

# TRANSITION

Securing a sustainable future for your farm business



## PUTTING A PRICE ON NATURE

How natural capital can  
generate farm income



# How to unlock potential of natural capital on your farm

Welcome to the fourth issue of *Transition*, the supplement from *Farmers Weekly* to help secure a more sustainable future for your farm business

This edition looks at ways that growers and livestock producers can generate revenue from natural capital – the range of natural assets found on most farms, including air, water, soil, trees and hedges.

Although not a new concept, the public benefits or ecosystem services provided by natural capital are set to become an important source of farm income. Yet they remain a largely untapped revenue stream.

That is all about to change. Across the UK, farm policy is now firmly focused on the delivery of “public money for public goods” – the expectation that farmers who receive financial support from taxpayers will provide public benefits in return.

Private money for public goods is available, too. Big companies are digging deep to pay farmers to improve the environment, offset greenhouse gas emissions and mitigate the pollution caused by other industries.

As always, we are grateful to our Transition Farmers (see p37), who are sharing their stories as they adapt to this new world. We are equally grateful to our Transition Partners, for sharing their expertise and advice along the way.

For more about our Transition initiative, visit our knowledge hub at [fwi.co.uk/transition](http://fwi.co.uk/transition)

**Johann Tasker, *Transition* editor**

## OUR PARTNERS

The *Farmers Weekly* Transition Partner Network is a UK-wide community of farmers, industry stakeholders and influencers working together to secure a sustainable future for UK agriculture.





## CONTENT HIGHLIGHTS



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How biodiversity net gain could provide a new income stream See p44



Opportunities for livestock farmers to improve natural capital See p51

If you are interested in joining the network and would like to find out more, please contact Anna Eccleston at [anna.eccleston@markallengroup.com](mailto:anna.eccleston@markallengroup.com)



Sandy by Trinity AgTech has kindly provided our sustainability indicators, working with our Transition Farmers to measure their environmental progress, product provenance and financial prosperity. For more information, please visit [trinityagtech.com](http://trinityagtech.com)



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# Meet our Transition Farmers

These 16 farmers are sharing their journeys with us as they adapt their businesses

## Karen Halton

Cheshire

P42



**Farm size** 240ha

### Enterprises

530-cow dairy herd

### Transition goals

- Recruit/retain staff
- Maintain animal health and welfare
- Increase direct sales

## James MacCartney

Rutland



**Farm size** 162ha

### Enterprises

Beef and sheep

### Transition goals

- Reduce disease in sheep
- Be better than net zero
- Establish herbal leys

## Vaughan Hodgson

Cumbria



**Farm size** 244ha

### Enterprises

Cereals, grassland, broilers

### Transition goals

- Support the next generation
- Replace lost Basic Payment Scheme income
- Adapt to uncertain weather

## Alan Steven

Fife



**Farm size** 138ha

### Enterprises

Potatoes, brussels sprouts, parsnips, malting barley

### Transition goals

- Reduce cultivations
- Improve soil health
- More resilient rotations

## Andrew McFadzean

Ayrshire

P54



**Farm size** 195ha

### Enterprises

350 beef cattle, wheat, beans, barley, fodder beet

### Transition goals

- Slash finishing time
- Reduce dependence on inputs using solar energy
- Improve grassland

## Rachel and Richard Risdon

Devon



**Farm size** 110ha

### Enterprises

300-cow dairy herd

### Transition goals

- Secure adequate labour
- Better understanding of Environmental Land Management
- Reduce carbon footprint

## Kit Speakman

Essex



**Farm size** 275ha

### Enterprises

Mixed arable, beef and sheep

### Transition goals

- Bridge income gap
- Fully diversified business
- Widen the rotation

## Eddie Andrew

Sheffield



**Farm size** 73ha

### Enterprises

Dairy, milk delivery service, ice cream parlour and farm shop

### Transition goals

- Co-operating to reduce costs
- Establish a new dairy
- Reduce carbon footprint

## Irwel Jones

Camarthenshire

P63



**Farm size** 375ha

### Enterprises

1,500 ewes on owned and rented land, suckler cows and followers, root crops

### Transition goals

- Manage natural woodland
- Plant hedgerows
- Rely less on volatile inputs

## Andy Bason

Hampshire



**Farm size** 800ha

### Enterprises

Cereals, spring beans, oats, linseed and oilseed rape

### Transition goals

- Cut carbon emissions by 30%
- Establish 10ha of agroforestry
- Establish 10ha of woodland

## Alistair Hall-Jones

Lincolnshire



**Farm size** 680ha

### Enterprises

Cereals, oilseed rape, spring beans, sugar beet, forage maize, anaerobic digestion, 900 sows

### Transition goals

- Recruit/retain first-class staff
- Pursue technical efficiencies
- Pay back borrowing

## Duncan Blyth

Albanwise Farming, Norfolk



**Farm size** 2,650ha

### Enterprises

Cereals, oilseed rape, sugar beet, pulses, grassland, woodland, wetlands

### Transition goals

- Improve soil health
- Develop natural capital revenues
- Achieve net zero by 2030

## Philip Vickers

County Durham

P49



**Farm size** 1,250ha

### Enterprises

Winter wheat, oilseed rape, spring barley, spring beans, lupins, rotational grass; share-farming agreement with tenant sheep farmer

### Transition goals

- Maintain margins while changing approach
- Improve soil health and resilience
- Enhance natural environment

## Kate and Vicky Morgan

East Yorkshire



**Farm size** 1,700 breeding sows

### Enterprises

Weaning 1,000 pigs a week – finished on-site and through B&B arrangements with local farmers, 140ha rented out

### Transition goals

- Facilitate structural change in supply chain
- Establish more influence over own destiny
- Diversify

## Ed Shuldham

Wiltshire



**Farm size** 1,800ha

### Enterprises

Cereals, oilseed rape, oats, forage and grain maize, peas, solar, biomass, anaerobic digestion, events and property diversifications

### Transition goals

- Help shape Sustainable Farming Incentive through participation in pilot
- Make more use of data
- Take natural capital

## Fergal Watson

County Down



**Farm size** 285ha across three units

### Enterprises

170-cow suckler herd, beans, wheat, spring barley, oats

### Transition goals

- Recruit/retain farm staff
- Restructure suckler herd
- Improve business resilience

Visit our Transition hub to find out more about our Transition Farmers  
[fwi.co.uk/transition-farmers](https://fwi.co.uk/transition-farmers)



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PARTNER PERSPECTIVE

# FORWARD THINKING

# DAIRY


At Arla, we believe we all have to play our part in addressing climate change and the challenges this brings.



Find out how farmer owners are working to build a sustainable future for dairy at [www.ArlaFoods.co.uk](http://www.ArlaFoods.co.uk)







Protecting waterways can include measures such as woodland management to reduce flooding

# A guide to unlocking value from natural capital on farm

There is increasing emphasis on the importance of natural capital – the elements of the environment that provide valuable goods and services. **Louise Impey** explains why

**N**atural capital is the cornerstone of agricultural policy across the UK. The term encompasses all of nature's assets: soil, air and water and every living thing, including trees and woodland.

A well-managed landscape has benefits for people and the economy. Put simply, the vital services that come from natural capital – such as pollination, flood control, clean air and fresh water – make life possible for people.

Often overlooked, these ecosystem services have an obvious value – and not just environmentally. The World Economic Forum estimates that more than half of global GDP is dependent on nature.

Although the four UK nations each have their own agricultural policies, farm support across Great Britain and Northern Ireland is increas-

ingly based on the concept of natural capital – rewarding farmers who deliver environmental outcomes.

This broad policy of “public money for public goods” recognises the role farmers and other land managers have in mitigating climate change, reversing biodiversity loss, improving soil health and providing cleaner air and water.

Big business is also adopting a natural capital approach. Some water companies pay farmers not to spread fertiliser near watercourses. Farmers can also earn money by creating habitats to offset the biodiversity loss caused by building developments.

For farmers, it is important to realise there are two elements to natural capital. Savills' head of natural capital, Jon Dearsley, likens the stock of on-farm natural capital to a balance sheet. The

ecosystem services it provides is the profit-and-loss account, he says.

“On one hand, you have the hedgerows, trees, soil and biodiversity on your farm, which is your natural capital stock. Then you have the ecosystem services, or operational bit, such as carbon sequestration, which that stock can provide.”

## How farmers can benefit

Demand is likely to increase for ecosystem services, which create social, environmental and economic benefits. Previously provided “free” by nature, many have a financial value and are no longer taken for granted.

“The natural capital market is still in its infancy but it is the mechanism for how growers will be rewarded for looking after existing environmental features and introducing new ones on >





Wetlands play an important role in flood management



## PRODUCING CLEAN WATER: WATER SENSITIVE FARMING

Water Sensitive Farming is a collaborative initiative delivering the support and advice for on-farm measures that improve the quality and resilience of the surrounding water environment.

Funded by a partnership between WWF and Coca-Cola since 2012, and latterly involving Tesco, the initiative operates at a catchment scale and develops bespoke and flexible solutions tailored to individual farms.

To date, some 220 farmers have received individual advice and follow-up visits, with more than 2,770ha of land use improvements delivered. More than 2.15bn litres of water have been returned to the environment already.

The scheme supports nature and farming by encouraging changes in farming practice. This ranges from the adoption of cover crops and buffer strips through to “slow-the-flow” type interventions, such as silt traps.

A voluntary scheme – with no obligation for farmers to engage – it provides free-of-charge advice across four management catchments in East Anglia, including the River Wensum in Norfolk.

“the farm,” says Mr Dearsley. Agri-environment schemes, such as Countryside Stewardship, already do this. Bigger rewards are coming for environmental and recreational benefits as new schemes are rolled out and privately funded initiatives get under way.

To start taking a natural capital approach – which often involves a change in management – farmers should have clear business goals and make an inventory of the natural capital assets on their own farm at the moment.

“A baseline study gives you that information,” explains Mr Dearsley. “Once you’ve done that, you can think about long-term budgets and investments, such as solar panels, as well as how you are going to achieve your aims.”

Natural capital on most farms falls into one of the following five key categories.

### 1 Soil

A Soil Carbon Code may still be a long way off but there’s every good reason to look after your soils and increase their organic matter content, as well as limit compaction and erosion.

“You may not be paid to do that at the moment, but it already makes good business sense to protect and improve your soil,” says Mr Dearsley.

Soils play a central role in nutrient cycling, carbon storage, water quality and flood prevention – all things that could attract financial support in the future but are also important for profitable food production now.

“With soil, it’s about getting your house in order, reducing your liabilities and improving resilience,” he says. “We know that arable and grassland soil options will be available under the SFI, so there’s no time to lose.”

### 2 Water

Water quality can be adversely affected by the run-off of fertilisers and slurries from farmland, as well as through erosion – with both sediment and excess nutrients being detrimental.

Land management practices such as buffer strips, margins and cover crops can help by reducing run-off and preventing pollution, as well as limiting nutrient losses to water.

“This sort of good-practice action has attracted financial support for some time in existing agri-environment schemes,” says Mr Dearsley. “On the catchment scale, water companies have been working with groups of farmers

for a while, incentivising them to move to ferric phosphate for slug control, for example, or adopt a change in farming practices.”

Flood risk management is another area where a well-managed landscape can help. This includes the creation of wetlands and slow-the-flow features such as leaky dams and strategically planted riverbanks to reduce flooding.

### 3 Air

Agriculture is responsible for some 10% of UK greenhouse gas emissions. But farmland and woodland can also contribute to the provision of cleaner air by removing pollutants from the

## NATURAL CAPITAL: EASY WINS

- Improve hedgerows and create new ones
- Switch to a 100% renewable energy provider
- Create new carbon sinks by planting woodland areas
- Introduce measurable environmental goals
- Monitor soil organic matter levels and work to increase them
- Use green manures, buffer strips and cover crops
- Reduce soil disturbance
- Protect watercourses and reduce flood risk
- Consider providing recreational access





Farms in Norfolk's River Wensum catchment can tap into free advice from the Water Sensitive Farming initiative

## NATURAL CAPITAL: WHAT'S IT WORTH?



Cholderton Estate owner Henry Edmunds

A natural capital account, prepared for an organic 1,000ha farming estate on the Hampshire/Wiltshire border, shows that the economic value of the public goods that will be generated by the farm over the next 60 years will be a staggering £125m.

The stock of assets on the mixed Cholderton Estate generates a range of benefits that are considered to have an economic value, so Defra figures were used to produce a natural capital balance sheet. This takes a long-term look over 60 years.

The gross asset value of production is projected to be £18.5m, including £5.4m of food production. The public goods that the farm is generating are valued at £125m after accounting for £5.8m lost through ammonia emissions from livestock.

The estate has a balanced system of farming with nature – with a healthy soil at its heart. Dairy, beef and lamb enterprises help Cholderton build natural fertility in the soils, pull carbon out of the atmosphere and store it in the ground.

There is also a wide range of wildflowers, grasses, insects, birds and mammals on the estate. This includes some 70 different plant species, 40 species of butterflies and 740 species of moths being recorded.

NORFOLK RIVERS TRUST

atmosphere. In terms of emissions, the main challenges are methane from livestock and nitrous oxide from nitrogen fertiliser. Carbon dioxide and other forms of pollution from combustion-driven machinery also contribute.

Taking steps to improve slurry storage, incorporate manures and increase the accuracy of nitrogen fertiliser applications can help reduce emissions, as can better diet management and improved housing of livestock.

Other areas to look at include alternative energy sources to replace fossil fuels, says Mr Dearsley, as well as measures to improve productivity.

“As with soil, there are good business reasons to adopt these measures, rather than any immediate payments on offer, although there will be help with improving slurry storage when the government’s Slurry Investment Scheme opens later this year.”

## 4 Farmland trees

Woodland and tree planting is a means of mitigating climate change and reversing biodiversity loss, as well as help farming meet its net zero ambitions.

Incentives for woodland creation and management of existing woodlands come in three possible revenue streams – government support, carbon payments and private finance – with all of them already available to farmers.

The Woodland Carbon Code is a good scheme with an established reputation, says Mr Dearsley. It allows farmers and land managers to generate

and sell independently verified carbon credits.

The Woodland Carbon Guarantee is less attractive, he believes, especially as private deals are on offer.

Another government scheme, the England Woodland Creation Offer, supports the creation of woodland and its ongoing maintenance for a period of 10 years. It can be used to support smaller areas of woodland.

## 5 Biodiversity

Putting an economic value on biodiversity is complex and difficult. This is one reason why Defra assesses farmland habitats and gives them a comparative value.

For most farmers, having a plan of what they want to happen on the farm will allow them to make the most of any appropriate features and the opportunities they present for building biodiversity. These include wet corners and inaccessible areas of the farm.

“Once that’s been achieved, you can have a management plan to achieve it, even if it’s not yet clear as to who is going to benefit and what it’s worth,” says Mr Dearsley

Land situated on the edge of a town or city may provide an opportunity to sell biodiversity credits to a developer, he adds.

“Biodiversity net gain allows developers to offset any loss in biodiversity caused by their activities. For some farm businesses, this is a good opportunity, although it must be recognised that these are long-term land use change agreements.” ■



Silt traps help prevent pollutants from entering watercourses





Karen Halton with son Jack (left) and husband Tom

#### FARM FACTS

##### Halton Farm

- Farm size: 240ha tenanted
- Enterprise: 530 three-way ProCross cows, all-year-round calving, three-times-a-day milking, 4.1% fat; 3.4% protein, 11,000 litres a cow
- Annual rainfall: 1,000mm
- Soil: clay loams

# ‘The cow is queen here and her health is wealth’

A good genetic mix is optimising dairy output in Cheshire. **Jonathan Riley** reports

**A** progressive approach to staff management, high welfare standards and selling milk direct, are key to the Halton family's dairy transition strategy.

Cow health and welfare underpin the entire business, says Karen Halton, who farms 240ha with husband Tom and son Jack on their farm at Astbury, near Congleton, Cheshire. “The cow is queen here and her health is wealth.”

The 550-cow herd was once Holsteins. But health and fertility issues saw the farm introduce Montbeliarde genetics in 2010. The result was a 25% increase in yields. “Nowhere else in farming uses a single breed. Whether it is sheep, pigs or potatoes, there is always a cross to promote hybrid vigour,” says Tom. “Even with two breeds, that initial level of vigour declines over time.”

Switching to a three-way cross maintains the genetic variation and an element of vigour, known as heritosis. The farm now uses a Pro-Cross dairy cow – a three-way cross of Montbeliarde, Viking Holstein and Viking Red. At 32%, the Halton herd's 21-day pregnancy rate is more than double the UK average of between 14-16%.

The farm has a rigorous vaccination policy, with weekly checks carried out by the vet. Any concerns are addressed before they become an issue.

The detailed health and welfare management extends to the 300 youngstock. Heifer calves are weighed monthly to ensure growth rates are maintained and this allows first calving at 22 months, well below the national average of 28-29 months.

#### Staff management

There is a big emphasis on employee engagement with all 16 staff across the farm and its milk selling business. The Haltons share performance indicators and costings at regular team meetings so that everyone takes ownership of what they are trying to achieve. A staff training programme is also implemented and delivered by outside employment specialists.

#### Direct sales

The farm prefers to retain control of where its milk is sold. About 25% of output is sold directly to customers with the remainder sold through a broker. About 5,000 litres a week is sold to the public, either through a vending machine or via one of the farm's four milk rounds. Currently, about 700 customers pay 130p for a pasteurised litre. The Haltons hope to extend that customer base and add a fifth milk round.

Milk is treated on-farm using a pasteuriser that processes whole milk at a rate of 1,000 litres/hour, with 500 litres of this skimmed.

Whole and skimmed milk are combined to produce semi-skimmed, which is put into screw-top glass bottles. The recyclable glass bottles are more environmentally friendly than plastic alternatives and are part of the appeal for customers.

Vending machine customers can dispense milk from a tank into their own container or buy a glass bottle. This has proved popular and about 120 litres/day are sold through the machine.

Other outlets include 2,000 litres/week to a cheese producer, a further litreage as a range of products and 21,000 litres to a neighbouring farmer with a barista milk contract.

#### Forage management

A one-day paddock system is used for cows, with heifers following on. The cattle help fertilise the ground, and further soil nutrients are supplied by a move to multispecies leys on a 16ha area that includes nitrogen-fixing legumes.

The mix has 21 different species of grass, clover, chicory birdsfoot trefoil and lucerne, and the farm receives £450/ha stewardship payment for using it. The area of multispecies mixes will be extended to 26ha this year.

Another move that has helped to reduce fuel costs and improve feed quality is the purchase of a forage wagon to facilitate a multicut silage system. Last year, the farm took five cuts from April to November with protein levels up to 28%.

Hybrid rye is grown on 10ha as a low-input crop, providing quality feed for dry cows. Cover crops have also been added after the 60ha maize crop to reduce nutrient leaching and run-off. ■

● Follow Karen Halton and our other Transition Farmers as they adapt their business for the new environmental schemes and phase-out of the Basic Payment Scheme. Find out more on **p37**

#### TRANSITION GOALS

- Recruit and retain the right staff
- Maintain animal health and welfare
- Increase direct sales to more customers

# Together with farmers our role in agriculture must be a responsible one

We are partnering with farmers to work towards shared objectives – a future for food production which is both sustainable and productive.

Germinal is focusing on the outcomes of innovative plant breeding for forage solutions. These technologies will be vital in achieving net-zero goals and will directly address climate change impact – pollution, nutrient resources and weather stress. It's about more from less, greater crop yield with fewer inputs, all managed efficiently.

We support knowledge share on the ground with farmers who are adopting smarter on-farm strategies. Home grown protein is still the foundation of livestock farming systems and Germinal is committed to developing climate smart products that will help farmers look positively towards a secure food future.

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# How farmers can benefit from biodiversity net gain

A new income stream could help offset lost basic payments. **Louise Impey** reports

**N**ew planning rules requiring developers to improve biodiversity is presenting a market opportunity for farmers and landowners.

Expected to be mandatory across England within the next two years, the biodiversity net gain (BNG) requirement means developments must demonstrate a 10% improvement in biodiversity after they have been completed.

In line with the government's commitment to leave the environment in a measurably better state than it was found, BNG is a potential income stream arising from Defra's natural capital approach, and could help farmers as their Basic Payment Scheme funding continues to reduce.

It comes at a time when nature has been recognised for playing an essential role in reversing further decline and increasing climate resilience, along with the economic benefits that ecosystem services provide.

"Both Defra and Natural England have been involved in developing BNG and are consulting widely at the moment," says Jason Beedell, head of research at farm business consultancy Strutt & Parker. "In effect, BNG means that any impacts that development has on biodiversity are minimised and offset as far as possible."

## Site assessment

Assessing the impact that any development may have on the natural environment is one of the main changes to planning in the Environment Act 2021. The common standard, known as biodiversity units – which has been

developed by Defra using its biodiversity matrix – will be the factor of account. It is based on the extent of the habitat, as well as its quality, distinctiveness and condition.

"Before being granted planning permission, a developer will have to calculate the number of biodiversity units that the original, pre-developed site accrues," explains Dr Beedell. "They will then have to demonstrate how they will both raise that level by 10% and maintain it for 30 years."

The calculations will be submitted to the relevant local authority that is implementing the new policy. It will verify them, using the biodiversity metric to calculate any change that the proposed development will cause, before deciding whether the plans can proceed.

A number of pilot schemes have been operating round the country, and the current understanding is that there will be an overall set of principles, with local authorities then allowed to make some amendments according to particular regional requirements.

## Net loss or net gain?

"From the calculation process, there are two outcomes," says Dr Beedell. "Either there will be a net loss of biodiversity units, or a net gain."

While a net gain is unusual, it can occur. "There are housing developments which include a wildlife area in the plans, for example, to enhance biodiversity. They don't always sit very well together in practice – wildlife sites can look scruffy compared to a neat and tidy housing estate that many house buyers want."

## BIODIVERSITY NET GAIN: KEY POINTS

- England only – for now
- Minimum 10% gain required
- Calculated using biodiversity metric
- Habitat secured for at least 30 years
- Delivered on-site, off-site or by purchasing statutory biodiversity credits

In most cases, there will be a net loss in biodiversity units. This is where the opportunity for farmers and landowners comes in through BNG, as the developer then has to create or enhance the habitat either on the site, nearby or next to it, or buy units from a third party.

"That could be a habitat bank or a wildlife trust, or a farmer," says Dr Beedell. While this can be anywhere in the country, most local authorities will want to keep it within their boundary.

For a farmer or landowner to benefit, there are various options. They can make land available for BNG through a recognised broker, enter into an agreement with a land bank or deal with a developer direct. "The latter has been the most common approach to date," says Dr Beedell.

## Demand for BNG

As to whether individual farms will be able to benefit, the demand for BNG is related to the amount of development being carried out nationally, so there is likely to be greater demand in the south of England.

It applies to all types of development, with the exception of very small projects. "We did some research which suggested there will be an annual demand of 6,000-7,000 units/year."

Anyone interested in BNG should approach it with an open mind, he advises. "It won't be for everyone and you have to be good at biodiversity management. They are long-term agreements, so may be more attractive to larger holdings, where an agreement takes up a smaller proportion of the land."

Tenants are not excluded from BNG, but they will need agreement from their landlords before signing up. "This is long-term land use change, so there has to be consultation."

What happens at the end of 30 years? The best solution will be to put the land into a suitable agri-environment scheme or some extension related to BNG, says Dr Beedell. "Putting it back into production may be possible, but will be challenging where trees have been planted," he adds. ■



Developments will need to demonstrate a 10% improvement in biodiversity after work is completed

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Biodiversity improvements include wildflower meadows, which attract beneficial insects, pond habitats and planting trees



## GOOD RETURNS POSSIBLE OVER TIME

Most biodiversity net gain agreements are for at least 30 years, so farmers must be in it for the longhaul. The theory is that any land entered will also be eligible for Environment Land Management, although that is still to be agreed.

Stacking of credits may be possible too, says Strutt & Parker's Jason Beedell (pictured). "There's potential for both biodiversity and carbon credits from the same parcel of land, or water credits if any trees planted are in the right place to fulfil that purpose," he says. "We are waiting for clarification on these things."



Where an arable field becomes a wildflower meadow in an agreement, for example, it can be mown, grazed or cut for hay in an appropriate way, so a production element is possible.

Local authorities will keep a register of sites and be responsible for monitoring them, with penalties applied if they are not delivering the biodiversity gain expected.

### Payment rates

In practice, it is likely that the responsibility will be placed on the farmer or landowner – perhaps with the help of an ecologist – to

verify what is being delivered. Payments will set the market, says Dr Beedell. Experience to date suggests that this is very variable, ranging from £3,000/unit to as much as £80,000/unit, spread over 30 years, with an estimated average of £20,000/unit.

"Most sites generate about two units/ha," he adds. "Over a period of 30 years and using £20,000/unit, that equates to about £1,300/year." That figure is before costs, he stresses, but it could account for 50% of the payment.

Having to sow or plant, maintain and monitor the site could cost in the region of £600/ha a year, which still leaves an equal amount for the farmer or landowner.

As Dr Beedell points out, that's better than many cropping and stewardship options in most years.





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# SPP VARIETIES PLAYING KEY ROLE IN TRANSITION SUCCESS

A focus on matching variety to future production and environmental needs will improve sustainability, food security and crop margins in the future, say KWS

**K**WS's Sowing for Peak Performance initiative (SPP) is all about making sure growers have the genetics they need to meet the challenges of the future, says the company's Dr. Kirsty Richards.

With the effects of a reduced number of agrochemicals available, increasingly variable growing conditions and the need to reduce the carbon footprint of agriculture in the future, genetics will play an increasingly important role in the future, she believes.

"Our belief is that 80% of what your crop can deliver is locked into the seed you buy and its match to your own individual growing conditions.

"Whilst you can fine-tune this with the correct Nitrogen levels, using fungicides wisely to protect it from disease and paying attention to basic management principles, once you've made your seed choice your production potential is largely set.

"For KWS the challenge of the future is to develop varieties that not only deliver the highest performance possible but also allow growers to achieve this in the context of the new production environment we are inevitably moving towards.

"Recent concerns over future food security further underline the critical role genetics and the development of more robust, reliable and higher yielding varieties will play in feeding the world of the future.

### Climate change impact

Climate change has become a reality for many growers over the last few years with growing conditions not just varying dramatically between

the years but also within the same season itself, she points out.

"SPP puts an emphasis on encouraging growers to choose the right varieties for their own individual circumstances but it also puts functional traits on the same pedestal as outright yield.

"Focusing on breeding varieties with high resilience in the face of adverse growing conditions and the ability to express their full genetic potential in a variety of less than optimal circumstances, is a key priority.

"For example, more variable weather conditions mean that traditional spray timings might not be consistently achievable in the future.

"Varieties with high levels of disease resistance are less dependent on time critical interventions such as specific fungicide applications and therefore provide a vital 'safety net' when it is impossible to spray at precisely the right time.

"In a world where more volatile weather conditions are the norm, stem stiffness and standing power also become increasingly relevant and in more challenging autumn drilling scenarios, later drilling capability becomes increasingly important.

### Focus on sustainability

Getting the most production from the resources you have available to you is the key to being sustainable and in general terms this means achieving as much yield as you can from your land, she says.

"But at an individual level it means your soil type, growing conditions and location to markets are key elements in your seed decisions so you can select the best varieties possible for your own unique circumstances.

"Strong disease resistance and untreated yield, demonstrated perfectly by the Group 2 variety KWS Extase, also become more important when agronomic inputs become less available.

"KWS Extase has an untreated yield of 93% in the 2022/23 RL and its combination of high yields, exceptional disease resistance and good grain quality have made it one of the most successful UK wheat varieties of recent times."

The new Group 4 hard feed wheat KWS Dawsum is another example of SPP thinking in action, she points out.

"KWS Dawsum's treated yield of 104% of control is pretty spectacular but it also has an untreated yield of 92% of control, just 1% behind Extase, so it's going to appeal to a wide range of growers with different production systems.

"This is underpinned by resistance scores of 9 for yellow rust, an 8 for mildew and a 7 for brown rust.

"Robust genetics also ensure KWS Dawsum delivers its full potential across the rotation regardless of heavy or light soil, early or later drilling and whether it's in a first or second wheat slot. It's a real work horse with short, stiff straw further adding to its reliability."

As well as the obvious performance benefits and cost savings delivered by more 'self-contained' varieties like KWS Extase and Dawsum, there are many other advantages, Kirsty Richards says.

"Secondary factors such as savings in diesel, labour, machinery replacement and better soil condition resulting from less intensive management can multiply the environmental and productivity benefits significantly."

# The benefits of Paulownia trees for net-zero targets

Fast-growing woodland offers income ‘as good as wheat’. **Louise Impey** reports

**T**he first-ever UK plantations of a “carbon-sucking” tree will be established on a Suffolk estate this year.

Paulownia can capture 10 times as much carbon as native British trees. Plantations are seen as a key way of mitigating the effects of climate change and helping the UK meet net-zero targets.

Some 200ha of Paulownia, a hardwood native to Asia, will be planted in nine blocks on the Euston Estate, near Thetford, following regulatory approval from the Forestry Commission and a 35-year land lease deal with a company called Carbon Plantations.

Replacing 10% of the estate’s current in-hand arable land, the plantations will be screened with native planting and blended with the estate’s existing 600ha of native woodland, enhancing its biodiversity value and ability to deliver ecosystem services.

## Carbon and timber

In addition to its carbon capturing ability, the fast-growing Paulownia tree is recognised for the quality and strength of its hardwood timber, which has a range of applications. This means the new plantations will have a commercial timber value too.

Planting will start in late May, after the frost threat has passed, and must be completed by the end of June. The selected variety, known as Phoenix One, is sterile, which means there is no chance of it becoming invasive.

To maximise biodiversity, each plantation must include 10% of native trees and 15% of open space, in accordance with UK Forestry Standards. This will enable an understorey of grass and wildflowers to be sown, providing different wildlife habitats.

## Net-zero solution

“It’s one of a number of nature-based solutions to climate change,” says estate director Andrew Blenkiron. “The annual rent we will receive is index-linked and at least as good as we can achieve with a good crop of winter wheat.”

Consultancy Brown & Co delivered the full environmental impact statement required by the Forestry Commission – giving confidence that the plantations will deliver the environmental and financial benefits claimed.

“It took two years for the UK approval to come through for the plantations,” says Brown & Co head of natural capital Greg Beeton. In total, some 486ha of Paulownia is due to be planted in



Paulownia is fast growing and its timber has a variety of applications. Inset: Estate manager Andrew Blenkiron

the east of England in the next two years. “We were successful in meeting the requirement of the environmental impact assessment and the Forestry Commission’s Woodland Carbon Guarantee, so the captured carbon can be sold in verified credits,” he said.

## Carbon potential

Each 1ha of Paulownia accrues 67 carbon units annually, says Mr Beeton – much more than the nine units accrued by 1ha of native broad-leaf

species and 10 units for commercial conifers. “The other benefits of woodland are well known – from flood risk reduction to soil erosion prevention and soil structure improvements. It’s one of the measures that meets the natural capital approach to future far sustainability.”

Trees will be drip irrigated for the initial stages of their development. The first timber harvest should take place after seven years, followed by a 10-year harvest cycle. This management will allow a five-year rotational harvest. ■

## PAULOWNIA’S POTENTIAL

	Rotation length (years)	Timber (cu m/ha/year)	Carbon units (ha/year)
Native broad-leaf	120	6	9
Commercial conifer	35	14	10
Paulownia	9	84	67

Source: Euston Estate





# Supporting the UK's on-farm innovation

The four UK Agri-Tech Centres support productive, profitable and sustainable farming

With ever-mounting pressure on food producers to improve their efficiency while reducing environmental impacts, the farming industry is increasingly looking for solutions from data-driven technology and innovation.

A recent survey\* revealed that while nearly 80% of farmers are now using some form of agri-tech to support their productivity and profit, just 35% are confident in technology's ability to help them meet their environmental responsibilities. So, before investing in new technologies and techniques, farmers need to be confident they will deliver clear win-wins for their businesses and the environment.

The UK Agri-Tech Centres - CHAP (Crop Health and Protection); CIEL (Centre for Innovation Excellence in Livestock); Agri-EPI Centre; and Agrimetrics – are helping by bringing together experts from across industry, science, and government to develop innovation that is focused on addressing today's on-farm challenges.

The Centres collaborate with partners in every sector of the UK farming industry. Each Centre has its own unique focus, offering world-leading capabilities to help producers balance their commercial and environmental priorities:

## **CHAP**

Improving crop and soil health and productivity

## **CIEL**

The front door for research and innovation with one of the world's largest livestock research alliances

## **Agri-EPI**

Enabling sustainability, productivity and resilience through technology

## **Agrimetrics**

The world's first Agrifood Data Marketplace

The role of science, data and technology in sustainable farming will be a highlight of the discussion at the Centres' annual conference, *Agri-Tech and Environmental Sustainability*, on Thursday 21 April. The Centres are inviting you to learn about the latest farm innovations, ask questions and give your views at this free event.

Find out more at  
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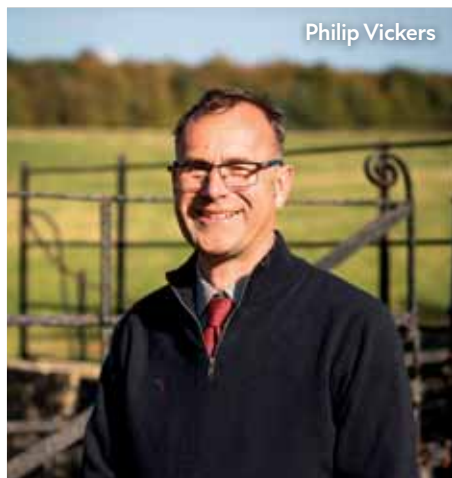


Agri-Tech Centres



## Centres' impact

- Over 55 new facilities in the UK and 3 overseas
- Engaging with the agrifood industry and involved in over 400 innovation R&D projects, worth £85 million to the sector
- Thriving membership schemes with 400+ organisations now connected
- Projected Return on Investment to UK economy of 13:1



Philip Vickers



The estate's soils are already in good condition, enabling the team to push ahead with changes

# 'We need to make fewer interventions'

It's all change as the Raby Estate farm business adopts a new direction. **Louise Impey** finds out more

**R**aby Estate in County Durham has committed to rolling out regenerative agriculture on its 1,250ha farm and building a legacy for future generations.

Farm manager Philip Vickers describes the new farming policy introduced by Lord Barnard at the estate as a "massive turnaround". Just eight months into his new job, Mr Vickers is full of praise for the farm team and its willingness to adapt – everyone is on board with the new direction and brimming with enthusiasm for what it involves.

Having tried out regenerative practices on small areas last year, the better March canopy measurements from direct-drilled land gave them confidence to expand across the whole farm. "This is not a half-hearted attempt," says Mr Vickers. "We are putting the environment at the heart of what we do, while building in business resilience and flexibility.

"The new approach will enhance natural capital and deliver public goods, while allowing us to keep producing high yields and quality food."

## FARM FACTS

*Raby Estate, Staindrop, County Durham*

- Farm size: 1,250ha (part of Raby's wider land holding across County Durham and Shropshire)
- Arable: winter wheat, oilseed rape, spring barley, spring beans, lupins and rotational grass
- Sheep enterprise: share farming agreement with tenant farmer
- Annual rainfall: 650mm
- Soil: loam, high magnesium content

PHOTOGRAPHY: RABY ESTATES

Lord Barnard has been a driving force behind the change of direction, he adds, having seen it working well on his land holding in Shropshire, where a contract farming agreement is managed by Heal Farms.

## Improving margins

Maintaining or improving margins remains a key goal for the business, despite global uncertainty. Attention to detail and knowledge exchange will help with that ambition, as change takes place.

Having inherited soils in very good condition, Mr Vickers has been able to push ahead with the plan to move to direct-drilling and has doubled the farm's drilling capacity from 8m to 16m. A diverse rotation, with a mix of spring and winter cropping, is being introduced. "Having diversity means that issues such as club root and flea beetle in oilseed rape just aren't as bad," he says.

## Rotation

The new five- to six-year rotation sees second wheats largely replaced and the oilseed rape area reduced by one-third. In their place come spring barley and spring beans, with lupins tried for the first time and rotational grass included.

Having spring crops in the mix means cover crops also feature, in line with another key principle of a regenerative system – keeping the soil covered. Given the farm's northerly location, Mr Vickers is very aware of the possible challenges.

"There may be difficulties getting a cover crop established in time if we have a late harvest, and destroying them soon after Christmas could be tricky in a wet year," he acknowledges. "However, even a late-established, small cover crop is better than none. The key is not to jeopardise the following cash crop."

## Blended wheat

He is also experimenting with a pea/barley bicrop and feed wheat variety blends, to see what they offer. Lupins, to be drilled in May, are being assessed as an alternative protein source to soya, which comes with a higher environmental cost.

A share farming agreement has the potential to be an integral part of the rotation, with sheep grazing cover crops, rotational grass, and early-drilled wheat crops keeping the latter in check. Removing crop biomass in spring takes any disease out and eliminates the need for early plant growth regulators and fungicides.

The farm is already in Mid Tier Countryside Stewardship and is keen to embrace the Environmental Land Management scheme on a local and landscape scale, with the protection of heritage landscapes and wildlife a priority.

A vibrant commercial business such as Raby Estate has financial, social and environmental targets, as well as the owner's long-term aim to hand it over in better condition, says Mr Vickers. "We've started a journey, rather than arrived at our destination." ■

● Follow Philip Vickers and our other Transition Farmers as they adapt their business for the new environmental schemes and phase-out of the Basic Payment Scheme. Find out more on **p37**

## TRANSITION GOALS

- Maintain margins while changing approach
- Improve soil health and resilience
- Enhance the natural environment



# THE JOURNEY TO PROFITABLE, SUSTAINABLE FARMING CONTINUES.



Take 7 steps to a sustainable future.

**New farm policy means that environmental responsibility and commitment to sustainable crop production are more important than ever.**

However, sustainability can mean different things on different farms and with changes to farm subsidies and future legislation leading to a new era of 'payments by results', it's vital that UK farmers have access to the right support and advice to deliver and evidence results.

Taking a holistic approach to farm management is therefore key and to help, Frontier's sustainability team has created a practical model of seven focus areas.



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- 2 Delve deep into your soils with specialist analyses from our Soil Life service.
- 3 Soil carbon benchmarking, auditing and farm-scale research.
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- 5 Expert advice from Kings Crops on natural capital management, agri-environment projects, SFIs and ELMs, soil health, stewardship and conservation.
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- 7 Support with legislation, farm assurance, stewardship and the compilation of farm policies to evidence your work.





Rotational grazing helps improve soil structure as the cows move round the system

# Opportunities for livestock farmers from natural capital

Improving natural capital can benefit livestock-based businesses. **Jonathan Riley** reports

**N**atural capital is a way of viewing the environment as a set of assets that benefit wider society, rather than any single individual or organisation.

Changes to on-farm slurry management, for example, can improve groundwater quality – benefiting water companies and the general population, not just the livestock farm where the improvements take place. But it is difficult to put precise values on the work done and the public goods generated by improving natural capital.

This challenge makes natural capital difficult to understand in a farm business setting. In turn, this can make it harder for farmers to justify investing in natural capital instead of other parts of their business. As a result, farm output and productivity has often been at the expense of the environment.

To rectify this situation, public and private funding is increasingly used to encourage more sustainable farming practices, explains Mark Reed, co-director of the Thriving Natural Capital Challenge Centre at Scotland's Rural College (SRUC).

## What is natural capital on a livestock farm?

Soil and water are the first two assets to consider on a livestock unit, says Prof Reed. Without

productive soil and a water source, you don't have a business. Both these assets have value for the wider public because they are the foundations for wholesome food and clean drinking water. In the face of climate change, both soil and water must be managed more carefully.

The impact on air quality from livestock methane, carbon and ammonia emissions is also important. Further examples of natural capital include wildlife, biodiversity, field boundaries, hedgerows, woodland and grassland.



Mark Reed

## How to assess natural capital

Livestock farmers should start by establishing where their business stands through a programme of natural capital auditing and testing. A range of tools can be used to assess soil, water and air quality, along with an overall carbon-footprint tool.

Any schemes – private or government-backed – are likely to want to measure improvements to base incentive payments upon. So it is essential that there is a record for a baseline year, including maps of existing hedgerows. A forthcoming code will require evidence of existing hedgerows and how planting has changed their extent, says Prof Reed.

Hill farmer Liz Lewis-Reddy, policy and economics director for Adas, says farmers should

take a relatively straightforward first step towards auditing, such as annotating a map of the farm.

She suggests marking and listing all the farm's natural assets. "It is important to not just list the actively farmed areas but include everything – hedgerows, trees, watercourses and boggy or marshy areas. Also consider how it dovetails with the wider landscape, neighbouring farms and the potential demand/needs from the local community, private business and government objectives, as these are the future income that opportunities will arise from."

## Improving natural capital

Dr Lewis-Reddy applied this approach to her own hill farm in Wales. It has some good grazing and floristic diversity, but other areas are less agriculturally productive because they are wet, slightly peaty, with soft rushes and few grassland species.

"The areas can't be grazed for months each year so we looked at how they could be managed differently, within our organic, regenerative system, to benefit the environment and enable the farm to access new markets."

Having done this, she then planned to plant small, carefully sited woodland areas to help improve drainage, taking advantage of the Welsh government's Glastir Woodland Creation scheme.

The soft rush areas, which had declined over time, were harvested for bedding to improve the plant species, biodiversity and production potential. This improved the carbon sequestering ➤



< potential of the land, enhanced biodiversity and grazing potential. “We knew grants were available for these options, and made applications that have helped fund the work,” she says.

### Individual strategies

#### Soil and water

Soil nutrients can be depleted through leaching losses, over-production and ploughing. On the other hand, excess slurry applications may lead to nutrient saturation.

Soil testing is the starting point with 25% of the land sampled each year, so the entire farm is tested on a four-year cycle. Profiling should include the full suite of nutrients, soil carbon and cycling organic matter as part of an active management programme.

Tillage practice should be assessed and geared to achieve the right balance of soil health without releasing carbon and damaging structure. Better structure and organic matter will improve drainage, carbon capture and nutrient retention and reduce erosion. This could increase the natural capital value, improving productivity and allowing the farm to quantify its value as a carbon sink or potential for water management, which may appeal to a utility company looking to manage waterflow and pollutants.

#### Grazing and grassland

Grassland acts as a carbon sink. But introducing a multispecies mix with nitrogen-fixing legumes and extensive rooting can further improve soil structure, biodiversity, carbon capture and nutrient retention. The additional nutrients reduce the dependency on fertiliser, while high protein options improve the feed value.

Data suggests rotational grazing increases productivity because cattle and sheep consume younger, higher D-value swards. The cows fer-

tilise soil as they move round the system, and the organic matter improves soil structure and the associated benefits.

#### Field boundaries

Judiciously planted woodland can enhance a livestock farm, with trees planted strategically on unproductive ground. But large-scale tree planting versus food production is contentious. An alternative is to improve or plant hedgerows.

Hedges have multiple benefits – improved shelter for stock, reduced soil erosion via the root structure and through acting as a wind barrier. They also provide a haven for plant and animals and act as wildlife corridors, helping to join habitats and create scale.

#### Air quality

The government’s Clean Air Strategy will encourage farms to cut ammonia, methane and carbon dioxide emissions. A polluter-pays system means using natural capital to offset emissions won’t necessarily increase returns, but will help avoid penalties.

Emissions could be lowered by planting trees around slurry lagoons. Precision slurry spreading, allied with soil sampling, will better match nutrients with requirements, reducing dependency on artificial inputs and improving soil fertility.

Rachael Madeley-Davies, consultant from dairy adviser Kite Consulting, emphasises the importance of a whole-farm approach. Water quality, productive soils, the atmosphere, minerals and wildlife should all be considered.

WAYNE HUTCHINSON/ALAMY STOCK PHOTO



## HOW CAN NATURAL CAPITAL BE MONETISED?



Permanent pasture is a valuable carbon sink that's often overlooked

JEFF GILBERT/ALAMY STOCK PHOTO

Funding opportunities for natural capital are available in England through Mid Tier Countryside Stewardship. As these agreements expire, farmers will be able to sign up to the Local Nature Recovery scheme, due to launch in 2024.

NFU livestock adviser Harriet Henrick says farmers should prepare for this sooner rather than later. They should assess their options and review their natural capital to ensure they are ready for the changeover. Other potential funding streams include peatland restoration, woodland creation, and maintenance grants and codes for hedgerows and soil carbon.

But she is cautious about the structure of these schemes. Payment systems for natural capital management are aimed at measured changes. While this is appropriate where improvements are needed, Ms Henrick says asset protection should also be recognised.

Permanent pasture acts as a huge carbon sink, yet this is largely overlooked and undervalued by policymakers. “This vital role in preventing carbon emissions is as valuable



### HOW LENS PROJECT IS CREATING RESILIENT DAIRY LANDSCAPES

A £1.5m project is matching farmers with private investors to offset carbon emissions and improve biodiversity, soil and water quality by planting hedgerows.

The Landscape Enterprise Networks (Lens) initiative, developed by 3Keel, encourages businesses to invest in landscape management. One of the first to invest have been Nestlé, Agricarbon and First Milk. The three companies

are working with farmers in the Eden Valley, Cumbria.

Said to be simpler than publicly funded agri-environmental initiatives, Lens has encouraged hedgerow planting at a rate four times faster than government-backed schemes, says Scotland's Rural College professor Mark Reed.

Backup work to evaluate soil and water quality showed the scheme had widespread environmental

benefits. Dairy farmers said they preferred the private funding route because it was more flexible, with less red tape than stewardship schemes.

Private finance could encourage an even greater uptake of natural capital improvement on UK farms, says Prof Reed. "Lens is now a proven method for enabling companies to invest in the natural capital they depend upon."

The Lens initiative focuses on private funding for landscape management

"On the one hand, we are trying to redress the negatives that may have built up through poor practice and improve our natural capital to make the farm more productive. On the other, we want to create a net gain," she says.

A damp field corner prone to waterlogging, can be difficult to farm and also harbour soil-borne disease and parasites. Fencing off the area and planting trees could help field drainage and create an income from woodland grant funding.

Herd health, welfare, and hence productivity, would also benefit. Extending this approach across the whole farm – from soil health to biodiversity – could yield further improvements, benefiting the environment and boosting farm income, says Ms Madeley-Davies. ■

as any other measure," she says.

Anyone considering privately funded schemes should seek advice before signing contracts. A farmer might face a battle with a corporate lawyer, for example, if they fail to meet the terms of a the contract.

SRUC's Mark Reed urges caution in signing deals with big carbon-offsetting schemes. Scotland, in particular, is seeing large-scale tree planting pushed by large companies, often based offshore. As well as taking farmland out of production, this can have a huge impact on the community.

Often farmers are approached with a tempting offer of a potential retirement nest egg. In many cases, the corporate will have targeted farmers across a whole area. As a result, entire communities have been surrounded by vast plantations of mono-cropped, conifers and left devastated.

As well as consulting advisers, farmers should talk to their neighbours. Collective bargaining can yield a better return, while preserving food production and the landscape, says Prof Reed.

### BIG BUSINESS PAYS BETTER THAN COUNTRYSIDE STEWARDSHIP

Private companies and other commercial businesses are helping farmers monetise natural capital – often at higher rates than Countryside Stewardship.

Sustainability consultant 3Keel works across the food and agricultural supply chain. Its remit to make agriculture more resilient includes helping groups of farmers market their natural assets, says principal consultant Catherine McCosker.

Turning natural capital from a concept into net gain requires many farmers to adopt a new mindset, says Ms McCosker. Once they do so, the farm's natural capital can be more easily identified and marketed.

Flood management, for example – perhaps by constructing a pond – could be an attractive asset to a utility company or local authority. This could generate a payment and become a marketable product, just like milk.

But just as large-scale buyers don't want to purchase a single litre of milk, one pond alone won't solve a flood. This means farmers need to deliver scale – either by working with one another or an organisation such as 3Keel to attract corporate investors.

One alternative system to marketing natural assets could be through a company such as Entrade – a subsidiary of Wessex Water. It was faced with building a treatment plant to remove nitrates that were polluting Poole Harbour in Dorset. Instead, the company paid farmers to reduce nitrate pollution by planting cover crops and buffer strips to protect watercourses.

Initially, farmers bid for funding through a reverse auction. But this meant bids were low and farmers were not properly rewarded. It also meant other benefits from cover crops – such as carbon retention and soil health – were not properly remunerated. The original system has now been replaced with one that matches farmers with buyers looking for multiple environmental outcomes. Farmers are paid much more than Countryside Stewardship, which is only based on income foregone.

James Peacock, Entrade product manager, says: "We are seeing large-scale demand from developers – required to reduce nutrient output from construction – to buyers looking for water quality, carbon and biodiversity improvements."



Private companies are paying farmers to establish field margins

TIM SCRIVENER



# ‘We need to protect farm from volatile input costs’

Business resilience is key for success in uncertain times. **Jonathan Riley** reports

**I**ncreasing cattle numbers, improving grassland and the arable rotation while reducing reliance on bought-in energy are key targets for Andrew McFadzean.

After a career in the grain trade, the Ayrshire farmer returned to 195ha Dalchomie Farm, near Maybole, a decade ago. He has since overseen improvements to the beef and arable enterprises.

## Renewable energy

Two wood-burning biomass boilers generate income from Renewable Heat Incentive payments, and supply energy to the farm. A 200kW biomass boiler supplies hot water to a high-pressure washer and heats the office and houses. A 350kW unit heats a wooden grain-drying floor, helping to offset the cost of 20-30 annual drying days.

The units are fed by 600t of wood annually, bought in 12ft lengths, then dried and chipped on farm. Some woodchip is sold to local farmers, providing another income stream.

The venture has helped to cushion the farm from rapidly increasing energy prices. Its success has prompted a plan for solar energy under a 25-year investment scheme. Two 200kW units totalling 500 solar panels will be installed on the roofs of two new buildings, along with batteries to store 30kW of power. These will send power to the grid at the highest price point.

## Beef expansion

The new buildings are part of the farm's transition plans. The silage clamp is now covered –

reducing rainwater run-off that would otherwise be classed as effluent, incurring extra storage and spreading costs.

The other building is a 100-stall house for cattle under the planned beef expansion. The herd has moved from 80 suckler cows to a rearer-finisher unit. Cattle are bought in at eight to 10 months old and the farm finishes about 350 beef animals a year. It aims to increase this to about 450.

The original set-stocking policy has switched to a paddock-grazing system, with upgraded infrastructure. Hedges, water troughs and 2km of track have been installed to provide additional capacity for the increased herd. Switching to paddocks has improved business resilience. Nutrient and grass yield has been improved through a programme of liming, increasing the pH from 5.5 to 6.5. “Cattle effectively fertilise ground as they rotate through the paddocks, reducing our need for artificial fertiliser,” says Mr McFadzean. “Under rotational grazing, the cattle consume younger, higher-quality grass at the highest D-value.”

Rearing growth rates of 1kg/day are achieved from grass, and during housing from grass silage. Fodder beet and wholecrop are fed to appetite using a mixer wagon. The finishing ration is 50% wheat wholecrop and 50% high-starch blend fed to appetite, aiming for daily growth rates of 1.2kg.

Better nutrition means finishing times have been cut from about 30 months a decade ago to just 18-20 months – saving £320 a cow in feed. “A growing beef animal requires nutrition just to

sustain it, before any growth is achieved. That maintenance feed costs about 60-90p/day.”

The existing setup sees three to four tractors and a forage harvester descend on the farm two to three times a year. Mr McFadzean has also invested in a forage wagon. In the future, silage-making will require only the forage wagon and one tractor to pull it, reducing contractor costs and cutting fuel use in half.

## Arable rotation

The extra cattle need a larger grazing area. About 10ha of leys will be added to the arable rotation and more protein introduced with a winter bean crop. Putting beans and grazing into the rotation will also reduce fertiliser requirements.

Additional organic matter should improve the soil over the long term and facilitate a move into min-till. This should cut emissions through reduced field work and by locking up carbon in the soil.

Cover crops could also be introduced, such as field radish or stubble turnip, after wholecrop wheat in the rotation. This should further improve soil health and reduce emissions.

“Overall, the plan should protect us from input price volatility, reduce emissions and better position us in a world that will increasingly need wholesome food,” Mr McFadzean says. ■

● Follow Andrew McFadzean and our other Transition Farmers as they adapt their businesses for the new environmental schemes and phase-out of the Basic Payment Scheme. Find out more on **p37**

## FARM FACTS

*Dalchomie Farm*

- Farm size: 195ha split 50:50 grassland and arable
- Enterprises: rearing and finishing 350 beef cattle; wheat, beans, barley and fodder beet
- Annual rainfall: 1,016mm
- Soil: upland 100-280m, mostly north facing

## TRANSITION GOALS

- Increase cattle numbers and slash finishing time
- Reduce dependence on inputs using solar energy
- Improve grassland and access



High quality AN is widely recognised as one of the main contributors to boosting NfUE



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# HOW 4M<sup>2</sup> OF CROPPING CAN BOOST YOUR NITROGEN EFFICIENCY

Leaving a small piece of land without fertiliser could give growers real insight into managing N more efficiently and benefit the environment and their future farm profitability

**A** national trials programme involving 50 arable producers up and down the country is encouraging growers to leave just 4m<sup>2</sup> away from the fertiliser spreader so they can get an accurate assessment of their Nitrogen fertiliser Use Efficiency (NfUE).

“If you really want to know how effectively your Nitrogen fertilisers are being used you need to start by knowing what happens to your production if you don’t use any,” explains CF Fertilisers head of agronomy Dr. Sajjad Awan.

“NfUE is the critical measure of how much of every kg of Nitrogen fertiliser you apply actually ends up in the plant where it can stimulate growth rather than getting lost from the system.

“It’s expressed as a simple percentage with the higher the value, the more N is finding its way into plants and in a UK wheat crop it’s typically in the range of 50% to 80%.

“But an NfUE of 50%, which does exist in some situations, means for every 1kg of Nitrogen you buy, half of it is effectively not being utilised and that’s a not a good result for the environment or your farm’s profitability.”

## NfUE arable values

<50% Poor  
50-60% Fair  
60-80% Good  
>80% Excellent

## Encouraging early results

The ongoing trials programme, being carried out by CF Fertilisers in conjunction with Agrii

and Frontier, represents some 20,000ha of UK wheat production across the country and the first year of trials has already shown some very interesting results, he says.

“NfUE can be influenced by a number of factors including how good your soil testing is, the type of fertiliser you apply, how often you apply it and of course, how much you actually put on.

“Ammonium Nitrate (AN) fertilisers typically achieve the highest NfUEs as they minimise loss of N to the atmosphere, but it’s becoming increasingly apparent how important the accuracy of the soil testing you use is.

“CF N-Min soil tests produced a level of accuracy approaching 80% whereas with estimates of Soil Mineral Nitrogen (SMN) this was just 45% and as low as 33% for RB209-based soil Nitrogen estimates.”

This accuracy of soil analysis combined with encouraging the growers taking part in the trials to adopt some basic Nitrogen management principles have translated into significant performance improvements (see table below).

The vital knowledge to be gained from understanding more about NfUE hinges on being able to remove all other Nitrogen sources from the usual Nitrogen Use Efficiency (NUE) calculation, Sajjad says.

“At the optimum N application, we’re looking at the amount removed by the crop (grain and straw) minus that would have been taken up if no Nitrogen fertiliser had been applied.”

“This is where the 4m<sup>2</sup> comes in. You can simply place a tarpaulin over your desired patch whenever fertiliser spreading takes place and this ensure your ‘Nil-N’ plot receives no fertiliser application through the season.

“The Nitrogen content of the grain and straw from this plot can be compared to that of the crop where the full application has been used and this can be used to calculate relative Nitrogen uptake by the crop and establish the NfUE.

## Making the right fertiliser choices

NUE is important in understanding how all your Nitrogen sources contribute to crop production but only NfUE can help you make the right fertiliser choice and help you fine-tune your management, he says.

“That 4m<sup>2</sup> of land that has no fertiliser applied could be the start of thinking completely differently about future Nitrogen management for many UK growers, as we hope our ongoing NfUE trials will continue to show.”

	Top ferts saving	Average ferts saving	Top NfUE gain	Average NfUE gain	Carbon footprint reduction	Soil N Balance reduction
Benefits	-£180/ha	-£40/ha	+ 22%	+ 7%	- 70kg CO <sub>2</sub> /ha	- 23kg N/ha



# How natural capital thrives at pioneering farm

New ways to boost natural capital are being trialled on a Leicestershire farm. **Jonathan Riley** reports

**A** working experimental farm in the small Leicestershire village of Loddington is developing groundbreaking natural capital schemes that benefit farmers.

The Game and Wildlife Conservation Trust's Allerton Project has been at the forefront of practical, agri-environment research since 1992. Its natural capital trials are key in helping growers and livestock producers transition towards a more sustainable way of farming.

Joe Stanley, the project's head of training and partnerships, says the 320ha commercial farm aims to identify management practices that deliver multiple benefits. "Our work covers natural capital accounting, agri-environment schemes and regenerative farming systems. This includes improving soil health, water quality, woodland and environmental habitats to increase biodiversity, while building farmland resilience."

In the 30 years since the project was set up, Allerton has shown how productive farming can work alongside nature. Bird species, mammal populations and invertebrate numbers have all improved, says Mr Stanley.

Many endangered, Amber and Red List bird species have recovered here at five to 10 times the rate seen on other commercial farms across the region. Moth numbers on the estate are increasing, bucking the national trend. Brown hare populations are thriving, too.

## Calculating biodiversity

The Allerton Project has seen researchers develop a system capable of measuring biodiversity by assessing its quality, condition and extent. This has enabled the Loddington Farm Estate to calculate a so-called biodiversity baseline – a potentially vital advance for the future of UK farming.

Mr Stanley suggests this area of work will be important for farmers who will need to establish biodiversity baselines for their own businesses. Future funding schemes and natural capital trading will be based on being able to demonstrate incremental improvements to assets.

From a legal perspective, companies will want to know exactly what they are getting in exchange for their investments. Farmers will have to be able to demonstrate and quantify accurately what improvement has been achieved, so the system will provide an important foundation.

From a farmer trading viewpoint, knowing what potential is on-farm will allow a better evaluation and more careful management of assets over the long term, says Mr Stanley.

As well as the biodiversity calculation, the Allerton Project has a range of practical trials under way. These include sediment traps, the



Project head Joe Stanley says it aims to deliver multiple benefits

development of a Hedgerow Carbon Code, agroforestry trials and a reduced tillage comparison.

## Sediment traps

Climatologists are predicting more frequent, heavy rainfall, adding to already serious risks of water run-off and soil erosion from field surfaces.

Losses from certain soil types can amount to many tonnes from a single field each year, says Mr Stanley. The losses reduce soil fertility and production capabilities, and can lead to nutrient pollution and sedimentation of watercourses.

Farmers and growers, therefore, face an increasing threat of reduced production and potentially fines or payment scheme penalties for pollution.

To investigate practical measures, the Allerton Project has developed and studied sediment traps, which are sited in watercourses at the field edge. The plan was to slow the waterflow, allowing time for soil to separate out and settle by widening ditches into ponds. The nutrient-rich sediment could then be dug out and reclaimed, and the water quality was improved with the removal of the nitrates and phosphates.

To ensure the trial represented a range of soil types, traps were built on Loddington's heavy



Sediment traps have successfully reclaimed tonnes of soil annually



Trees have been planted at various densities over 5ha at Loddington

#### FARM FACTS

Loddington Estate Farm

- Farm size: 318ha
- Enterprises: 253ha arable, 29ha pasture, 18ha woodland
- Annual rainfall: 600-700mm
- Soil: heavy clay

clay and two further sites in Cumbria – one on sand, and a second on a silty loam. Results differed hugely – the higher the sand fraction, the greater the amount of settlement and capture, Mr Stanley notes.

At Loddington, the fine particles of the clay remained dispersed among the pond water, limiting the amount of soil that was captured. But the pond traps on sandy soil retained tonnes of sediment. As much as 39t of soil was reclaimed in a single year on the sand, while the silty loam retained 18t. Loddington, in contrast, was just 0.3t in the same year.

Nevertheless, the sediment traps proved it was possible to retain valuable natural capital in the form of reclaimed soil. The traps could also be monetised by growers in financial deals with regional utility companies, which may view them as a cost-effective way of improving quality.

### Hedgerow Carbon Code

Allerton was selected by the government to develop a Hedgerow Carbon Code with funding from Defra's Natural Environment Investment Readiness Fund (Neirf).

The Hedgerow Carbon Code project is at an advanced stage and expected to be useable by 2023. It has huge national potential for enabling farmers to increase the amount of carbon storage and trade the associated credits.

In England, there are more than 400,000km of managed hedgerows and a further 145,000km are derelict or declining. This represents a valuable resource for carbon capture because

hedgerows have almost as much biomass in their root structure – about 40% of the total – as they have above ground at 60%.

The total amount of biomass and the three-dimensional structure means hedgerows sequester carbon at twice the rate of woodland. Estimates suggest England's hedgerows store about 9m tonnes of carbon which would currently be worth about £63m in credits, says Mr Stanley. Hedgerows grow rapidly and doubling their height and width would equate to a 200% increase in the amount and value of the carbon stored.

As part of the code, Allerton has developed a matrix that attaches values to the length, width and height of a growing hedgerow. It also accounts for cutting, laying and coppicing regimes. The matrix will eventually account for the value of cuttings that increase soil organic matter and apply a value as a biomass energy source.

There is then no disincentive to lay or trim the hedge. Once in place, the scheme will be audited and accredited by a verification body in a similar system to the Woodland and Peatland Codes.

### Agroforestry

Allerton has been investigating the use of woodland combined with livestock production on the Loddington Estate Farm. The aim is to assess how to introduce trees that provide wildlife habitats, capture carbon and improve water management while maximising livestock growth.

A 5ha plot was planted in 2016, with trees at different densities. Two plots were planted

at 100 trees/ha, representing a relatively high agroforestry density. Others were planted at 400/ha to represent the lowest permissible density for open woodland with government funding. The remainder was planted at 1,600/ha – the maximum density normally funded under woodland creation.

"We quickly learned that the densities and the associated availability of grazing between the trees make a significant difference," Mr Stanley says.

Initial results showed that stocking rates and grass growth had to be carefully matched, especially in dry spells when sheep will readily turn to graze young trees, he explains.

### Reduced tillage

Allerton has partnered with Syngenta to set up a conservation agriculture trial comparing direct drilling with ploughing and the effects on profit and wildlife. The five-year, five-crop rotation trial took place on two sites: light land, in Lenham, Kent, and heavy clay at the Loddington site.

Now in its fifth year, results are showing that direct-drilling can benefit wildlife and reduce emissions while raising net profits.

### Wildlife and emission changes

Both sites saw bird sightings almost double – Lenham was up 105% and Loddington increased by 90% versus inversion tillage.

Earthworms were used as an indicator of soil health, which improved under direct-drilling. Soil greenhouse gas emissions fell by 16-17% in a direct-drilling scenario, and both farms saw their overall carbon footprint reduce by about 10% a hectare.

Fuel use dropped dramatically by 65% on the sandy soil of Lenham and 50% at Loddington. This had a beneficial effect on operational costs, which fell by 8-10% – although crop establishment dropped by 3% at Lenham and 8% at Loddington, with roughly the same percentage declines in yields. However, net profits rose by 5% at Loddington and 18% at Lenham when the reduced costs of time and fuel were included. ■

### FIT FOR FUTURE PROGRAMME

In addition to the research work, the Allerton Project hosts up to 3,000 visitors each year from the public, policymakers, farmers and schoolchildren.

This spring, it is also offering training as part of a partnership between Defra, the Game and Wildlife Conservation Trust and National Federation of Young Farmers' Clubs (NFYFC).

The Fit for the Future programme centres on an online package of guides. But it also includes visits to the Loddington Estate Farm, where young farmers can learn about topics including conservation agriculture, integrated pest management and agroforestry.

The final visit is scheduled to take place on 21 May, and clubs are encouraged to get in touch with NFYFC if interested.





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# ‘I am recruiting for the first time in my life’

Staff retention is at the heart of a good farm business. **Jonathan Riley** reports

**R**ecruiting and retaining good farm staff is a key goal for Northern Ireland beef producer Fergal Watson.

Mr Watson runs a 285ha arable-beef setup, with wife Lucy and daughter Eabha-Marie, across three steadings near Cloughey on the Ards Peninsula, County Down. All three are at sea level, and close to the coast.

## Urgent recruitment

The farm has two long-serving staff – one arable worker and another on the suckler cow enterprise. They have worked at the farm for more than 40 years and both are nearing pension age.

“Therein lies a major transition challenge,” says Mr Watson. “I am having to look at recruitment for the first time in my life.”

With the labour market at its most difficult for generations, the farm will need to stand out to attract the best people and hold on to them. It has to be a good place to work and tasks must be manageable, he says.

Mr Watson has already completed what he calls “gritty jobs” before any new recruits arrive. “Over the past year, we have spent £20,000 on fencing and gates. It makes the farms look up-together and signals to prospective employees that we are in good shape.”

It also means workers can focus on the important issues of growing crops and managing cattle. At the same time, Mr Watson has taken steps to make the beef enterprise more manageable.

Previously, the farm had up to 300 continental crosses. But the herd has been cut back to 170 cows and is in the process of switching to Hereford and Stabiliser genetics. One of the main reasons for the breed change is temperament.

Some of the continentals were ill-tempered, flighty and difficult to get going as calves, Mr Watson says. “We no longer want to spend valuable time managing these bad traits while difficult animals might act as a deterrent to recruits.”

## Self-sufficiency

The switch to earlier-maturing breeds should also reduce days to finish to a target below 24 months.

### FARM FACTS

Watson Farms

- Farm size: 285ha split across three units
- Enterprises: 170-cow suckler herd (Herefords and Stabilisers), beans, wheat, spring barley, oats
- Annual rainfall: 810mm
- Soil: sandy to medium loam



### TRANSITION GOALS

- Recruiting and retaining farm staff
- Restructuring suckler herd
- Improving business resilience

This will cut overall feed use and reduce the farm’s carbon footprint. Environmental costs will be further reduced by a move to home-grown feed.

“I have cut the amount of bought-in feed and will extend the arable rotation to include more beans. That will provide more protein for the ration and remove the reliance on bought-in soya blends, cutting the carbon footprint.”

The target is to cut out the bought-in protein and be 100% self-sufficient by the end of this year. Moving to home-grown feed has the added benefit of better protecting the farm from future input price volatility.

Reducing the dependence on high-priced, artificial fertiliser is something the farm is working hard to achieve. All fields are soil-tested every four years, providing a detailed insight into any nutrient shortfalls. This is closely matched to levels in the farmyard manure from winter housing, and supplemented by slurry from neighbouring dairy units. Increasing organic matter and soil testing are all part of a continuing process of soil improvement.

## Soil health

Mr Watson plans to switch to multispecies swards, including red clover, chicory and plantains. Use of the deeper-rooting legumes will add nutrients to the soil and improve its structure, making the sward more drought tolerant.

The introduction of cover crops within the rotation will further add to soil benefits. Having a living root to improve soil structure and a canopy to protect the surface will be a boon to the farms’ mix of sandy to medium loams.

A healthier soil will retain moisture, nutrients and carbon in times of drought, yet continue to be free-draining. “As the soil structure improves, we aim to gradually ease back on ploughing and look to strip-till or min-till processes,” he says.

To date, the farm has not been in an environment scheme, but 2024 will bring a new agri-support system. The basic area payment will be reduced and a resilient payment introduced – supplemented by a new Farming with Nature scheme.

“This is likely to be results-based, so if we deliver for the environment we will be financially rewarded. I firmly believe we can achieve this while retaining production levels,” he says.

“If we get our plans right, the farm should be easier to manage, have a lower carbon footprint and be more resilient to change, whether that is driven by the climate, economics or, most likely, both.” ■

● Follow Fergal Watson and our other Transition Farmers as they adapt their businesses for the new environmental schemes and phase-out of the Basic Payment Scheme. Find out more on **p37**





Mike Edwards

# How Norfolk farm is maximising its natural capital

Fruit and nut trees are set to play a key role in generating income at Albanwise Farming. **Tom Allen-Stevens** reports

**L**ine after line of newly planted trees stretch across a 13ha field on the outskirts of the village of Barton Bendish in west Norfolk. “These are almond trees – a bit of an experiment, really,” explains Mike Edwards, as he inspects the young saplings, which are just pushing out their first leaves.

“We have a mixture of fruit and nut and some boundary trees. So there’s also walnut, hazel, sweet chestnut, mulberry, pears, apples, hornbeam, beech, oak and small-leaf lime.”

The trees are part of an agroforestry venture at Hill Farm – one of four large-scale farms operated by Albanwise Farming in Norfolk and Yorkshire. It is one of 16 Transition Farms whose journey *Farmers Weekly* is following as the farm business seeks to secure itself a more sustainable future (see p37).

In rows 40m apart, the lines of trees here will soon include 4m-wide wildflower strips, leaving 36m between to match the tramlines.

“It took a bit of juggling in this field to align the rows of trees with the electricity poles,” says Mr Edwards, who is a director of Albanwise Environment.

The capital cost of planting the trees was covered by Defra’s Shared Outcome Fund – Trees Outside Woodlands project, via Norfolk County Council. “We’re responsible for the maintenance, and I guess we’ll harvest the fruit and nuts,” he says.

But the real value in the trees may lie not in the fruits they bear, nor in their aesthetics, but in their natural capital. This includes the carbon dioxide they sequester and the wildlife they support – with matching lines of trees in a neighbouring field encompassing some 20ha in total.

To find out how much these benefits are worth, Albanwise is assessing the natural capital across the whole of Hill Farm – the carbon footprint of the business, along with

its biodiversity value and water quality. To do this, the enterprise is using Sandy – a software package developed by Trinity AgTech, which uses scientific modelling to assess natural capital on a field-by-field basis.

## Establishing a baseline

Cropping records, generated by Gatekeeper, have already been uploaded into Sandy. So too has information on woodland, hedgerows and other environmental features.

“The first step is to work out our baseline, establish our main sources of emissions and make a plan for reaching net zero – we want to get there by 2030,” says Mr Edwards.

“But we also have an eye on the carbon market, and how that can supplement the farm income. And I’m particularly keen to know the farm’s biodiversity value.”

On the way to another field, he points out the boundary trees – a striking feature

flower-rich margins and AB11 cultivated areas for arable plants.”

### Whole-farm strategy

But plans to enhance the natural capital at Hill Farm aren't restricted to field edges. They also involve the farm business itself – overseen by farm manager Duncan Blyth and assistant James Sedgwick.

All straw goes off the farm to neighbours in a straw-for-muck deal, which enhances soil organic matter. This, and about 16,000cu m of digestate from the AD plant, form early season nutrition and reduce dependence on bought-in synthetic fertiliser.

The farm is also moving to a mandate across the business that every hectare of stubble gets a cover crop if it is not immediately drilled up. This may be fodder radish with barley mixed in, grazed off by sheep from two local graziers, while phacelia and black oats go in ahead of vining peas.

Cultivations are “as little as possible”, with a 6m Sky EasyDrill used direct on about 200ha

### FARM FACTS

#### Hill Farm

- Farm size: 2,650ha (part of Albanwise Farming's 12,000ha across Norfolk and Yorkshire)
- Enterprises: 2,400ha combinable crops including winter wheat, winter and spring barley, oilseed rape, winter rye, grain maize and spring beans; sugar beet; forage maize for Future Biogas AD plant at Swaffham; vining peas; the rest in woodland, pasture and stewardship
- Annual rainfall: 660mm
- Soil: light chalk and sandy to heavier loams

Milad Toolabi from Trinity AgTech to discuss the natural assets and where the opportunities may lie.

The carbon figures have not been finalised, but Dr Sykes gives his initial impression of the sequestration value of the features on the farm, starting with the agroforestry. “This is a happy medium between production and trees, and not insignificant in terms of what it can capture,” he says.

“The agroforestry module in Sandy generally indicates 1-3t/ha of carbon dioxide, while the emissions for a typical arable field are about 2t/ha. It doesn't guarantee net zero, but certainly helps on a field basis. Agroforestry is also a highly tradable form of carbon, and both the trees and the wildflower strips boost the biodiversity score,” he adds.

That's good news, but with only 20ha, and no plans to extend the venture, the overall impact will not be great. So what about the 92km of hedgerows, asks Mr Edwards.

“These have good potential, but much depends on their management,” says Dr Sykes. “Laying or thickening a hedge that's in poor condition adds significantly to its carbon value, but still doesn't sequester as much carbon as you might hope, given the visual impact – in total they may offset emissions from approximately 10ha of arable cropping and perhaps 15ha with good management. They have considerable landscape and biodiversity value, however.”

It is a similar picture for the rest of the woodland. There are plans for a further 25ha around the agroforestry fields which will, along with other woodland, all sequester carbon. The boundary trees each contribute a little, with their value in landscape terms far higher. But for all their good management, it is clear the farm's trees and hedgerows are nowhere near enough to offset the arable emissions.

Dr Sykes says: “Synthetic fertiliser contributes the most here, both in terms of Scope 3 emissions – relating mainly to its manufacture – and the release of nitrous oxide from fields following application. One kilogram of nitrous oxide released into the atmosphere

of the estate. “Sadly, we've lost a lot through ash dieback, and are currently replacing them as we restore old hedgerows,” he says. He stops by one hedgerow that has recently been laid, its new growth now greening over the slanted liggers.

“This was originally planted with a stewardship grant over a decade ago, and we received additional grant funding to lay it.” Boundary trees are planted in 1.6m tubes and are well-protected by the hedge. The estate has 92km of hedgerow and in the past four years has planted more than 7km of new hedges with about 1,000 boundary trees.

Its Entry Level and Higher Level Countryside Stewardship contracts ended in February, and Mr Edwards is in the throes of stepping up to a Higher Tier agreement, planned to start next January.

“We have been asked by Natural England to join the Insect Link project to support the rare Grizzled Skipper butterfly, so intend to make a 24m wildlife corridor through the farm for it,” Mr Edwards says. “This will be a series of AB8



A wedding venue is being developed on the farm

of the farm's heavier ground. A Vaderstad Rapid remains the main establishment tool, and the plough comes out only for second cereals and after sugar beet.

Our tour of the farm ends on some land that lies next to the village – 23ha destined for arable reversion. “These are smallish, awkward fields, and probably among the least profitable,” Mr Edwards says. “They'll be put to permanent pasture and we have plans to add ponds and scrapes to attract a wider range of species, so it'll be interesting to see what their natural capital value will be.”

### Net carbon balance

Back in the farm office, he opens the laptop and joins a Zoom call with Alasdair Sykes and





Mike Edwards is pleased with the multiple potential benefits of the agroforestry

< is equivalent to about 298kg of carbon dioxide.

"The manure and digestate represent the best material you can apply from a carbon perspective. They reduce reliance on synthetic fertiliser, cutting nitrous oxide emissions by up to two-thirds, and help to increase soil organic matter [SOM]. There's huge potential to do this in arable soils, which can sequester large amounts of carbon."

The reduced tillage will also help, he adds – ploughing tends to release carbon dioxide and reduce SOM. But what about the arable reversion? "Reverting to permanent pasture can increase carbon stocks in those fields by up to 40% – that's huge," says Dr Sykes.

"But be careful of leakage – arable production displaced from Hill Farm will have to be sourced from elsewhere, which may result in higher emissions per kilogram of food produced. This would be taken into account if you choose to trade carbon."

## Biodiversity scores

Sandy scores the biodiversity of land parcels on a scale of 1-5, based mainly on records of their use and management. This follows an established scientific process informed by peer-reviewed studies, says Dr Sykes.

"We look at five aspects, scoring for each field and the farm as a whole: farmland wildlife, pollinators, natural enemies, conservation score and soil biodiversity."

Subject to what the final figures reveal, he is expecting strong results. "The network of hedgerows with boundary trees and 4m margins will already deliver high scores. Plans to increase these to 6m and add a new wildlife corridor will create additional benefits. The arable reversion area and agroforestry in particular have a high wildlife value and will boost scores once established.

"In the fields, the cover crop policy is excellent for all biodiversity metrics, while manure applications, combined with reduced tillage, build soil biodiversity."

This is good news for Mr Edwards, who explains that the costs of all the environmental measures the farm undertakes are generally covered by grant funding and stewardship payments. So what about the prospect of additional payments on the private market?

He sees an opportunity in fulfilling the new biodiversity net gain requirements for housing developments.

Dr Sykes agrees, but adds a note of caution. "Buyers will be looking for additionality, so voluntary measures you are implementing for which you're not fully compensated by public grant-funding. Auditors will also be checking they will bring a genuine net gain," he says.

"However, the prices paid for carbon are hugely variable and you can attract a premium through platforms such as Trinity Natural Capital Markets for carbon with co-benefits. Agroforestry in particular does well here."

## Nitrate leaching

Dr Toolabi explains that Sandy uses field records of fertiliser applications combined with historic weather and soil type and topography data to accurately assess this metric.

"While synthetic fertiliser is instantly available to the crop, it also leaches easily. How much is lost depends on timing and also the amount applied, and can be as much as 30%. With the current price of fertiliser, it's not just environmental damage that's the concern.

"Organic manures, if applied within guidelines, release N gradually. They also increase SOM, improving a soil's ability to retain nutrients. Cover crops help to capture excess nutrients, especially in that post-harvest to late autumn window, which is when a lot

## WHAT IS SANDY?

Developed by software specialist Trinity AgTech, Sandy is a digital assistant that helps farmers take control of the natural capital assets in their care.

It does this by calculating, evaluating and measuring carbon emissions and sequestration, biodiversity and water stewardship of all the main farming enterprises, including woodland and glasshouse production.

Farmers can then plan using scenarios to understand which actions are going to best improve environmental performance and generate carbon credits.

Trinity Natural Capital Markets is a platform that offers additional biodiversity and water protection co-benefits, and biodiversity tokens as these markets develop.

of leaching to groundwater occurs. They also build SOM and make the N available gradually to the following cash crop as the cover dies back," he advises.

"Hill Farm is putting in place all the right measures to reduce leaching. As well as providing historic information, Sandy can advise on when and how much fertiliser to apply to reduce leaching going forward. Generally, little and often is the best approach."

## Nitrogen uptake efficiency

With fertiliser prices soaring, this is one metric Albanwise is keen to improve across the business. Dr Toolabi explains it runs in tandem with nitrate leaching and measures the ratio of nitrogen taken up by the crop to the total nitrogen available in the soil.

"Applying small amounts of fertiliser frequently according to crop need is again the best way to improve this," he says. "Variable-rate application, leaf-tissue and soil testing to assess reserves and crop need through the season also help. A nutrient analysis of manure and digestate applied is important to tailor applications and therefore improve nitrogen uptake efficiency." ■

## THE TOOLS TO MEASURE AND MANAGE

"For Albanwise, this is very much a journey we've been on for some time," says Mr Edwards. "As a business we believe both in land-sparing – setting areas aside for nature – as well as land-sharing, ensuring we improve the environmental performance of the arable fields.

"But we must strike the right balance – produce optimal yields sustainably. It's really interesting to see how the software puts things into perspective from both an environmental and financial point of view."

He is buoyed by what he now knows of the prospects for the natural assets at Hill Farm, especially the multiple benefits from

the agroforestry, arable reversion and measures to improve SOM.

"The interest in natural capital is now really accelerating, and it's clear that those who have the data will be the ones who will be able to make the most of the opportunities," he says.

"As for trading carbon and biodiversity net gain, we may be holding back on plans for the moment to see how the market develops.

"But we now have the tools to measure our natural capital, and can use these to understand what we have and then how we want to use them."

## FARM FACTS

## Aberbranddu Farm

- Farm size: 375ha (255ha owned and 120ha rented)
- Enterprises: sheep (Tregaron-type Welsh Mountain) – 950 ewes on owned land, 550 on rented area with Welsh and Aberfield sires used; suckler cows and followers – 40 continental crosses; root crops
- Annual rainfall: 2,000mm
- Soil: clay and peaty on marshy areas

RICHARD STANTON



## TRANSITION GOALS

- Carefully extend and manage natural woodland
- Plant hedgerows to improve biodiversity and aid pasture management
- Rely less on volatile inputs

# ‘The rain we get pretty much dumps itself on us’

Upland farming brings challenges but opportunities, too. **Jonathan Riley** reports

**B**etter grazing management and more hedgerows are among the long-term targets for upland beef and sheep producer Irwel Jones.

A third-generation farmer, Mr Jones took over the 375ha Aberbranddu Farm, near Llanwrda, Carmarthenshire, from his parents, Eirwyn and Heulwen, in 2013. He now tackles the challenging upland terrain in partnership with his wife, Charlene. The land rises from 200m above sea level to 400m with areas of marsh and mountain about 20 miles from the coast.

“The farm is the first high ground to be hit by the weather and the 2,000mm of rain we get pretty much dumps itself on us.”

## Grazing management

Of the 375ha, just 150ha is improved. The remainder is rough grazing with steep-sided slopes and 80ha of ageing, natural oak woodland. But Mr Jones is working to turn the challenges to his advantage. He hopes a balance of woodland and rough grazing will fit well with the future aims of policymakers. The farm has long made use of environmental schemes with a decade in Glastir and years in Tir Gofal before that.

Under the schemes, the farm planted hedgerows and trees. The aim is to continue with that process under the Welsh government’s yet-to-be announced post-Brexit agriculture plans.

Aware of the land grab and tree planting under way by large corporates offsetting their carbon outputs, Mr Jones says woodland improvement will be carried out sensitively. “Tree planting is a good way to capture carbon, but we respect the

natural aspect of the land and don’t want to plant rows of commercial conifers. It’s about getting the right tree in the right place,” he says.

Instead, trees will be deciduous species and in keeping with existing woodland within a site of special scientific interest. It is natural, but full of scrub and briar, and Mr Jones hopes to improve it by securing setup and maintenance grants.

## Planting hedgerows

Likewise, he expects there to be future funding for hedgerows which will support a major planting policy at the farm. Hedgerows are central to the business’ future – they are likely to attract payments, but will also support a change in grazing management. They provide shelter for stock up the hills and encourage biodiversity.

“We aim to break up large grazing areas into smaller fields, making grazing management more precise. The aim is to use newly planted hedges to create up to 40 paddock areas, as opposed to the original 11 on the upper block.”

Over the past five years, Aberbranddu has been a demonstration unit for Farming Connect. One project looked at rotational grazing, moving ewes every four to five days. It showed the production benefit of using smaller paddocks for rotational grazing.

“Surprisingly with our rainfall, one challenge will be to get water supplied to each of the paddocks,” Mr Jones says. “The water flows down the hill easily enough, but it is trickier to get it to go back up.”

He intends to build ponds to collect water at the foot of the slopes and to use solar power to

pump it up the hill. The farm already has a 7kW hydro-electric power generator, which has helped to protect the business from soaring energy prices.

## Reducing inputs

Mr Jones also wants to look at ways of reducing reliance on other inputs, such as fertiliser, feed and fuel. The farm has already improved pasture with a liming regime and makes use of the suckler herd to boost nutrients. This has helped fields to carry heavier stocking rates and reduce fertiliser use by one-third to 40t/year. Applications are underpinned by regular soil testing so that supply is tailored to meet precise requirements, rather than calculations and estimates.

Further reductions in fertiliser are targeted as the soil health continues to improve under rotational grazing. The farm has not used bought-in feed for the past three years on the main flock, says Mr Jones.

During winter, sheep are on root tops, grown on 4ha of the farmland. But the extra field work and ploughing is carbon intensive. Mr Jones hopes the improved grassland will allow him to drop the root crop venture in the future.

It may be necessary to trim the flock size by about 100 ewes to meet this aim, Mr Jones says. Livestock would still be the main driver, but grazing and production would be more in balance and, therefore, more sustainable. ■

● Follow Irwel Jones and our other Transition Farmers as they adapt their businesses for the new environmental schemes and phase-out of the Basic Payment Scheme. Find out more on **p37**





# Five ways to increase farm output and maintain margins

Productivity – the efficiency with which inputs are turned into outputs – has seldom been more important for farmers. In a recent webinar, experts focused on the actions that can be taken to help keep farm businesses profitable

**W**hether it's embracing innovation and new practices, collaborating and sharing knowledge, or simply doing everything that little bit better, there are actions that every farmer can take to improve business performance

Yields are important, but being more productive isn't about chasing yields. It's about optimising the ratio of inputs to outputs in a way that aligns with personal and business goals.

In our Transition Summit webinar "Pathway to productivity", experts from across the industry explored what farmers can do to reduce input costs while maintaining margins. Here are five top takeaways:

## 1 Measure and manage

Gathering data to make informed decisions did not have to mean a massive investment in a management system, said John Richards, industry development and relations manager at Welsh red meat levy board Hybu Cig Cymru. "As the starting point, let's get back to basics: number of ewes, number of lambs born,

number of lambs raised. Then we can start getting that daily liveweight gain information."

Joshua Batterham, ruminant veterinary consultant at Zoetis, added that as well as the tools, whether software or hardware, having the people behind the scenes to help guide you through the process and make those better decisions was absolutely key. "Work with your vet, your nutritionist or your farm advisers," he said. "Take their advice on the data to make sure you're using it properly."

## 2 Maximise yield from forage

Getting more grass from fewer inputs might mean addressing your fertiliser regime, or bringing clover or herbs into the ley.

But Ben Wixey, national agricultural sales manager for Germinal, said often it was about grazing the plants at the right time or cutting them at the right stage of growth. "Grass grows grass, so by rotationally grazing we can increase the production per hectare without necessarily increasing the inputs," he said.

Mr Wixey also stressed the importance of choosing quality seed. "The difference between the top and bottom variety on the

grass and forage Recommended List has a financial penalty three times that of the one on the cereals list. If you change nothing else but the grass varieties you grow, that has a massive benefit."

## 3 Make every part of a field earn its keep

Pinpointing areas within fields that were not economically viable was key, said Max Dafforn, climate activation manager at Bayer. "Satellite imagery has been available for a long time, so you can get years' worth of data on any given field that will allow you to identify areas that are consistently underperforming," he said.

"There are also platforms out there to put in your input costs, assign that to a yield map and generate a profitability map so you can see what parts of fields are underdelivering and may be suited for other uses or other schemes."

In terms of soil testing, there are still massive gains to be made in the grassland sector, according to Sajjad Awan, agronomist with CF Fertiliser. "Up to maybe 90% of [arable farmers] are doing soil tests regularly, whereas in the grassland sector this number is about 60%.

To improve efficiencies and productivity at the same time, we must know what is already present in our system," he said.

#### 4 Collaborate to help manage fixed costs

There was a huge difference across the bottom 25% and the top 25% of arable farms in terms of their fixed costs, said Duncan Rawson, a partner at European Food and Farming Partnerships. "That tells you that there is more work to be done around consolidating fixed costs," he said.

But it was not just about fewer farmers farming more hectares – smaller farmers could also benefit by sharing machinery with neighbours or others further afield. "Whether we like it or not, we have far too many combines, we have far too many tractors burning far too much diesel across the industry. So there's still a lot we can do in terms of collaborating," he said.



Mr Rawson added there were also hidden benefits because groups of farmers that started to share were beginning to benchmark against each other too. "The progressive farmers out there, they've got itchy feet all the time, they're the ones who learn."

#### 5 Be strategic with your productivity grant spend

Defra's Farming Investment Fund launched on 16 November last year with a tight window for farmers to claim some of the £27m up for grabs under a variety of schemes to pay for new equipment and infrastructure that improve efficiency and deliver environmental benefits. The next step is a full application, with payment later in the year.

"Most of the schemes are about step-changes in processes on farms, and use of the funds will require some big decisions about how the business will run in the future," said Strutt & Parker's head of farming Jonathan Armitage. However, with the Farming

Equipment and Technology Fund, he said purchasing decisions were a little more straightforward. "There was grant funding for livestock handling systems and all that sort of thing, which frankly wouldn't require big changes on farm, but it's a great way to get something paid for," he said. "Farmers should take advantage of that as soon as they can." ■

#### TRANSITION SUMMIT SERIES – REGISTER AND WATCH NOW

The Transition Summit webinars examine how farmers can adapt to some of the biggest changes that the sector has seen for more than 50 years, including the loss of BPS. You can find out more and register for future sessions at [fwi.co.uk/transition-summit](http://fwi.co.uk/transition-summit)

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