measurements from different tools, concerns about market regulation and the implications of participating in the market. One potential consequence of selling carbon credits is that they are then attributed to an external business (the buyer) rather than the farm itself, meaning the farm would be unable to promote its products as carbon-neutral or similar, as credits can only be counted once.

Additionally, there is concern that evaluating carbon emissions per litre of milk could disadvantage regenerative farms. High-yielding farms might seem to perform better, as their large milk production volumes result in a lower carbon emission per litre. In contrast, smaller, more agroecological farms, which focus on higher carbon sequestration but produce less milk, could be unfairly penalised due to their relatively higher carbon emissions per litre. Overreliance on any one indicator of efficiency or success misses the complexity of the farming system and the holistic nature of the triple challenge that such systems are trying to address. While measuring the intensity of greenhouse emissions is important, it needs to be seen as part of a wider picture and in conjunction with other indicators of sustainability.

Most case study farmers are **planning more actions** to improve their environmental and economic sustainability. Subject to finance in many cases, these plans range from planting more trees (as silvopasture or simply in hedgerows), to adding value to milk by making cheese, to installing ground-level solar panels. These build on existing actions, as farmers seek opportunities to develop and improve their farms from business and environmental perspectives.


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LEARNING AND ADVICE

A good understanding of finance, debt and business management is important. Many farmers carry a considerable amount of debt. This may have been willingly incurred in order to develop a specific farm enterprise, or may be forced on the individual or business by circumstances beyond their control. Although explicitly discussed by only one case study farmer, Andrew Brewer, it is clear from all of the case studies that a good level of financial literacy and the ability to maximise profits are vital for the sustainability and success of the farm business.

Opportunities to learn from others are varied and appreciated, but the **final decision rests with the farmers.** Finding out about new developments in agriculture, learning new skills and discovering new opportunities are important to all the case study farmers. Sources of information are varied, from a variety of online platforms to WhatsApp and discussion groups to in-person farm visits.

While some have developed links with academic institutions and some get information from milk processors, **farmer-to-farmer sharing remains very significant.** This peer support helps farmers who may be struggling with specific issues and allows them to see how others manage similar challenges. For more established businesses, it is also an opportunity to 'give something back' by sharing their experiences and advice. While advice can be valuable and well-founded, it ultimately needs to fit the specific needs of the farm and align with the farmer's own goals and beliefs.

The farm and animals are essential sources of information. Every farm is different, and the land and animals provide many important lessons, whether it is docks indicating compaction in a certain field or cows being less settled because they do not like a new system. Observations of their animals and the land tell the farmers whether cows are stressed or ill. Relatedly, many farmers view a thriving and diverse natural environment as an indicator of their overall success in managing the farm. This approach allows for continual assessments and improvements to be made for the benefit of the livestock and the land.

BEING AND WORKING IN SOCIETY AND THE COMMUNITY

The case study farmers are all very aware of their wider role in both the community and wider society. This includes providing ecosystem services, through carbon capture for example, as well as the provision of food. Relationships at the community and personal level, for example with neighbours and customers, are also extremely important for the business, as well as for the individual's well-being.

Although much of the milk produced by the case study farms is sold to bulk processors, **there is some interest in supplying local markets, with their opportunities to engage with members of the community.** Developing and supplying local markets requires time, effort and resources on the part of the farmer, but can also increase local employment, strengthen social ties, contribute to a sense of place, and help build mutual trust and respect between the farmer and their community.

Education is seen as a key task for all the farmers. This takes a variety of forms, from advising other farmers and hosting farm walks, to organising formal visits by schools and other non-farming groups. Informal opportunities to teach the general public may arise for those who provide on-farm holiday accommodation. While these educational efforts are both important and enjoyable, they require significant time to organise and ensure that hygiene and safety rules are complied with. Those who want to do more may also require financial investment, like Sophie Gregory who wants to build a classroom. As this is additional to the core farming activities, the support of others, usually the farmer's family, is essential.

WELFARE: ANIMALS, STAFF, FAMILY, SELF

Animal welfare is a top priority for farmers in this case study, who demonstrate their commitment to it in various ways. They are all concerned about promoting and maintaining good health and avoiding common issues found in dairy herds, such as lameness and mastitis, but some have taken particularly significant actions, such as reducing milking frequency or moving to a cow-with-calf system. These practices not only lead to financial savings through lower replacement rates and reduced veterinary and medicine costs, but also contribute to the well-being of the animals, although the benefits of more contented animals are harder to quantify.

Human welfare includes staff, the family and the farmer. Some of the case study farmers have proactively sought to reduce working hours and enhance conditions for their staff, addressing the industry-wide challenges of long hours, low pay and high accident rates. Valued staff are more likely to provide good animal care and alleviating the farmer's workload. Retaining dedicated and experienced staff not only makes good business sense, as there is a financial cost to recruitment, but also ensures continuity of care for the animals. Reliable staff also mean that the farmer can spend more time with their family and make it easier to take up opportunities off-farm.

While farmers care deeply about their work and farms, they also cherish the opportunity to step away occasionally for training, learning or holidays. Farming is frequently described as a lifestyle rather than a job, and often requires a farmer to be 'on call' for 24 hours a day in case an animal or employee needs attention. Time away can improve physical and mental health or may be needed if the farmer or a family member is ill.

CONCLUDING COMMENTS

Dairy farming in the UK is a highly productive sector that has much potential to contribute to improving our environment and biodiversity.[d] The discussion has highlighted the real-life issues faced by some of those farmers who are already taking steps to address these while continuing to run their businesses and plan for the future. The case studies explore their individual stories in more depth.

Eight key conclusions can be drawn from the interviews with farmers and this research:

1. **There is a desire for change, however, 'one sizes fits all' approach should be avoided.** The most important and consistent message is that every farm is unique, and that each farmer must determine what best suits their specific farm and business goals. They do not need to do everything at once, but can take one step at a time and trial those actions that they are interested in on a small scale before rolling them out at the farm scale. The farmers are not resistant to change *per se*, but potential changes are scrutinised carefully. Those providing financial, advisory or other services must recognise that farmers and farm businesses are not an homogeneous group. A 'one sizes fits all' approach should be avoided, as farmers' decisions vary even under similar pressures.

2. **Soil, resilience and benefits of regenerative farming.** The case studies illustrate the significant positive impact of transitioning to regenerative farming methods. In managed ecosystems such as those on farms, soil health can be sustained, enhanced or restored through sustainable soil management practices. To maintain soil's vital functions, it is crucial to prevent and address all forms of soil degradation. Most of the farmers interviewed report feeling more financially and environmentally resilient to both economic and climate-related challenges. By reducing inputs such as nitrogenous fertilisers (in addition to other actions such as diversifying and adding value to their milk, improving animal health, and considering employee conditions), farmers are discovering a range of benefits from regenerative practices. These practices may not only enhance farms sustainability but also offer a more hopeful future for the stability of the farm business.

3. **Institutional support and upskilling make a real difference.** Policymakers, financial service providers, dairy processors and retailers play a crucial role in supporting farmers to become more sustainable, enhancing agriculture's contribution to wider ecosystem services. For these institutions, this support can be strengthened by striving for a deeper understanding of farming and farm businesses. This could include local 'relationship managers' based near to their farming clients who have the time and inclination to learn about their specific needs. Long-term thinking and relationship building help develop trust between the parties, respect for each other's expertise and a more secure footing for both sides through re-evaluating risk in relation to borrowing money.

4. **Unintended consequences must be avoided.** An awareness of the broader impacts, including unintended consequences, of policy and funding decisions is crucial. Care should be taken that policies and funding priorities do not undermine other aspects of regenerative, agroecological or organic farming. This underlines the need for the triple challenge approach, where action on climate, nature and nutrition security need to be considered together.

5. **Measurements of 'success' must be reconsidered.** Good environmental and welfare standards are important to a sustainable farm. Soil, animal and human health and well-being problems often incur costs which can be high, but positive health is unlikely to appear on a budget spreadsheet. Measurements of farming's sustainability (or, indeed, success) should be reassessed to account for its wider benefits and costs.

d House of Commons Library. 2020. UK dairy industry statistics
https://commonslibrary.parliament.uk/research-briefings/sn02721/

6. **Farm work and learning are continual.** For the case study farmers, work is never truly finished; they are constantly looking out for new ways to improve and innovate. There is always another step to take, more to learn, and additional actions that can benefit their farms, their profits and the environment. While some learning comes from observations of their land and animals, some have had to reconsider things that they learnt previously when they embarked on the transition to more nature-friendly styles of farming. The advice and education provided to farmers must meet the needs of farming with nature.

7. **Farmers accept risk, but should not bear it alone.** Farmers have a lot to lose if things go wrong. As well as the physical dangers, their places of work may also be their homes, and may support multiple generations of the family. Several case study farmers have made changes that have been personally beneficial, for example in creating a better work-life balance or offering opportunities for professional development – things that are standard practice in other industries. They are not afraid to take a risk in order to gain stability and make improvements for their farms, families and themselves; they often borrow significant amounts of money or undertake on-farm trials. However, having debt, coupled up with changing policies, inappropriate advice and other factors that could compromise business viability which could result in consequences that impact farmers personal circumstances as well. Financial institutions, milk processors and retailers can help farmers in this by addressing the way they calculate risk and being more willing to take on their share. The huge changes that the case study farmers have already made to their farms and farming systems, often overcoming serious issues along the way, as well as their courage and tenacity, should be acknowledged.

8. **Doing things differently carries its own problems.** Most of the case study farmers are pioneers or, at least, early adopters of their farming styles and practices. In addition to frequently lacking practical advice, the farmers ran the risk of social and institutional misunderstanding of what they were trying to achieve. This is compounded by the strongly felt pressure of not allowing the farm to fail and a certain amount of stigma if they try to do things differently to the mainstream. Their message to other farmers is that it may appear difficult (and indeed it sometimes is), but benefits will come in time.

CASE STUDIES

ANDREW REES, MOOR FARM, WALWYNS CASTLE, PEMBROKESHIRE

THE FARM

Situated just outside the boundary of the Pembrokeshire Coast National Park in west Wales, Moor Farm is only three miles from the coast in the southwest of the county.
The farm was originally bought by Andrew Rees's grandfather, and has gradually been expanded to its present size of 420 acres (170ha).

The herd, which is British Friesian, currently numbers 290 adult cows of which 259 are milked and the remainder are nurse cows who rear the heifer calves that will eventually join the milking herd. Andrew also breeds a few pedigree bulls to sell to either artificial insemination studs or to other farms. All the adult animals are housed in winter to protect the fields from damage in the cold, wet weather, while the young stock remain outside until they are bred from at 15 months old. Calving is within a tight block in spring.
All of the milk produced is sold to the farmer-owned cooperative First Milk. In 2022, Andrew was a runner-up in Farm Carbon Toolkit's 'Soil Farmer of the Year' award, which aims to find the best farmers and growers who are engaged with and passionate about managing their soils.

CHANGING THE SYSTEM: TOWARDS SELF-SUFFICIENCY

Moor Farm was a mixed farm, with a milking herd of about 120 cows, until Andrew and his father, Colin, reviewed the farm's enterprises in the early 2010s. Finding that the dairy herd was by far the most profitable part of the operation, they decided to concentrate on this.

To do this, they moved to spring block calving, increased animal numbers and increased grass production. From 2013 until about 2017, this system was financially successful, and the farm hit its business targets. Andrew and Colin were using a New Zealand-style grazing system, where cows graze fields in a 21-day rotation. This required a regular application of nitrogen fertiliser to keep grass production – usually a monocrop of rye grass – at a maximum.

However, by 2018 Andrew noticed that the grass yield was beginning to plateau, even with increased amounts of fertiliser. The drought of that year also began to show some of the weaknesses of the system, with Andrew observing that his cows were not as contented as he would have liked, despite managing them 'by the book'. It became clear to him that the farm was slightly overstocked.

"It was those observations that started me questioning whether everything we were doing was right."

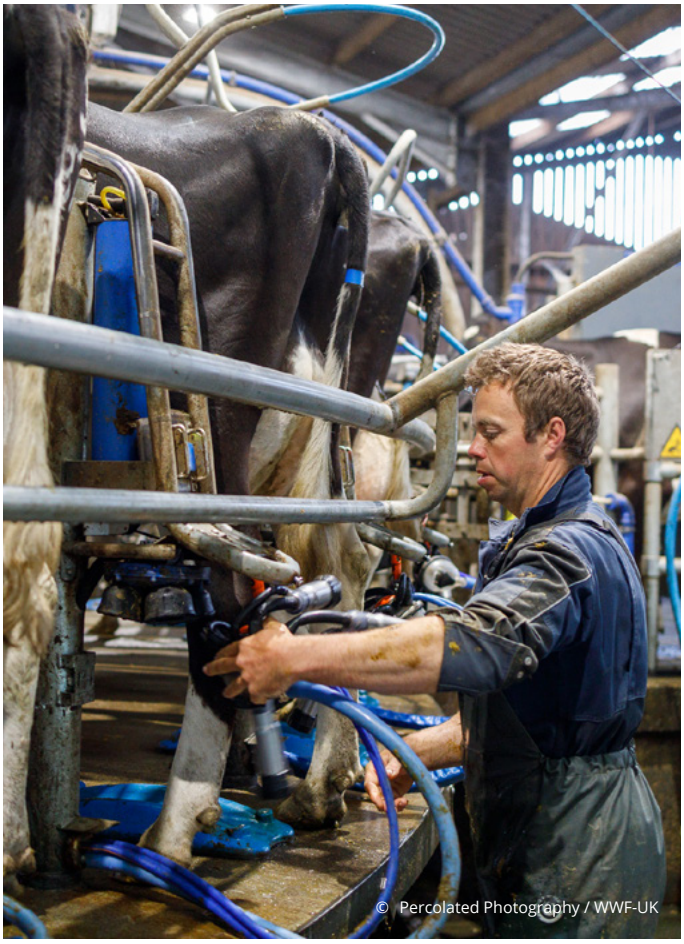
Early in the same year, Colin died, which eventually prompted Andrew to reassess what he wanted from the farm.

In 2019, Andrew began looking for ways of making the farm more financially and environmentally sustainable, beginning with reducing the amount of nitrogen fertiliser he was using, which was 220 kg/ha that year. He also sold the farm's plough, having learnt about the damage that ploughing can cause to soils, admitting that he was not keen on it anyway.

By early 2020, Andrew had found out about foliar feeding as a way of reducing nitrogen fertiliser through applying it directly to the plant rather than scattering it on the ground. He took up an opportunity to visit Ireland where he saw a Tow and Fert machine in action, and took delivery of one later in the year, bringing it into use for the remaining half of the growing season. In 2021, the first year entirely under the new fertiliser system, nitrogen use was reduced to 83kg/ha – a reduction of over 60% from 2019.

Crucially, milk yield did not noticeably change. However, Andrew wanted to do more for the cows' welfare, and in 2022 began a flexible milking regime, whereby twice-a-day milking was gradually reduced until the cows were being milked once a day. Despite the significant decrease in milk being produced for sale, Andrew is happy that the reduction in costs along with non-financial benefits make this worthwhile. For him, there is an additional value in retaining the former level of profitability while working fewer hours. He is confident that further financial and animal welfare benefits will be seen over the next few years as the system settles into the new routine.

Andrew's ambition is to produce as much as possible from the farm's own resources, in order to be less reliant on external supplies. He recognises the need for the business to be resilient to weather events that affect growing conditions and also sees the importance of having a biodiverse farm, which gives him the flexibility to adapt to changing conditions.



ISSUES:

Carefully managing finance and risk is crucial

Andrew and the family take a very careful approach to financial decision-making, which involves asking whether each potential purchase is affordable and whether it is going to provide a reasonable return. While they are willing to take on debt, they largely succeed in financing developments on the farm from their own resources, the most significant perhaps being the Tow and Fert machine, which they bought using the farm's own finances. At the time of its purchase, they were spending about £40,000 on fertiliser per year, while the machine cost approximately £35,000. Savings in fertiliser were predicted to be 40% and, as fertiliser prices increased substantially in the early 2020s, the machine effectively paid for itself in just over a year, helped by the actual fertiliser saving being nearer 60% in the first two years. At the same time, Andrew estimated the amount of cattle feed that had been bought during the introduction of foliar feeding, and felt that at least initially there was no – or minimal – loss of production and they were growing the same amount of grass but with less fertiliser.

However, he has recently noted a slight reduction in grass production and has to purchase some additional feed. Andrew feels that this may have been caused by the effects of climate change, particularly the increasing frequency of hot, dry weather, as well as the rapid removal of synthetic inputs, which he thinks may have been too sudden to allow the sward to rebalance itself under the new system. Furthermore, TB (bovine tuberculosis) regulations prevented the sale of some livestock, increasing the demand for feed. These extra costs were covered by the farm's cashflow.

Given the need to buy in extra forage crops, the farm faces the challenge of finding the correct stocking rate – one that can be maintained, generates sufficient income to cover costs, and provides a return on investment. Simultaneously, it must withstand external factors such as climate change and TB restrictions. The quality of purchased forage also raises concerns, as Andrew has limited control over how other farmers cultivate it, directly affecting the nutrition received by his cows. Good relationships with supplying growers help with this until a longer-term solution can be found.

With the changes to the milking system, the farm now requires less labour. However, with a long-term member of staff taking up their own farm tenancy, and finding suitable workers often proving difficult, the transition to once-a-day milking suits the current labour available on the farm.

Measuring decarbonisation is complex

Reducing the amount of nitrogen fertiliser used on the farm was primarily a financial decision for Andrew, although one that does reduce the farm's carbon footprint.

It led to Andrew taking a much greater interest in the farm's soils and their management, including calculating their carbon content. However, he has several concerns about the measuring of soil carbon and the trading of carbon credits. These include the way that carbon footprints are calculated and expressed. He feels that when carbon counts are measured per litre of milk, it could make a high yielding herd appear better in this respect, as relatively poor carbon scores can be shared across a very high volume of milk. A dairy farm with lower production levels is likely to be doing more to farm in a more natural way in terms of soil health, carbon content, reducing nitrogen fertiliser use and improving biodiversity, but may score poorly on the single measure of carbon count per litre. Andrew is also unhappy that different sources of carbon emissions are not taken into account, with too much weighting put on methane emissions. His further concerns include the fear that carbon 'tunnel vision' risks ignoring the problems of biodiversity loss and soil health, and that offsetting allows the biggest polluters to continue to emit greenhouse gases if they can afford it. In essence, Andrew feels that farms with a long history of good practice will be disadvantaged, as their potential for improvement is lower than those who have degraded soils.

Reducing synthetic chemical use – whether fertilisers or pesticides – requires planning but has many benefits

Synthetic chemicals put natural systems out of balance, and these can take time to recover. Continuing to restore the soil is important to Andrew, even if further actions mean sacrificing some production in the short term.

In addition, some choices between common farm practices are difficult. Specifically, is ploughing

better or worse than direct drilling, which is commonly associated with the use of glyphosate? Having learnt that not disturbing the soil through ploughing is beneficial, Andrew has recently been reading about the negative effects that glyphosate has on the environment and human health. Needing to renew some pasture, he decided to plough (rather than direct drill) after a six-year break, but said that it did not seem right. He feels that it is important to consider all the tools available in the toolbox, but that it can sometimes be difficult to choose which is the most appropriate. Andrew believes that there are lessons to be learnt from the organic sector on managing soils through direct drilling, but without using glyphosate.

The introduction of herbal leys, more biodiverse fields and healthier soils and animals have led to a noticeable increase in wildlife on the farm, particularly insects in the herbal leys. More birds, including swallows and goldfinches, have also been seen, and even a flock of feeding curlews has visited. However, the herbal leys require different management to rye grass pasture, and several lessons were learnt in the transition journey, such as the need to observe in detail the levels of grazing and deciding when to move stock on. The leys' less dense growth habit also means that they do not cope with wet weather very well and are easily damaged by trampling in these conditions.

Learn from people and animals

It was Andrew's own observations of his cows that largely started his change of direction on the farm. His father had always allowed Andrew to make farm-related decisions, but did question them in order to encourage Andrew to think them through, which perhaps gave him early training in considered decision-making.

The Covid pandemic provided an unexpected opportunity, as online learning rapidly increased. Andrew was able to read and listen to many more ideas, including ways of reducing artificial fertiliser and other chemicals, in addition to better understanding soil health.

However, in the case of the Tow and Fert machine, trust in the people who were advising Andrew, as well as seeing it in action, was a major factor in his final decision.

Additionally, the farm has a good relationship with First Milk, which steers its members towards regenerative farming practices and provides Andrew with good opportunities for making contacts and hearing information about new developments. It was First Milk who nominated Andrew for the 2022 Soil Farmer of the Year competition, organised by the Farm Carbon Toolkit. Despite not typically seeking such recognition, this experience has boosted Andrew's confidence, reinforcing the idea that innovative approaches can yield meaningful results: "*maybe doing something a bit different is worthwhile.*"

Animal welfare and productivity are linked

Since adopting these changes, Andrew has noticed several positive changes with the cows: fertility rates have increased, cases of mastitis have decreased, and the cows are more settled. These have obvious animal welfare advantages, but are also financially beneficial in terms of veterinary and medication bills, and replacement rates.

The transition to once-a-day milking means that less productive cows are more obvious, with consequences for business finances, and are removed from the herd. This allows Andrew to ensure that each cow earns her place in the herd, albeit within a system that produces less overall, but that has healthier cows and is more profitable.

NEXT STEPS

Looking ahead, Andrew would like to try **silvopasture**. Just as the soil has multiple levels that are used by different plants, he feels that layers of plants above ground can also be used to turn more sunlight into nutrition. The cows themselves demonstrate this by browsing hedgerows and trees when they can, and benefit from the variety of nutrients that these plants provide.[e] This helps with another of Andrew's aims, which is to improve biodiversity on the farm. The additional trees may also help with the farm's carbon account, if the carbon accounting approach continues to be pursued. Such a system could help to diversify the income stream through biomass or timber production, but care is needed in planning how this would work with the rest of the farm, and how it would be financed.

He is confident that the **improvements in animal health and welfare** that have already been seen will continue, and that these contribute to the farm's financial sustainability even if some of the changes mean that the short-term income is not maximised.

While he admits that he may not have taken it, Andrew feels that **independent advice** is generally lacking in UK agriculture. He believes that many farmers rely on companies selling products for guidance. There are opportunities here for organisations to provide genuinely independent advice that takes into account the broader farming, environmental, social and economic context.

His own advice to other farmers is to **try out ideas on a small area** first and analyse what works or why things fail. Even then, things may not work at a larger scale, so lessons still have to be learnt. He warns against simply copying what someone else does, and believes that it is essential to work out what is best for each farm, but also for the wider community.

"[Farmers should ask] 'are we farming in a way that's doing the least harm, whether that's to the environment, animal welfare, human welfare, society?' [...] It's not just the financial side, because sometimes the best financial result for a farmer has a cost to society, whether that's in pollution or whatever. So, it's that holistic, 'what is the best overall?'"

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e See research by Lindsay Whistance, Organic Research Centre, and colleagues; for example, Whistance, L, 2021. Browse and tree fodder: nutritional benefits for livestock. *Organic Research Digest* 6, **www.organicresearchcentre.com/wp-content/uploads/2021/03/6.-Browse-and-tree-fodder.pdf**; Whistance, L, 2018. *Browse, preserved tree fodder and nutrition*. Agricology, **agricology.co.uk/resource/browse-preserved-tree-fodder-and-nutrition**

DAVID FINLAY, THE ETHICAL DAIRY, RAINTON, GATEHOUSE OF FLEET, CASTLE DOUGLAS, DUMFRIES AND GALLOWAY

THE FARM

In the southwest of Scotland, Rainton is a rented upland dairy and sheep farm of 850 acres (344ha) – 500 acres (202ha) of pasture and 350 acres (141ha) of woodland, scrub and rough grazing – where David and Wilma Finlay run an organic cow-with-calf system. This was the first of its kind at a commercial scale in the UK and is the largest in Europe. They milk 125 cows that are a three-way cross of Viking Red, Holstein and Montbeliard. Approximately 80% of the milk is used to make cheese, which is sold direct to customers and the food sector, with the remainder going to a wholesaler and to make ice cream. Visitors to the farm are encouraged, with frequent guided tours and cheese-making courses.

CHANGING THE SYSTEM: NAVIGATING CHALLENGES AND ACHIEVING CHANGE

Towards organic and Fairtrade

The current farming system is very different from the one that David intended to run when he returned home to the farm in 1987 after a spell as a farm consultant. At that time, he was heavily influenced by the prevailing industry ethos of intensification and efficiency. Diversifying the farm income was also important, and David began ice cream production and opened a visitors' centre on the farm in 1994. However, he became disillusioned with the environmental, animal welfare and health problems and the financial costs associated with the industrial system, while Wilma, other family members and the public expressed similar opinions.

Most significantly, the 10p per litre price premium for organic milk and the huge demand for organic ice cream meant that David felt it was worth the effort of converting to organic production, and this process began in 1998. The family also borrowed about half a million pounds to invest in new buildings, machinery, equipment and vehicles for the diversification businesses. The foot-and-mouth disease outbreak in 2001 saw their market halve and, because of the recent borrowing, they were technically bankrupt. Milk production had also dropped by about 3,000 litres per cow per year because of the reduction in concentrated feed that organic certification required. As the business began to recover from these issues, the milk price fell by nearly a third because of increasing competition.

In response to customers' suggestions, the ice cream then became a Fairtrade product, which meant sourcing certified Fairtrade ingredients (although the farm's milk and cream, along with eggs and strawberries, were exempt) and investing £60,000 on developing the new brand. This was launched in 2008, just as the global financial crisis occurred, and the market for luxury goods - like organic Fairtrade ice cream – all but disappeared.

Cow-with-calf

The set-back prompted another rethink of the farm business: the family realised that they could not compete on price and needed a simple, compelling message for their products. They knew that their customers were unhappy about the dairy industry's standard practice of removing calves from the cows soon after birth and had noticed a rise in related online activism. Inspired by successfully working with natural processes in the organic system and a visit to two cow-with-calf dairies in the Netherlands in 2009, David and Wilma decided to adopt this system in 2012, becoming the first farmers in the UK to do so commercially.

Although the initial experiment was halted in 2013 because of practical challenges, David learnt more about the cow-with-calf system, improved the farm's infrastructure and tried again in 2016. Despite facing disease outbreaks related to winter housing which caused the loss of a third of the autumn calves, the family made further management changes, and these disease threats are now a rarity. Calf health is exemplary, with growth rates over twice those of bucket-reared calves, and finishing/breeding weights achieved six to eight months earlier than previously. This is a direct result of the effects of suckling and the low-stress system.

Pasture-fed

David had been told that the maximum figure for milk produced from forage only was 4,500 litres per cow per year. However, he realised that no one had actually investigated the output of a cow-with-calf system that was entirely forage fed and, despite the calves drinking 2,000-2,500 litres, he decided to investigate further. The result was that the herd as a whole now produces so much milk that this compensates for the extra milk the calves are drinking. Two-thirds of the herd are producing over 6,000 litres of milk per year from a 100% forage diet. With focused breeding, this is now a farm target. The farm was certified as 100% pasture-fed in 2019, and is one of a very small number of dairy farms in the UK to achieve this.

Enhanced staff working conditions

Having considered animal welfare, David has also improved conditions for his farm staff. He has been able to reduce and rearrange their hours, from the norm of 12-hour shifts over a 70-to-80-hour week in a 12 days worked/2 off pattern on industrial farms, to an average of 40 hours a week, with a four-day break over the following weekend if a weekend is worked.

ISSUES

Financing innovative change can be difficult, but worth the risk

Although the price premium on organic milk was the deciding factor for David to begin conversion, it was a difficult journey. To cope with the early financial issues while the farm's natural systems settled down, the farm was heavily destocked, with a resulting loss of subsidy, as this was based on a headage payment at the time. As cow-with-calf is seen as an unusual way of farming, financing the initial trial as tenant farmers, along with the new dairy, proved to be extremely challenging. David tried several ways of finding external sources of help, including partnering with academic and research organisations to try and leverage research funding from European and UK sources. However, he felt that funders seemed more interested in marketable products rather than the diverse benefits offered by the cow-with-calf system, even though the project achieved outstanding results in animal welfare and had significant positive environmental impacts. Banks, including the farm's, were seemingly uninterested. A crowdfunding campaign towards the new cheese dairy was successful and eventually helped persuade the farm's bank to lend, as it had helped to prove the existence of a market for the cheeses. Other loans were arranged with family and friends, and a trust.

Despite these issues and thanks to David's perseverance, the financial savings in recent years were over £100,000 per annum. This was largely because of the very low level of inputs needed due to the pasture-fed, organic and agroecological practices employed and the resulting health of livestock and the environment.

For many farmers producing products in this way, a continuing problem is the lack of routes to market paying a premium for agroecological and regenerative goods. Even when a market is found, the costs and effort of getting produce to it are prohibitive, especially for those who are remote from the main centres of population.

Grants and incentives: how to effect widespread change?

David feels that financial institutions' risk aversion is not currently helping farmers move towards more sustainable production.

"How do you get innovation, real innovation, system innovation, when the system involves major change? Because you don't get system innovation just by changing one thing: you have to change everything, which is what we've found over and over again, both with organic – that was a system change – then moving to 100% pasture-fed was a system change again and then cow-with-calf, system change. Each one brings with it risk, uncertainty."

Another common source of farm finance is grant funding. However, David believes that this is a poor mechanism for achieving change. It can increase costs as grant-funded items must be new, and it often comes with restrictive and bureaucratic requirements; for example, grants might require specific equipment that does not fit the farm's needs. Similarly, subsidies can have unintended consequences, such as creating dependency for farmers who come to rely on them. This reliance can discourage innovation and adaptation, as farmers may focus on meeting subsidy criteria rather than developing the best options for their farms.

David has successfully made wholescale changes to his farming business, and frequently speaks about his farm, as well as hosting visits. However, he is concerned that these changes may be too big a challenge for many other farmers: greater and more effective incentives are required, with better support and farm gate prices for organic and other quality products. He believes that with the right support, farmers can break free from the constraints of the industrial system.

The public sector must play its part

David believes that for farmers to deliver higher quality food, the public sector must also commit to purchasing higher quality products at a significant premium, rather than opting for the cheapest options available. Additionally, there needs to be more awareness and support to make these options available and accessible for everyone.

Environment and biodiversity benefits can be huge

Although natural systems do take time to recover from chemical use, David has found a wealth of benefits to the farm's soils and wildlife, with associated financial savings. Soil health has improved, supporting more diverse pastures and avoiding the need for supplementary nutrition even though the farm is in a mineral-deficient area. With over 25 years of soil organic data, the farm has gone from an already high 11% to 14% organic matter in recent years.

A carbon audit has shown that the farm is net zero,[f] as they buy very little in and sequester a lot of carbon in the 100 acres (40.5ha) of recently planted woodlands, and soils which have not been deeply cultivated for many years.

Biodiversity audits in 2023 showed a 50% increase in plant diversity since 2000, in addition to 120+ insect species, two of which were new to Scotland, and the identification of a very rare medicinal leech.[g]

Learn from others and be prepared to change yourself

Pressure for change at Rainton Farm came from many quarters, notably family members and customers, as well as financial incentives and necessity. However, making these changes was arguably easier because there were other people to provide advice. The visit to the cow-with-calf dairies was helpful but, being pioneers of this in the UK, trial and error, which is often expensive, was the only option.

f See www.theethicaldairy.co.uk/blog/soil-matters-most-all for how David went about this.
g David wrote about this in a blog post: www.theethicaldairy.co.uk/blog/five-eyed-medicinal-leeches-and-other-stuff.

Perhaps the biggest change that David has made over the years has been to his mindset. Converting to organic production, then pasture-fed, then cow-with-calf, have all required relearning many aspects of farming. Crucially, time and patience are needed for people and animals to learn new systems even when they are more natural, such as cow-with-calf.

Improving food security and safeguarding livelihoods through natural systems is possible

The farm is able to support about 25% more cows than before cow-with-calf was introduced, and the size of the herd has increased accordingly. The calves drink a lot more milk than in industrial systems, but they grow quicker, come to maturity and either join the dairy herd or are grown on for beef six to eight months earlier than usual. This means that more forage is available for expanding the remaining herd.

Achieving 4,500 litres per cow per year from forage is considered good in any dairy system. The effects of calf suckling and high welfare mean that over half the herd are producing more than 6,000 litres, and David is confident that through careful selection, more cows will achieve this in the near future.

Given a 25% increase in cow numbers and a 25% increase in yield, despite the calf drinking a third of the milk, the system produces as much, if not more, milk than before. In addition, there are 25% more cattle to sell, making the system even more resource efficient and profitable.

Animal health is very high and further positive outcomes are anticipated

Animal health has improved and remains at a high level, since the early issues with the cow-with-calf system were dealt with, and advice from vets, experienced staff and researchers was crucial. It was discovered, for example, that *Salmonella* existed at a very low level in the housing. It had no direct effect on the herd, but David's vet advised him that it predisposed the calves to *Pasteurella*. By vaccinating against *Salmonella*, *Pasteurella* cases have reduced by 90%. In addition to no longer needing supplementary nutrition, treatments for biting flies are now unnecessary. David attributes this to the organic and environmental work undertaken, including the seven new ponds which attract predator species that keep fly numbers under control. Cases of intestinal worms have also significantly reduced, and cattle have not required treatment for over a decade.

Replacement cows that have been born into this system are now coming through, and David is selectively breeding from those that particularly thrive and are calm and compliant. Temperament is crucial, as calm animals are more likely to share their milk. Unlike the industry standard practice, which is to cull animals that do not become pregnant or are less productive fairly quickly, David gives his young cows up to three years to attain reasonable milk yields if he feels they have potential. They then stay with the herd three or four times longer than in the average industrial herd, providing further financial savings.

NEXT STEPS

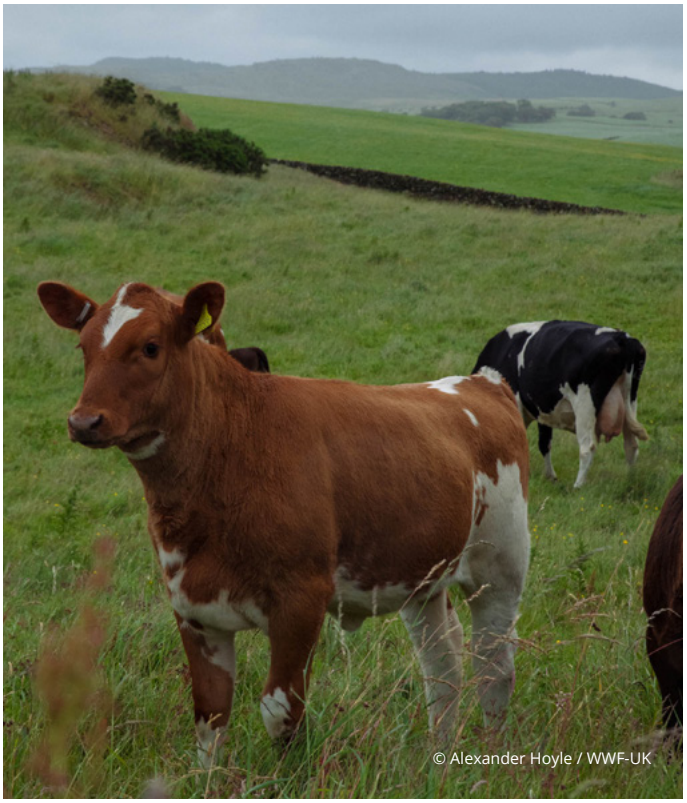
Despite substantial financial, political and structural challenges facing farmers, there are ways forward. David has an idea that by reallocating the money that currently goes into subsidies and industrial agricultural research and systems, a **fairer financing system** could be designed that **rewards farmers at different scales** according to their stage on the journey to produce agroecological goods with holistic outcomes. The scales would encourage farmers to move towards delivering a broader package of high-quality outcomes including meaningful jobs, carbon sequestration, animal welfare and high biodiversity. **Support to enable the public sector to buy these products** would be combined with taxes on ultra-processed food to encourage access to healthy food for those most in need. Finally, government-secured **soft loans** – loans with low or no interest and flexible repayment terms – based on whole farm plans would replace grants and encourage particularly younger and tenant farmers to innovate and transfer to more sustainable farming methods.

In the meantime, **using the term 'regenerative agriculture'** starts farmers thinking in different ways and leads to reductions in chemical inputs, despite its current use being rather variable.

For the future, David feels that **agroecology is a better way of farming**, and not that difficult once the mindset has changed from industrial agriculture.

"The fact is that we do know – in ourselves anyway – that this system can deliver all these social, environmental, welfare and economic outcomes. All we need now is to get proof of concept."

This is one way that supply chain and public policy can play a role in supporting a widespread move towards productive and useful farming that benefits the nation's health, the farmers themselves, their animals and the environment.



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SOPHIE GREGORY, HOME FARM, THORNECOMBE, DORSET

THE FARM

Sophie Gregory, her husband, Tom, and their children live on a rented 1,400 acre (566ha) organic farm on the Dorset-Devon border in England, where they farm 400 spring-calving mainly Irish Friesian cows. About 300 acres (121ha) is used for arable. About 80 animals a year are grown on for beef, some of which provide grazing for their landlord's rewilding project. They have an organic contract with Arla, the multinational, farmer-owned dairy cooperative which in turn supplies Yeo Valley organic dairy. Some milk goes to McDonald's restaurants, and to Tesco supermarkets under their own-brand label.

Sophie and Tom are first-generation farmers, and arrived at Home Farm in 2014. In 2021, Sophie, who has a background in accounting, won Dairy Woman of the Year at the Women in Dairy Conference, which is an initiative from the Royal Association of British Dairy Farmers (RABDF). She is also currently undertaking a Nuffield farming scholarship, looking at the future of organic farming, with a particular focus on dairy.

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CHANGING THE SYSTEM: FROM A 'BLANK SLATE' TO AN ORGANIC DAIRY

Before moving to Home Farm, Sophie had trained as an accountant and Tom was working as a cattle foot trimmer, and they had been in a partnership with a farmer to produce high-welfare, RSPCA-assured rosé veal.[h] However, neither Sophie nor Tom had direct farming experience when the opportunity to take on the tenancy arose.

Believing that they would be unable to attract funding from financial institutions, partly because they were only in their mid-twenties, they approached their business partner with a share-farming plan. Sophie and Tom financed 20% of the business themselves initially, aiming to buy into 50% through the farm's cash flow. This was accomplished in five years, but the contract meant that they could not continue beyond this level, so they invested any profits outside the business and began negotiations to fully buy out the partner. Agreement was reached in spring 2024, when Sophie and Tom gained a 10-year tenancy in their own name.

Home Farm had been unworked for six months when they moved in, and this fallow period, along with buying in organic animals, counted towards the required organic conversion period. This meant organic status was granted in 2015, after only 18 months.

During the first 10 years, they have also taken on the tenancy of two other blocks of land, one being a contract farming agreement, almost doubling the farm size.

The herd size has increased from the original 280 cows to the present number. Sophie is working to change from the original mix of breeds, which was based on what was available and what Tom and Sophie could afford, towards an all Irish Friesian herd.

h Rosé (or rose or pink) veal is meat from calves slaughtered under a year old, often bull calves from dairy herds, that have been given appropriate nutrition to avoid anaemia and hence provide a pink meat. White veal may sometimes be seen, where the diet is low in iron and fibre, leading to a pale colour. The RSPCA only assures rosé veal and has additional welfare standards. See **www.rspcaassured.org.uk/farmed-animal-welfare/beef-cattle/what-is-veal**.

ISSUES

Diverse income sources are needed to secure the business

The financing of a brand-new business has needed imagination, and Sophie has taken up and created a variety of opportunities to enable this. The priority was to generate cash in order to buy the farm. Having careers outside of farming, she and Tom had some capital, but made much use of their overdraft facility at the beginning, while living very frugally in order to achieve this.

While the share farming provided a financially manageable way into the business, the capping of a 50% share allowed them to invest in a couple of houses, which gives them financial options for the future. The remaining payments for the farm have been agreed using a payment plan, so interest rates have not yet been an issue.

Contract farming and Sophie's off-farm accountancy work also help, but both are enabled by farming.

Despite the organic conversion grant, conversion to organic is expensive. Organic animals and feed cost more, but the farm only receives the price for non-organic milk during this period. Sophie feels that buyers can make a difference here, by paying a premium price for in-conversion products that have not yet achieved certification, and she was grateful that she had an organic contract at all at that time.

The quality of organic feed can be another issue and maintaining control of this was one of the reasons that Sophie took on an additional block of land.

Underpinning the whole enterprise are the animals themselves. Having bought a variety of cows from several sources, Sophie soon found that the larger animals were not suited to all the walking that was needed on the farm. The fertility rates were also disappointingly low initially, and additional in-calf cows had to be bought, which resulted in two calving blocks during the year. This means that there is never a 'dry' period – with less work – but Sophie feels this is the best way to get the most profit out of the buildings that are available. Within the herd, the most profitable cows are those that Sophie calls "ghost cows": the ones that she never has a reason to notice because they are healthy and productive, needing no special treatment.

A grant, match-funded by Sophie's landlord, is allowing her to build a classroom on the farm through the Farming in Protected Landscapes programme.

Upskilling and investing in future farmers

Having had to fund her entry into farming through a private partnership, Sophie feels that she still does not have assets that banks consider worthwhile. Despite being settled on the farm, it is still difficult for Sophie and Tom to borrow money as they own cows, rather than land. This is the type of situation that makes it particularly difficult for new entrants to the industry.

Banks could aid new entrants by developing a better understanding of farming. Sophie suggests that each institution appoints a panel of farmer representatives to provide them with information. She feels that such a group would help banks realise that investment may be needed simply to adapt to changing government policy. Flexibility in their dealings with farmers would be appreciated, and she would also like to see relationship managers able to deal with all levels of loans, so that if borrowing is needed, or needs to be increased, there is already someone who understands the farm business and industry.

Sophie also calls for policymakers to better understand the pressures that farmers are under, recognising that they are already adapting to many challenges, including changing political, financial and climate conditions. She would like the government to think longer-term when designing policies, and to pay more attention to whether policy innovations are realistic in practice. Engaging with farmers remains key to this.

"We all, as a group [of farmers], want to do the right thing. We want to open our doors and let others understand, but some of us don't know how to do that, and some of us need the confidence that it's going to be listened to."

Sophie feels that the skills required now are very different to those in even the recent past, and that more support should be given to improving the education of children and young people in terms of food, farming and the environment. The possibility of agriculture as a career should also be promoted. Ideally, she would like to see these subjects on the national curriculum, with apprenticeships and appropriate degree courses being offered. While training in other subjects, such as Sophie's own accountancy qualification, is undoubtedly beneficial, she believes that the industry also needs people who have studied agriculture and an increasingly wide range of technical skills, notably IT experience with the introduction of robotics on some farms.

Balancing regenerative agriculture with economic requirements and carbon sequestration can be difficult

For Sophie, going organic was a purely financial decision. She and Tom assessed the economic implications of producing organically and non-organically, and organic returned the best figures, which were needed to increase their share of the business as quickly as possible. She feels that if the figures change, and risk the profitability of the farm, she would return the farm to industrial production.

Another issue is how to renew pasture without using herbicide to kill off the old growth, which is not allowed under organic rules, but also without ploughing, which releases soil carbon. Ploughing is done at Home Farm, but not as often as previously.

Soil carbon assessments have undertaken using several tools, including Farm Carbon Toolkit, Soil Association Exchange and Arla's own, although they all gave different results. Despite this, Sophie believes that all farmers should have baseline readings done. However, anyone considering entering the carbon market should ensure that they have a sound understanding of its requirements and implications before doing so, as Sophie feels that better regulation is needed.

As one holding within a bigger estate, the hedgerows are maintained in a way that suits the whole, specifically trying to keep them as good wildlife corridors. This means coppicing, laying and flailing in a rotation, and more have been planted.

Sophie has also trialled sowing some herbal leys and mob grazing – practices associated with regenerative farming. However, in the context of an organic farm where these actions are closer to existing practice, Sophie has yet to be convinced about their added value.

She feels that many such practices were already being undertaken by organic farmers and that the movement has perhaps been too slow to adopt the term. Indeed, much of regenerative farming is a return to mixed farming. Despite the lack of definition of 'regenerative', Sophie feels that it is useful if it enthuses farmers about their soils and encourages them to change damaging practices or makes them more profitable.

The community and the farm are strongly interlinked

The wider community is very important to Sophie and Tom: at the very least, they found out about the tenancy through Tom's work, which meant that he was aware of changes and events in the area. However, the bond is much deeper:

"I want to have a positive impact on the community I farm in, because it was here before we farmed. We're only here by invitation, and so it's really important to me that we have a positive impact across that."

It is also strengthened by Sophie's passion for teaching young people about where their food comes from. One of the local schools has created its own young farmers club (independent from the National Federation of Young Farmers' Clubs), and Sophie hosts school visits on the farm, as well as going to schools. In addition to talking about food, she is keen to promote agriculture as a career.

The community also includes other farms, which has enabled a group of them to participate in Open Farm Sunday. They share the event between them, so that it rotates around the group. Other farmers – organic and industrial – are also important sources of information and sharing learning through WhatsApp and discussion groups.

NEXT STEPS

An immediate change will be to the **conservation grazing arrangements** on the landlord's rewilding project. Sophie will lose access to 200 acres (81ha) of grazing, but will sell the cattle and also be free of the responsibility of looking after animals in an area where there are public rights of way. Having gained experience with cattle management, this type of enterprise no longer fits with the Home Farm plan, although the rewilding project will continue. The loss of the land will be balanced by the sale of the cattle and less stress.

While that was an easy decision, Sophie is still considering her response to the **effects of climate change** on the farm's grass production and her **future as an organic farmer**. As drought periods are increasing, and grass growth is slowing, she would like to encourage it with the application of a little nitrogen fertiliser. While she does not wish to begin using pesticides and wants to do as much as possible to protect the soils, she would like a little more freedom to use products to mitigate climate change, and that are not allowed under organic certification rules. Coupled with this is the recent low price for organic milk. For Sophie, this is tied in with how she keeps the farm business going in the face of poor returns (even for a high-quality product), more droughts and declining grass production. However, she does say that organic production seems to suit some areas of the farm, perhaps because some of them are quite rough and respond better to more natural management styles.

Finally, she plans to do more **educational activities**, including building an on-farm classroom and bringing school and other groups out to see the animals and dairy. The overall aim is to reconnect people, especially children, with their food, beginning with where it comes from:

"I think the biggest thing is to get people out on farms, and get kids on the farm. That's the way that we'll win with British agriculture, is connecting people back with their food. .... It is for us to tell our story."

JAMES ROBINSON, STRICKLEY FARM, KENDAL, CUMBRIA.

THE FARM

James Robinson is the fifth generation at Strickley Farm in the north west of England. He farms 300 acres (121ha) in partnership with his parents, wife and son. It is an all grassland, organic farm with 130 Dairy Shorthorn cows and about 120 youngstock. There is also a very small flock of non-commercial Herdwick sheep. The family celebrates 150 years on the farm in 2025.

The destination of the milk is in the process of being changed. As well as transferring to a different dairy company, the intention is to begin processing some of their own milk in order to sell directly to a local supermarket chain and to hospitality outlets. James is the England chair of the Nature Friendly Farming Network, a membership organisation for farmers that works with other organisations and public supporters to provide a voice for sustainable food and farming in the UK. James also won the Farming and Wildlife Advisory Group Silver Lapwing Award in 2022, which recognises farmers who demonstrate real commitment to the conservation of species, habitats, historic aspects of the farm and natural resources.

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CHANGING THE SYSTEM: RETHINKING WHAT ORGANICS CAN DO FOR THE FARM

As with most farms in the area, Strickley was originally a mixed farm. Even up to the early 1990s, the Robinsons farmed beef cattle and sheep, as well as a dairy herd. At that time, they stopped the beef enterprise and concentrated on sheep and dairy.

In the late 1990s, the family considered converting to organic, but discounted it as they thought that, without chemical inputs, there would be problems with weeds, animal health and grass growth.

However, by the early 2000s, the organic milk price was about 30p per litre, with a margin of at least 10p per litre, so they investigated it again and decided to convert. James feels that this was probably the biggest change to the farm in his lifetime. It was only possible because of the organic conversion grant and because Dairy Shorthorns are the right cows for his system: they are generally healthy, able to walk up and down the tracks and efficiently turn grass into milk. At this time, they sold the sheep flock.

Grazing management has also changed in the last few years, with rotational grazing being introduced. A feature of this is long rest periods when fields are not grazed. As well as this being good for the soil and grass, James finds it a good way of minimising the occasions when youngstock graze where adult animals have just been. This helps to avoid disease transmission from adult cows to younger ones, who have less-developed immune systems.

He has also extended the period that the milking herd are outdoors. They are housed in winter but, through good pasture management, they now stay out from around mid-March until early November, gaining six weeks extra grazing.

To facilitate rotational grazing, infrastructure development has been undertaken, with new tracks and a water system, consisting of troughs and pipes connected to a solar-powered pump that deliver water from the beck around the fields.

Having not had sheep on the farm for 20 years, James's son has recently bought a small flock of Herdwicks, which are useful for improving new pasture although they are not intended to be a commercial enterprise.

ISSUES

It is not necessarily the first couple of years that are the financially difficult ones

As James and the family had already investigated organic conversion, they were prepared for, and indeed noticed, a dip in milk production. James suspects that this was because of reduced grass growth, which also had less protein and energy available for the cows. The organic conversion grant for the two-year transition period was crucial in helping to mitigate this. James also sold some stock from each age group which meant that he could build up a small reserve and this, combined with the grant, made up for the shortfall in milk sales.

However, the most difficult years were the three immediately after certification had been achieved: the conversion grant had finished, but the pastures had not returned to their previous yields. It took several more years for the effects of artificial fertiliser to wear off, the grasses grow deeper roots, the sward become more diverse and the soil become healthier.

Two things helped James to deal with the financial dip in years three to five after beginning organic conversion. Firstly, there was a rise in organic prices during that period. Secondly, he found that he had more heifers (as opposed to male calves) than usual and found extra markets for the replacement heifers that were not needed in the herd. Having Dairy Shorthorns meant that he was already able to sell to other farmers wanting that specific breed, as well as those wanting a general dairy animal, but he could now also sell into the organic market.

Nevertheless, although these helped to cushion the financial shortfall, profit did not really return to pre-conversion levels until years six or seven. By then the wider environmental and animal benefits of the organic and higher health system could also be seen.

Measurements of success: a whole-farm view shows a wide range of financial and related benefits

However, the family were still not completely convinced that organic production was the right way forward, as the organic premium dropped considerably, and they compared organic and industrial figures again the following year. This time, they did it with a different attitude, and assessed the finances on a whole-farm basis, rather than only looking at dairy production.

Rather than simply comparing the output per cow and price per litre for industrial versus organic, they included all the inputs and other benefits that they were now seeing. The result was they felt they only needed an additional 4 or 5p per litre to break even, rather than the 10p or so that they had been used to, and the price did not drop this far. By now, James feels that the farm is too settled into the organic system to leave it, and he recognises the many other benefits that it brings.

Animal health improvements, for instance, bring financial savings as well as benefits for the livestock. Antibiotic use is now almost unnecessary as cases of mastitis are very rare. Instead, cows and calves are helped to develop their own immune systems with support from natural remedies. Similarly, the use of wormers is negligible as calves are vaccinated against lungworm when they are turned out to pasture for the first time, and then faecal egg counts are undertaken to monitor if there is a need for active treatment, which is now very occasional.

Despite the grass growth reducing during the early organic period, James has learnt that total yield is not necessarily the best measure – dry matter is perhaps more important as this is where the nutrition lies. The farm now produces almost as much in terms of dry matter as it did previously, but without the expense of artificial fertilisers.

One of the family's initial concerns about organic conversion was that weeds would become a problem, and by now James feels that docks are "*a bit of a problem*", but not enough to warrant going back. Docks also convey a message that the fields where they are growing are perhaps a bit compacted, but their presence also helps to break the ground up.

An ongoing result of this is the additional value that James now places on the manure that is generated: instead of being considered a waste product to be dealt with, it is now stored and used more effectively, and appreciated more highly.

Despite the increased profitability of organic production, the Sustainable Farming Incentive scheme and other environmental payments remain very important to the farm's finances unless the premium for organic milk rises or there is an alternative source of income.

Actions for climate change mitigation and wildlife help the whole farm system

Increasing rainfall is having an impact on the land. This is demonstrated by aerial photographs from the 1940s which show that areas that used to grow cereal or hay are now almost too wet to farm. For James, these are obvious candidates for putting into agri-environmental schemes as they will still earn an income.

James has looked at the best ways of managing these wet areas, and the farm has a two-acre pond that was created about 30 years ago. This has been fenced in with some ancient woodland and has a beck running through it. He has also created a further three areas of wetland and 'rewiggled' a couple of becks, which serves to slow rainwater and mitigate flooding further downstream.

However, these areas are still farmed and provide some grazing opportunities. James has found that allowing a few cows into these wet areas for a short period in late summer after the ground-nesting birds have left, and possibly again in the autumn, provides useful grazing that benefits the habitat and also avoids liver fluke that may occur with higher numbers of animals.

Areas of wood pasture have been planted to provide shade and browse for the cows, which helps with their nutrition and health. While many farmers are concerned that planting trees will devalue land, James feels that this helps to future-proof the farm:

"That field might be worth more in 2050 because it has that shelter in it, and it is somewhere where you can graze cows in the hottest of summers. [...] So, potentially, we might be adding value by planting trees."

He recognises that wood pasture would not be desirable in every field, such as those used for silage, but planting trees around the farm means that shelter is accessible near all areas.

A key feature of Strickley Farm is its tall, diverse hedgerows. These provide the same services as wood pasture, with the advantage that they already exist around every field and connect with many other habitats.

Finally, there are also two six-acre (2.4ha) traditional species-rich hay meadows, with another recently created. These improve the farm's biodiversity, are an important part of farming heritage, provide a more diverse diet for the cows and currently attract good governmental payments.

Policymakers and financial institutions: cash flow, relationships and unintended consequences need attention

Stewardship and grant scheme actions are paid in arrears, and this can cause cash flow issues, particularly for more expensive works. Given that some of these can incur costs in the tens of thousands of pounds, delays can cause difficulties for the farmer. While there is a need for accuracy in the claim form, even minor mistakes can result in delays of three or four weeks.

The issue is further compounded by the loss of agricultural relationship managers in banks, who often used to remain in post for many years, visited clients' farms and developed a good understanding of their businesses.

This is particularly important if a loan is needed: some on-farm developments are reasonably easy to describe in a business plan, while others are difficult to attract funding for because they are often deemed too risky if considered by a small business adviser with no agricultural knowledge.

James feels that government support is not always directed in the right places, and is having unintended consequences. Specifically, a lot of support is for technology and innovation which, on a dairy farm, largely means robotics. The result is that government support is – perhaps inadvertently – encouraging the keeping of cattle indoors full-time, whereas he feels that cows should be grazing outside as much as possible.

Listen to others but decide for yourself

When James was beginning his organic journey, it was fortunate that there were several other farmers in Cumbria converting at the same time who had set up a group which provided advice and support. Those who have been organic for longer also provide inspiration, as they can prove that problems can be overcome and show what an organic farm can look like. By now, James provides that inspiration and help himself. This is not just for farmers converting to organic, but may be those who simply wish to stop using fertiliser or manage their hedgerows differently. Doing this is also a good way to learn from others, both about visitors' holdings and about James's own farm.

James has undertaken a business assessment to see where improvements could be made. One of the main findings was that he could save 2 or 3p per litre by block calving. However, once he started selling milk for cheese production, a year-round supply of milk became more important.

A further suggestion was that he should contract out silage making on the farm, saving money on machinery that was only used occasionally. However, he had already had experience of losing a crop when contractors were unable to harvest as planned and the weather broke. While it is uneconomic to keep machinery that is infrequently used, having control over farming processes can make it worthwhile in practical terms.

While James did not take up either of the main findings, he does feel that doing the exercise was useful in order to look at the costs of things and, if savings are needed in the future, he will already have some ideas for where these can be made.

NEXT STEPS

Looking ahead, James will probably plant some more **wood pasture**, and has another five acres (2ha) of very wet land that he is not sure what to do with, as it has a footpath across it which must be maintained.

He intends to **add value to the milk** as much as possible by bottling and processing some of it on-farm, rather than selling to the large wholesaler. However, this will require a considerable amount of investment and extra work, when the whole family is already working long hours. Nonetheless, the benefits would be substantial, and not just for the farm: it would provide milk and a few employment opportunities for the local community, as well as a source of organic, nature-friendly milk to local hospitality and private customers.

Financing such a development may come through grant schemes and/or borrowing, but James is also looking at other **funding options**, such as an initiative to bring together the public, private and third sectors to improve the state of nature in the north of England. Although this may have potential, James is not yet sure how such a scheme would work:

"I would like that sort of funding opportunity to come to the actual farmers and not to go to big companies to basically greenwash their credentials, and potentially force out local buyers of land or local farmers. I think there's a huge opportunity to encourage family farms, small farms to do some fantastic stuff with those funds, but whether it would actually get to the individual farmers without it getting creamed off in the middle, I don't know."

Clarity from government and the **simplification** of support schemes would help. With four different schemes running on the farm, all with different start dates, running times and actions, managing them is complicated. Some fields are in more than one scheme. James enters these because they help to keep the farm funded, but they are also the sorts of environmental actions that he wants to see undertaken.

His message to farmers is that they should remember that **farmers are key to delivering good environmental outcomes** as well as good food. They must all make a contribution, perhaps by becoming organic or by undertaking just a few regenerative practices, but farmers need not be intimidated by this:

"I think, potentially, some of us might feel quite threatened by all these people telling us to do [environmentally friendly] stuff, but I see it more as an opportunity, and I think we as an industry should probably feel quite empowered by it: that everything has to come through farmers."

ANDREW BREWER, ENNIS BARTON, FRADDON, CORNWALL

THE FARM

The Brewer family farms at Ennis Barton, which is in central Cornwall in the south west of England. The family has a variety of enterprises, including a wind turbine, renting land out to a vegetable grower and, notably, a fish and chip shop, alongside their dairy herd. Andrew Brewer and his wife, Claire, who has a background in the banking industry, are the third generation to farm here. They have a herd of 450-500 Jersey-cross cows on their 1,100 acre (445ha) farm. One of their daughters manages the fish and chip shop, which provides an outlet for burgers made from beef from the farm. Milk is sold to Arla, a multinational farmer-owned cooperative dairy. The cows are housed over winter, although they go outside for at least three hours every day during this period. Andrew was the winner of the Farm Carbon Toolkit Carbon Farmer of the Year 2024 for his work in reducing his business's greenhouse gas emissions.

CHANGING THE SYSTEM: OPTIMISING RESOURCES RATHER THAN MAXIMISING OUTPUT

When Andrew and Claire took over in 1997, Ennis Barton was a mixed sheep, beef, arable and dairy farm of about 600 acres (243ha). A legal issue meant that they had to take on considerable debt during their early years on the farm, and therefore conducted an assessment of the farm's different activities. The dairy herd was found to be generating the most income, so this became their focus, although having a young family was also taken into account:

"... we had to make these profits to pay off the debt. We wanted to grow our business as well, and make the most of our time. We had two young girls – we've got one chance at their childhood."

They developed a grazing-based system, in order to make the most of Cornwall's natural climatic advantage for grass growing and therefore reduce the expense of bought-in feed. They also enlarged the herd from 60 to, at its peak, 700 cows, although achieving the necessary grass growth to feed these required quite a lot of nitrogen fertiliser. Eventually, they bought more land, taking the farm up to its present size.

During the 2000s, Andrew and Claire changed some of the farming practices, as they could see problems beginning to develop because of the high stocking level. They started sowing herbal leys, reduced and then stopped artificial fertiliser use, and changed from British Friesian-type cows to Jersey-crosses because of the premium for the milk.

With their early experience of needing to repay debt, they also improved their financial and debt literacy skills by undertaking training.

However, 2014-2015 saw the start of further changes, with an outbreak of TB in 2014, which resulted in the loss of 15% of every group of animals – over 150 individuals – and a number of cases of Schmallenberg virus in 2015.

With animal movements at a standstill due to TB restrictions, replacement summer-calving heifers that should have been sold had to remain on the farm with their calves, and Andrew and Claire decided to concentrate on optimising their grass and herd, rather than maximising them.

The success of calving in the summer, instead of during the usual spring period, prompted Andrew to change to summer-autumn calving.

Once TB movement restrictions were lifted, the milking herd was reduced to its present number, continuing their earlier actions to remedy the problems caused by the higher stocking rate.

Andrew has also concentrated on improving the grass and the genetics of the herd. The cattle are bred to be slightly larger than the usual Jerseys, and the calves are finished (grown to slaughter weight) on the farm. Being Jersey-crosses, they are perceived to be too small to be sold to butchers, and Andrew had difficulty finding a market for them. However, the purchase of the fish and chip shop has provided an outlet for burgers made from these animals – creating income from produce that was traditionally thought to have little or no value.

Milking is done flexibly through the year, meaning that at peak lactation, it is done twice a day, eventually reducing to once a day as the cows gradually dry off. These are not extremely high producers of milk, but are very reliable animals.

Altogether, the changes have resulted in a more effective grazing system that better suits the animals' needs and the natural growth and reproductive phases of the grass.

ISSUES

Risk reduction and financial literacy are needed for business resilience

For Andrew and the family, risk reduction included diversifying their income streams and creating a market for all possible farm products, specifically the dairy-beef carcasses that would normally be considered almost worthless in the mainstream system. This also means that the family has an element of control over part of the downstream chain for at least some of the farm's outputs. Diversifying into the wind turbine, which provides a passive income, and renting land out for vegetable growing helps to spread the financial risk away from a single enterprise.

With debt featuring heavily in their early years on the farm, financial and debt literacy, including undertaking training, is something that Andrew strongly advocates. He and Claire seek to understand the farm's budget, and regulate and update cash flow, remembering that this is a living document. This is particularly important before commencing a new project. They also maintain a good relationship with their bank, built up over many years. As a consequence of the substantial amount of borrowing that they have done over the years, they have been able to maintain an association with a bank manager, who travels a considerable distance to meet them on the farm. They also ensure they are properly prepared when such meetings are needed. Claire's experience in and understanding of the banking industry is valuable.

Decarbonisation, soil health and profitability are linked

Ennis Barton is a demonstration farm for Farm Carbon Toolkit,[i] meaning that it acts as a hub for training and inspiring other farmers. It is also aiming to be net zero for carbon. Having undertaken soil carbon testing for 5% of the farm that had been used for vegetable growing, and which was then returned to mixed-species pasture, a significant reduction in the carbon footprint of that field was found due to increased carbon sequestration in the soil. Andrew feels that it is likely the farm as a whole is already well on its way to achieving or even going beyond net zero.

No artificial fertiliser is now applied and, with muck from the partly housed animals being used to improve the soil structure of some of the newer fields, better use is made of this resource, and also the farm's dirty water. Some biogas digestate is also used. Crucially, Andrew is confident that they produce as much milk as they would anyway, but without the expense of additional inputs.

Reductions have also been made in the amount of bought-in feed, most now being produced on-farm, which has positive implications for carbon and financial accounting.

The land is ploughed less often and no longer deep ploughed, further helping to protect soil carbon stocks.

i See farmcarbontoolkit.org.uk/demo-farm/ennis-barton

Climate change may mean altering cattle management

Although the change to summer-autumn calving began through necessity, Andrew found that calving outside in a clean, healthy environment – and in shorts, rather than waterproofs – was a pleasure. It also tied in with his observations that climate change is beginning to cause more dry spells in summer and more grass growth in winter. The shift from spring calving to summer-autumn calving has meant that his cows have access to better grass when they are lactating and particularly need nutrition. The summer grass, with more stem, is more suitable for 'dry' cows who are not producing milk.

Increasingly wet winter weather is also a concern, and was a factor in the decision to house the cows at that time of the year, as outwintering them in such conditions can damage the soil.

Learn from other people and the farm itself

Andrew is very aware of the importance of good mentors and advice, having benefited from them himself, from his early days on the farm to current discussion groups in the south west area. Such groups have allowed Andrew to develop friendships with people from around the world, and benefit from the different perspectives that they bring.

He won a Nuffield farming scholarship in 2014, and gained much from the opportunity to travel widely, picking up ideas and examples of best practice.

The journey that Andrew and Claire have taken the farm on in more recent years has increased the chance for further engagement with other farmers, research institutions, policymakers and beyond. These opportunities include Andrew becoming heavily involved in many research projects with Farm Carbon Toolkit, Arla, and Agri-tech Cornwall and the Isles of Scilly (an EU-funded project of which he was chair), aiming to make dairy farming better for the environment and people. Because of his experience with these organisations and his on-farm changes, he is often invited to speak at events and conferences.

However, even with excellent advice, Andrew and Claire recognise that it is vital for each farmer to work out the right system for their own farm – what their aims are, what will work best and how this can be achieved. For them, finding the right balance between farm work, family life and caring for the farm's animals, workers and environment is essential.

Governmental, financial and certification bodies need to understand farming better

Andrew feels that short-termism in government thinking hinders effective agricultural and environmental policy. Nature – the foundation of farming – needs time to recover when practices are improved or altered and, while governments tend to think in five-year periods at best, even 40 years is a short time in the natural environment. This is compounded when government policy changes, being completely reversed in some cases such as payments to formerly remove and now replant hedgerows. While Andrew feels that England's Sustainable Farming Incentive (SFI) scheme is a step in the right direction, some assurance that it will continue in the longer term would be appreciated.

He would also like to see some recognition by the government that some farmers are already experts in delivering the requirements of SFI-type schemes.

He further thinks that more support for encouraging young people into farming is needed.

Longer-term thinking is something Andrew would also like to see from banks, along with a better understanding of how farming businesses work. If a new business is struggling, putting interest rates up compounds the problem, whereas he feels that banks ought to *"put their arm around [the business], support them a little bit and think longer-term, rather than just a risk-based, paper exercise."* This is enabled by developing a relationship with the farmer and building trust.

Organisations offering assurance and other schemes that need a level of compliance must remember that farmers' primary objective is *"to produce food, not bits of paper"*, and that some farmers may be in several schemes. While Andrew agrees that food standards and safety are definitely needed, the administration of many schemes could be better balanced, so that they provide assurance to the public while not being a burden to farmers, especially small producers for whom this can be disproportionate.

Acknowledge the value of family life

Despite the pressures of dealing with the farm and its various enterprises, and with having suffered a health issue in recent years, Andrew is clear about recognising the importance of family life. From their earliest years on the farm, and the need to service the large debt, he and Claire knew that if they did not spend time with their children, they would be very unlikely to want to continue the business. Andrew stresses that time away from the farm is also vital. Many of the farm business decisions, including diversifications such as the wind turbine, are intended to provide an income without taking up additional time that could be spent with the family.

NEXT STEPS

Despite Andrew's broad welcome for the SFI, he feels that it is unlikely to change much of his farm practice, as he is already largely farming in the style that he believes best suits the farm and what he wants to achieve. However, SFI payments will help with the loss of the previous Basic Payment Scheme.

Nevertheless, he does plan some changes. Firstly, there will be the installation of 200 acres (81ha) of **solar panels**, which will then be rotationally grazed by sheep, while measuring soil carbon with the intention of building this up during the lifespan of the panels.

With the use of land for solar panels, some **additional winter housing** for cattle will be needed, and Andrew hopes that some support for that will be found.

He intends to use wood from a woodland on the farm on a **long rotation coppice** as bedding for these winter-housed cattle. This will then be returned to the soil, helping with fertility, while coppicing should increase the biodiversity in the woodland.

Tree planting in the hedgerows will probably be undertaken, as the suckers of the elm trees that died during the 1980s outbreak of Dutch elm disease are now also dying, just as ash trees are also succumbing to ash dieback.

Finally, and crucially, having borrowed money to finance these actions, Andrew and Claire will ensure that they continue to check their budgets, and maintain **five- and ten-year plans**.

Despite the farm apparently undergoing considerable changes in the last 30 years, Andrew points out that some elements would be recognisable to previous generations:

"Farming in a low input, but rich biodiverse way – we're just trying to do what our grandfathers did better. They didn't have nitrogen 'til after the war, and the old saying is that sheep should never hear the church bells twice in the same field. Well, that's just rotational grazing, isn't it. We're just putting a bit of science to it to prove to a lot of people that actually we are the solution not the problem."

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