



THE BENEFITS OF SHEEP IN ARABLE ROTATIONS

A NATIONAL SHEEP ASSOCIATION PUBLICATION





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THE RETURN OF THE GOLDEN HOOF

BY PHIL STOCKER
NSA CHIEF EXECUTIVE



When people talk about bringing grassland and sheep back onto arable land, you often hear older generation shepherds use the phrase ‘the golden hoof’.

Indeed, 50 years ago it was commonplace for sheep to be considered highly useful on arable farms. They supported the rotation, helping keep weeds and cereal pests at bay. Importantly, through their manure, they released essential plant nutrients into the soil for the following crops. The reasons for the dramatic decline include the introduction of artificial fertilisers and weed killers, specialisation and what some farmers refer to as the ‘nuisance factor’ of looking after livestock. Most importantly, a reservoir of soil quality and fertility left over from previous decades, but which is now largely depleted.

Fast forward to now, and specialist arable and cropping farmers are recognising the need to improve soil structure and fertility and find alternative controls for problem weeds. These are the driving factors behind a growing interest in the reintroduction of grass, fodder breaks and livestock into arable rotations. But there are other reasons too. Financial margins in arable farming are tight and volatile. Reductions in yield reduces profitability, while well-run sheep enterprises can generate returns whilst building soil fertility at the same time. Environmentalists and policy makers have long called for a return to mixed farming – crops, grassland and livestock, which together support increases in small mammals, pollinators and farmland birds.

With fewer people farming more and more acres, there is also an appetite to bring people back onto farms to look after the animals and to reinvigorate rural communities. Alternative enterprises can also offer new income streams and spread the risk of an enterprise failure.

Animal of choice: If grassland and livestock are to make a comeback, sheep are ideally placed to be the animal of choice. In relation to cattle, they have relatively low capital requirements and low or no building and machinery needs. They now benefit from modern, efficient temporary fencing and watering options, so are relatively mobile and can be moved around easily. A range of business options can be set up around them.

Sheep also benefit from living on arable fields. Short-term pasture provides clean, parasite-free grazing, and nitrogen-fixing and fertility-building clover leys offer good nutrition and fast lamb growth rates. This may be a return to a traditional practice, but technology in grass, clover, herbs and forage crops has moved on, as have sheep breeds and management techniques.

I hope this guide offers inspiration, ideas and guidance to arable farmers who may be starting to think their farms and soils would benefit from the return of the golden hoof. It will also be helpful for shepherds and young farmers looking for new opportunities, a possible step up onto the farming ladder.

The case study farmers in this booklet show that putting sheep back onto arable farms is not only possible, but also beneficial and potentially profitable. My thanks and appreciation goes to them for their willingness to share their experiences and knowledge.



FOREWORD

BY IAN BOYD
CHIEF SCIENTIFIC OFFICER, DEFRA

Many challenges lie ahead for the farming community over the coming years. Departure of the UK from the EU could radically alter the trading environment, and future demand for lamb and cereal products is uncertain. But these challenges also offer new opportunities to strengthen our food and farming sector, which should be welcomed.

Sheep farmers can potentially benefit from opportunities for new grazing areas for their flocks on grass leys and different catch and cover crops. This could help them, for instance, meet a funded environmental scheme requirement to remove stock from their home farm.

The benefits of mixed farming for arable farmers are many, but are not always obvious. The impact of having animals on the land in improving soil health and nutritional status cannot be underestimated, and has the potential to reap longer term financial benefits in following crops.

THE FACT THAT INTRODUCING SHEEP ONTO ARABLE UNITS CAN ALSO OFFER AFFORDABLE WAYS FOR YOUNG PEOPLE TO MAKE A START IN FARMING IS ALSO TO BE COMMENDED.

I welcome the publication of this document by the National Sheep Association. The numerous case studies clearly show that having sheep on arable farms can work, and can work very successfully. I am sure it will prove to be a valuable booklet for all farmers seeking to collaborate in such a way in future.



BENEFITS FOR SOIL

Arable soils in the UK have experienced worrying declines in carbon levels over the past 40 years. Some of the most productive agricultural land is at risk of becoming unprofitable to farm within the next generation, due to soil erosion, loss of organic matter and soil structure.

Soil is crucial to agricultural production for growing crops, but also has an important role to play in flood risk management. It can be a great carbon sink, storing three times as much as is held in the atmosphere. Its degradation leads to increasing carbon emissions and contributes to climate change.

More than a quarter of all living species on earth are found in soil, mostly invisible to the naked eye. They potentially weigh up to ten times more than the livestock grazing on the surface. This soil life is made up of earthworms, bacteria, fungi, protozoa and nematodes.

Organic matter in soil provides an environment and a source of energy for all these organisms. When it breaks down it forms humus, which plays a crucial role in supplying nutrients to crops and creating a good environment in which they can grow. It is vital humus is maintained at sufficient levels.

In grassland systems soil life:

- Forms an intricate food web which gets energy from inputs of carbon to the soil in organic matter, through plant roots, crop residues and livestock excreta
- Powers nitrogen fixation through the symbiosis between rhizobia found in the nodules on the roots of legumes
- Drives phosphorus, nitrogen and sulphur cycling to recycle nutrients back into a plant available form
- Stabilises soil structure and allows the soil to absorb intense rainfall through an open pore network
- Becomes sponge-like and will hold on to water and support plant growth through drought

Fields of pasture and fodder crops are less susceptible to soil erosion and compaction and absorb more water than fields that have crops planted in rows. Manure from grazing livestock remains in the soil for a long time, slowly releasing nutrients, contributing as much as 35% of soil organic matter. Grazing results in an even spread of manure across the field. Sheep defecate and urinate more evenly than cattle and do not reject the grazing around their deposits. Sheep are also less damaging to soil structure than cattle following short-term treading on wet soils at equivalent stocking densities.

CASE STUDY

TIM MAY ARABLE AND LIVESTOCK FARMER, NORTH HAMPSHIRE



Tim May is bringing animals, wildlife and people back to his family's 1,000ha Kingsclere Estate through regenerative farming practices.

In 2013, he sowed 360ha of herbal leys with mixtures of ryegrasses, cocksfoot, fescues, timothy, red and white clovers, birdsfoot trefoil and herbs such as salad burnet, plantain, chicory and yarrow.

The first animals to arrive were 1700 ewes, which live as one group and lamb from May to July. Lambs are finished off grass only and sold direct to a processor. A self-employed shepherd, who has his own flock and manages another, looks after the sheep.

Each grassed area is bounded by one temporary electric fence, with one main fence down the centre and flexible fences cutting these areas into daily sections. Grass growth is measured with a plate-meter every week during the growing season to gauge how much fresh pasture the sheep will need each day.

Four years since the first leys were drilled, 2017 will see the first arable harvest following the fertility-building break.

Winter wheat is drilled in early autumn in min-tilled ground at a high seed rate and with no fertiliser or sprays. Over winter it is grazed with sheep. Decisions are then made in spring whether to take individual crops on to harvest or to graze them right down and re-drill with a spring crop.

In August, spring barley crops undersown with grass mixtures will be combine harvested – but the straw left on the ground. The sheep will graze the straw and trample what is left into the soil, increasing the soil organic matter content.

“The change in the farm has been dramatic,” says Tim. “Soil structure has improved beyond belief, with roots travelling more than 1.5m deep, where before they were struggling to get just below the surface. Water troughs have helped bring birds, insects, worms and bees to arable landscapes that previously had little water in them.

“It does not really matter if we produce higher yields following the herbal leys because of all the other good things the grass mixtures have given us. The cash flow will certainly have increased, even if the yield has not.”

BENEFITS FOR CONTROLLING BLACKGRASS

Blackgrass (*Alopecurus myosuroides*) is one of the biggest challenges many cereal growers face on their farms. It is an annual grass weed occurring throughout the UK, but a particular issue on arable farms in the South and East of England.

It is usually confined to heavy soils, but can be found growing on sand and even chalk. The trend in recent years towards winter crops rather than spring-sown, and a tendency towards early establishment has effectively reduced the opportunity for pre-emergence herbicide controls. With the range of effective chemicals becoming increasingly limited, farmers need to find management strategies to tackle weeds like blackgrass and brome, as well as pests and fungal infections.

Sowing grass leys or cover crops, or grazing the cereal crops themselves with sheep, offer a real chance to combat blackgrass. In short-term situations, replacing a badly infested crop with a catch crop can then be grazed off with sheep. What is left can be sprayed off completely before a more competitive crop is drilled to smother out weed regrowth. Where seed burdens are particularly high, it is unlikely that one season's actions will be enough to stop blackgrass re-colonising. In these cases, longer-term forage cropping could be an answer, such as three to four years of perennial ryegrass and clover leys.



CASE STUDY

JOHN PAWSEY ARABLE AND SHEEP FARMER, SUFFOLK

Organic farmer John uses grass and clover leys to boost soil fertility on his 645-hectare farm. He is also involved in blackgrass trials with the Organic Research Centre (ORC).



“We run a six-year rotation starting with two-years of a herbal ley consisting of ryegrasses, clover, chicory and up to six species of clover, taking advantage of different rooting depths to improve soil structure. We follow this with four arable crops, which can include wheat, barley, oats, beans, peas, spelt or quinoa. Originally growing the leys as a mulch, the grass crops were cut four or five times and left to rot on the surface of the field. Since the introduction of 500 New Zealand Romney ewes in 2014, John now predominantly uses the two-year leys to graze sheep.

The ewes lamb outside, have good resistance to worms and good foot health and can be managed very simply with electric fencing, water bowsers and the involvement of two self-employed shepherds. His clover-rich leys are ideal for finishing lambs and he plans to double the flock to 1,000 ewes. “Sheep were introduced into the rotation because I wanted to extend our fertility-building leys from 18 months to 24 months. I felt sheep would fit in well to graze the extra leys, rather than mowing and incorporating them into the soil pre-cropping. Green manures planted after harvesting some of the crops are also used for over-wintered sheep grazing. “Long term, we hope to see increased soil fertility, less weeds and healthier crops. The leys also provide additional income from sales of finished lambs.”

Blackgrass research: John has been participating in a two-year trial with the ORC to see whether blackgrass in wheat can be controlled by grazing sheep in early spring.

Grazing a winter cereal crop at this time provides green forage during the winter feed gap, as well as controlling weeds and diseases and reducing lodging risk by shortening crop length. Stocking rates in year one were 6.3LU per hectare with the sheep being moved every four to five days. In the second year, John increased the stocking rate to 12.5 LU per hectare but the sheep were left to graze for three days only. They were taken out of the crop before the onset of wheat stem extension and when John felt enough defoliation had taken place without causing undue stress or damage to the crop.

Overall, grazing has reduced blackgrass in the early sown crop, with the density of blackgrass heads nearly 20% lower in the grazed plots. Differences in the normal sown plots however, were not significant. This suggests that grazing may be an effective strategy to reduce high pressure of blackgrass and buffer the risks associated with earlier sowing dates. The study found only a small reduction in grain yield from the grazed crop. While the results suggest it might still be better to sow wheat later to reduce blackgrass infestations, the other benefits of cereal grazing should not be overlooked, such as supplying feed in the winter forage gap, its use for controlling other weeds and adding fertility through manures and providing additional income.

BENEFITS FOR THE ENVIRONMENT

The British countryside has been shaped by livestock grazing for centuries. Many plants, insects, birds and mammals have come to depend on it for their survival.

But the loss of mixed farming in the past fifty years or so has undoubtedly led to a loss of habitat and food sources, in particular insects and invertebrates above the ground and in the soil. There is widespread agreement that the reintroduction of mixed farming and livestock into predominantly lowland arable areas would be beneficial.

Additionally there are environmental benefits to be gained by linking upland and lowland sheep farmers, through the finishing of store lambs and away-wintering breeding stock on higher quality lowland grazing.

As well as encouraging invertebrates such as earthworms and dung beetles, the presence of mixed species swards can boost animal and insect populations up and down the food chain. Grazing animals return nutrients and organic matter back to the ground as they deposit their manure, ensuring the soil remains healthy and fertile. Legumes such as white and red clovers and other trefoils help grasses and plants grow, reducing the need for artificial fertilisers. Herbal and species-rich leys attract and maintain wildlife including many flowers, insects, birds and mammals.

The re-introduction of sheep onto arable units, turning them into modern-day mixed farms can help boost wildlife. Farmers who have already done so now see their fields teeming with a variety of new life, and have done so, in just a few years.

MOB GRAZING

Domesticated sheep still retain the instincts of prey animals, which in the wild would move regularly as a bunched group to find fresh grazing and reduce the risk of predation.

Mob grazing replicates this natural behaviour by placing sheep in relatively small areas for short periods of time. Moved to fresh pasture every day or so, they will not return to the same grazing area for weeks. Mob grazed paddocks typically grow taller plants due to the long periods of rest. The animals eat a third, leave a third and trample a third of the growing plants. The trampled third protects the soil from compaction and the surface of the ground from erosion. As the broken stems decompose, worms drag them down into the soil, which increases the organic matter content and rebuilds moisture retentive topsoil.

Sheep given regular access to a small amount of fresh pasture eagerly graze whatever is in front of them. They graze evenly and not selectively, which they would do if they were set stocked. The plants are highly nutritious, owing to good soil health and rooting diversity and contain many vitamins and minerals. Taller grass also provides more fibre, which can aid digestion and utilisation of nutrients in ruminants. The plants on mob grazed fields have time to flower and set and drop seed, ground nesting birds can raise their broods, bees have ample nectar to collect, bugs, beetles and voles proliferate which provides rich pickings for owls. Large, modern sheep breeds may be less suited to mob grazing than traditional, native breeds.

CASE STUDY

ROBERT LAW SHEEP AND ARABLE FARMER, HERTFORDSHIRE

Sheep are an essential part of the arable rotation on Robert's farms on the light chalk of north Hertfordshire.

There are 2,100 breeding ewes, lambing in two groups. The first 1,000 Dorset x Mules lamb in early January and are turned out with their lambs at four weeks of age onto stubble turnips. The lambs are creep fed until they reach the desired weight and grade. From late May to November the dry ewes graze Therfield Heath a Site of Special Scientific Interest (SSSI), and at other times they graze other areas of permanent grassland that cannot be ploughed or cropped. The rest of the ewes lamb from mid-February to mid-March and are turned out onto grass. The lambs are creep fed until they are finished, with 90% sold by the end of July before the grass stops growing due to lack of rain. Each autumn, depending on feed availability, up to 3,000 store lambs are brought onto the farm and finished on catch crops of stubble turnips, sown after winter cereals and before spring barley and sugar beet.

One full time shepherd looks after all the sheep, and takes on help as and when he needs it. Lambs are sold throughout the year via a local butchers shop and through abattoirs in East Anglia and the South West.

"I am a first generation farmer and we have always had the sheep to graze the traditional chalk downland or it would quickly revert to scrub," says Robert. "There is a huge amount of wildlife and plant species where the sheep graze and we collect agri-environmental payments for this. The sheep are really important for the overall well-being of the land, but they are also an increasing challenge on lowland farms. The loss of pesticides to fight flea beetles in stubble turnips and wireworms in grass is making it harder to produce the food for them to eat. And of course Brexit is likely to have significant impact on future lamb sales."



BENEFITS FOR YOUNG ENTRANTS

The future of British Agriculture depends on young people entering the industry. But taking the first steps in a sector based on high priced land is almost impossible. With only a third of farmers saying they wish to retire completely, the movement of people up the career ladder is very slow. Just 13% of farmers in 2015 were under the age of 45, a fall from 17% in 2003.

Of farmers surveyed, 84% operated in 'established family farms', ie businesses that had been passed down at least once, and nearly 30% had business continuity back to 1900. Only 8% were farmers without a farming background. Such stable structures bring resilience but prompt concerns about injecting fresh, new ideas, entrepreneurialism and innovation into the industry.

Other traditional routes to enter farming are by taking a tenancy or renting a County Council farm. However tenancies tend to be given to established farmers and local authorities are selling their farms to make up shortfalls in their budgets. Young farmers can be a high-tech, highly skilled and motivated group of people. They are looking at other new entrant options such as share farming, contract farming, partnerships and 'bed and breakfast' grazing agreements. They are looking at doing things differently, with the use of digital communications and IT. Some have their own funds to start enterprises, while others are tapping into new ways of borrowing money, such as peer-to-peer lending and crowd funding using social media.

Starting with sheep: Setting up a sheep flock is a definite option for young people keen to work with farm animals, as it does not require the same investment and inputs of other enterprises, such as dairying.

Young shepherds can work with established arable farmers, who want to reap the benefits of mixed farming, while still specializing in arable crops. The new entrant will usually need to provide the temporary fencing equipment and have a plan for how the land will be grazed, bearing in mind access to water. It is common for the landowner to be paid a headage payment based on the number of sheep grazing within a given time period, or be paid on a hectare basis. In many cases introducing a flying flock of finishing stores to a new grass ley or cover crop is the simplest option. A longer-term alternative is to host a breeding flock, although the logistics of lambing, shearing and weaning are more complex and time consuming. It is important that the landowner and young entrant communicate well and each understands each other's obligations, from the moment the sheep arrive to when they leave.

Youngsters should be positive and polite in their approach. Building up a stock of kit, such as handling equipment, fencing posts and electric fence energisers, will show an element of self-sufficiency and not having to rely on the arable farmer to do things in relation to the sheep. Once in an agreement, they should always be professional and do things properly, keep to agreements and react quickly to problems. Building trust with another farmer, not only makes it more likely they can work together in following seasons, but also increases the youngster's profile in the local area as a trustworthy and reliable shepherd.

CASE STUDY

MICHAEL RITCH SHEEP FARMER, ABERDEENSHIRE

Michael has introduced sheep onto the family farm, allowing him to expand the business sufficiently to work fulltime alongside his father and grandfather.

There have never been sheep on the 728-hectare mixed grassland and arable unit before, only cattle. He started with store lambs on grass and forage crops before establishing an outdoor lambing breeding flock.

"Most of the arable is spring barley for malting, but we also have 12 hectares of swedes and this is where we wintered the sheep initially. We are now starting to experiment with forage crops sown after harvest, such as forage rapes and stubble turnips, to finish lambs on.

"The sheep manage the land over the winter without poaching it and keep down the docks. Having a grass rotation has definitely improved the land for following crops, and having the sheep has motivated us to improve our management, which has rewarded us with greater yields and better utilisation and performance of grass. We now use less fertiliser and less herbicides, so our input costs for the whole farm have been reduced.

"My advice is to know your costs and do the figures beforehand, so you know your plans are feasible. Aim for a low maintenance system and choose a sheep breed that gets the best out of forage and is capable of looking after itself. Most importantly, utilise grass to its full potential, as it's the cheapest feed available."



BENEFITS FOR SHEEP AND ARABLE FARMERS

Incorporating sheep into an arable rotation can offer real financial benefits and many hidden, less quantifiable advantages too.

Soils become more fertile and, if legumes are included in the grazing mix, significant savings in nitrogen and other fertilisers can be made in following crops.

The friability of soils also improves and both its water holding capacity (useful in a drought situation) and the rate of water infiltration (useful during periods of heavy rainfall) are greatly improved. Increasing soil organic matter also results in soils less prone to compaction from hooves or machinery.

ADVANTAGES FOR THE SHEEP FARMER:

- Offers additional acreages to graze so flocks can be started or expanded
- Break crops such as stubble turnips and mustard provide clean grazing and sheep can self-medicate on herbal and species-rich leys that include plants like chicory, which have anthelmintic properties. This keeps vet costs low
- High output ryegrass/clover leys can finish lambs at high growth rates on grass alone – which may attract a premium, eg certified Pasture for Life
- Outwintering situations reduce any need for housing, reducing costs significantly

ADVANTAGES FOR THE ARABLE FARMER:

- Improved soil health with higher organic matter and adaptability to freak weather events such as flooding and drought
- Improved nutrient status so less artificial fertiliser is needed
- Increased productivity with increased yields in following crops
- Difficult weeds like blackgrass and brome can be controlled culturally/using less inputs
- Arable by-products such as straw and vegetable tops can be eaten by sheep and turned into protein for very little cost
- Encourages partnerships with young farmers who have no land but want to shepherd. This may result in more help at busy times in the arable calendar
- Guaranteed income/monthly cash flow from the sheep
- Can unlock environmental payments, eg for crop diversity or for fencing to keep stock from waterways, or hedges



CASE STUDY

ROBERT SPINK SHEEP AND ARABLE FARMER, SUFFOLK

Robert runs 400 ewes on rented ground in addition to his 32-hectare arable farm. He has increased the acreage through a grazing agreement with a local arable farmer.

"It came about through contact with a friend," says Robert. "I visited the farm and walked the fields with the farmer and we discussed how we could work together. He drills winter forage crops like fodder radish and forage rye which provides cover on his light land. The sheep graze and manure on it, increasing its organic matter and its ability to hold nutrients. The soil is fit for cultivation once the sheep come off. It reduces his need for spraying and what I pay helps cover the cost of growing the crop in the first place. From my point of view, the ewes come off the crop in very good condition and scan well. The advantage of arable ground is that it is clean grazing so worms are not a problem."

Robert has complete responsibility for the sheep, with no input from the landowner. He sets up electric fencing, provides water and has his own mobile handling system. He has also recently introduced a grass ley into the arable rotation at home, which the sheep will also graze from now on.



BIOSECURITY MATTERS

The movement of sheep to new grazing carries the risk of spreading parasites or disease. When new animals arrive on the farm quarantine procedures should be followed, particularly if there are already sheep on the farm. This allows time to determine their health status, and to monitor and carry out any necessary treatments.

QUARANTINE

An effective quarantine area for this purpose should give real separation from other livestock, with consideration given to avoiding the introduction of parasites or diseases to clean sites.

Always work with quarantined animals after all other stock. Wear different protective clothing and disinfect before and after entering and leaving the quarantine area.

GRASS LEYS OR OTHER CROPS?

GRASS LEYS: Grass leys can be used in rotations from one to three or more years. The leys can consist of pure ryegrass and clover, which produce high plant yields with high levels of energy and protein, which can finish lambs quickly. Or they can be a multi-species mixture, including wildflowers, herbs and plants such as chicory, sheep's parsley and sainfoin. Many of these are deep rooting, which is good for renewing soil structure and offers more holistic sheep nutrition. Planting grass leys should present few problems for arable farmers – who are likely to have the machinery and equipment to do this.

Example of the costs of a 'best practice' grass reseed, after an arable crop:

	Cost/ha		Cost/ha
Cultivations	£50	Seedbed preparation including rolling	£50
High quality seeds mixture	£185	Fertiliser (including application)	£163
Drilling	£37	TOTAL	£484

Source: Germinal.com July 2016

Apart from possibly artificial fertiliser, these swards should require no further inputs for their lifetime.

OTHER CROPS: Brassica crops such as kale, forage rape, grazing turnips, stubble turnips, fodder beet, swedes and new rape/kale hybrids, can provide nutritious, cost-effective feeds for sheep. These are short-term crops, usually grown and consumed in less than one year. They are also referred to as cover crops, as they cover the ground between the harvest of one main crop and the drilling of the next, which helps prevent soil erosion, particularly over winter. They can increase output/ha, both in terms of dry matter (DM) feed and animal performance and near 100% utilisation is possible with careful management. Out-wintering on brassicas on the right soils is also possible.

Cost of growing and feeding some catch crops for sheep:

Total production cost/ha	Stubble turnip, £307	Forage rye, £34	Forage rape, £410
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Source: Kingshay/EBLEX 2010

It is best to strip graze cover crops and a wide-access run-back area is strongly recommended in accordance with good agricultural practice. This will increase utilisation and animal welfare, and also reduce the risk of contamination of fleeces with soil. Sheep must also have access to hay, straw or grass to graze. Bales placed in the field during summer reduce the need for machinery to go into the field during the winter, minimising soil compaction and runoff from wheelings. An adequate water supply is essential at all times. There may be financial support available for this type of crop in the Ecological Focus Areas of the Basic Payment Scheme and also in agri-environment schemes, providing they comply with the rules.



CASE STUDY

SAM CLARKE ARABLE AND SHEEP FARMER, OXFORDSHIRE

Sam and Charlotte Clarke run a flock of 870 ewes on their own arable farm in Oxfordshire and on land rented from neighbouring farmers.

In 2016 the cover crop was mustard and oats and all the ewes were tupped on them, before scanning pregnant at 202%. The sheep are moved off the cover crops one month before lambing in sheds. This year, the sheep returned to a trial field after lambing to examine any differences between grazing a ryegrass and clover ley or an enhanced herbal ley with added red clover, chicory and plantain. "We wanted to see if we could get lambs to more than 30kg with 100% forage by 12 weeks on the enhanced leys," explains Sam. "Also can they help combat weeds issues such as blackgrass and brome. With a spring barley gross margin per hectare standing at £248/ha, this is what the sheep will need to do to compete financially. Unfortunately, after a brilliant start, lack of rain on our light soils meant we could not supply enough feed to all the ewes and we had to stop the trial. But next year we will start again and probably apply some ammonium nitrate and sulphur fertiliser early on to increase spring growth. I can see sheep having an important role to play in arable systems – it is just a case of working out how to manage them to maximise their output while benefiting the soil."



CASE STUDY

MARC JONES LIVESTOCK FARMER, POWYS

Marc runs a flock of 1,000 breeding ewes and finishes beef cross dairy calves on a system that relies on out-wintering stock on forage crops, with intensively grazing ryegrass and clover mixes in the spring and summer. While not doing this within an arable rotation, the same principles apply.

"We started by growing swedes to out-winter stock but switched to fodder beet as it gives us two to three times greater yield, meaning we can grow more and keep more sheep. We stock 600 sheep on 4-hectares for 75 days from Christmas to the first week in March, when they are switched to rotational grazing on grass until the week before lambing. They are then set-stocked, with twin-bearing ewes at 13 per hectare and single-bearing ewes at around 40/ha. They lamb from the 1 April and by late April are ready to be grouped for rotational grazing. Groups of around 250 are moved every four days, with twins getting the best grass and the singles following behind them. Fodder beet breaks up the soil ready for the next crop or grass ley and spraying fodder beet seedlings keeps on top of docks. It also reduces the costs of the livestock enterprise. Our sheep receive no concentrates and we out-winter them for a total of £4 per animal. Lambing outdoors has also cut our costs."



INFRASTRUCTURE

Fencing is a crucial element of managed grazing, as it provides the ability to control where the livestock eat and how long they remain there.

On arable farms, where hedges may no longer be stockproof and permanent fencing non-existent, electric fencing is likely to be the answer.

An electric fence is designed as a psychological barrier to stock. A pulse of electric current is sent along the fence line from an earthed energiser. When an animal makes contact with the fence, the circuit between the ground and the fence line is completed, sending a short, sharp but safe shock. This should be sufficient that the animal remembers it, but will not cause it any long-term harm.

Electric fencing can be permanent, semi-permanent or temporary. The height and number of wires will differ depending on the livestock. Permanent electric fencing for sheep requires five strands of wire, with the lowest three strands placed at 15cm intervals from the ground and the highest two placed at 25cm intervals. The lowest wire is often not energised as grass can easily short it out. Temporary fencing will usually require up to three strands of wire, but can be up to eight if there are frequent breakouts, with the lowest two strands at 25cm intervals from the ground. There are also more robust semi-permanent systems available, which can be relocated when needed.

It is a good idea to train sheep new to electric fencing inside a permanent stock fence in a small field. Ensure voltage is +4,000V for shorn ewes or ewes with young lambs and +5,000V for weaned lambs and ewes with fleeces. If they challenge the fence keep them in the field until they stop doing this.

The post-weaning period before tupping is normally the best time to introduce ewes to electric fencing. Lambs learn quickest if introduced while still with their trained mother at a couple of weeks of age. Do not attempt to train lambs directly after weaning. Leave at least seven to ten days before introducing them to electric fence.

HANDLING. All sheep farmers should have easily operated and efficient handling pens, to facilitate routine management and treatment, on a size and scale to suit the flock numbers. This might be a mobile set-up owned by the flock owner. When sheep are to be transported, well-designed collecting, loading and unloading facilities should be available on the farm.

WATER. Adult sheep can drink around six litres of water a day. The amount depends on the weather and what they are eating, eg grass can be up to 80% water. Requirements increase greatly during late gestation and lactation. Some sheep prefer to drink still water as opposed to water from a moving stream. It can be provided from mobile water bowsers into troughs or via a mains supply, either through buried pipe or piping laid onto the surface, which has interconnectors to the trough. Water sources should be kept clean at all times.

SHELTER. Sheep should have access to shelter from inclement weather including snow, sun or flooding.

CASE STUDY

NICK JASPER SHEEP FARMER, CORNWALL



Nick erected 6,000 metres of three lines of electric fence to form four 2.5ha lanes and one 2ha holding paddock, in one 12 ha field so he could carry out cell grazing. The aim is to carry as much stock as possible without compromising the state of the field.

The flocks are contained using a back fence, a front fence and a safety break. The sheep are moved every two days. Nick travels across the fences to the new piece of grazing, on his quad bike that has a fender kit on the front, which allows him to ride across the wires, which pop back up again after he has crossed. The front fence is held down for the sheep to move forward to graze up to the safety break, which then becomes the new front fence. The back fence is gathered quickly and easily by Nick on his bike and replaced as the safety break, ready for the next shift. This adaptable system allows the grazing area to be made bigger or smaller, depending on the animals' feeding demand and grass growth.

A single flock of 240 ewes and lambs was introduced to the system, after training, six weeks after lambing. The ewes and lambs grazed 0.85ha every two days, which enabled a 26-day rotation. After weaning, the heaviest 220 male Romney lambs were grazed ahead of 159 dry hoggets for one rotation – which lead to great use of grass without compromising lamb growth rates. The ewes cleaned up what the lambs left leaving a good residual. 240 store lambs were then brought into the system. The average daily liveweight gain has been 0.21kg/day with a total production/ha from 20 May to 31 August of 600kg of liveweight.

Nick has been astonished by the amount of grass that has been grown in the field – growing at 80kg DM/day on average from May to August. He has also relished how easy the system is to run. "I can pull into the field and travel straight to the stock to do what needs to be done," he says. "Also every two days I can watch every single animal walk past me across the fence, so it is easy to detect early signs of lameness or mastitis. This saving in my time far outweighs erecting the fences in the first place."

REGULATIONS

There are many rules and regulations that accompany the keeping of sheep. Arable farmers who introduce them into their systems must be aware of them, even if they are not looking after the sheep themselves.

IDENTIFICATION. There are strict rules relating to sheep identification that includes the use of two paired ear tags, one of which must be an electronic identifier. The only exception for this is for lambs less than six or nine months old depending on the level of intensity of rearing, that do not need to be identified until they leave the holding of birth, and for lambs going to slaughter that only need one single electronic tag. There are various options for using holding numbers that need to be understood to avoid cross compliance penalties. There is also a requirement to keep an up-to-date flock book, recording numbers of births and deaths and a veterinary medicines record. Due to the complexity of these rules, and the fact that they are liable to change, arable farmers and sheep farmers are encouraged to seek advice on all aspects of sheep identification, as well as reading all the official Defra and devolved national guidance documents.

RECORDING SHEEP MOVEMENTS. Sheep keepers, ie those responsible for the animals, must report all movement of sheep on and off the holding. Each UK nation has its own service for doing this, along with differing rules and requirements. There are also different standstill rules that will affect all livestock not just sheep that are on the holding. This is a complex area and needs to be understood fully. Seek advice from the relevant, official Government administration and follow carefully, as non-compliance can lead to payment penalties applied across the whole holding.

ANIMAL WELFARE. The Code of Recommendations for the Welfare of Sheep produced by Defra and the other devolved Governments, sets out the level of stockmanship needed to keep sheep fit and healthy. The most significant single influence on the welfare of any flock is the shepherd, who should develop and carry out an effective routine of continuing care, including daily inspection. He/she should pay particular attention to signs of injury, distress, illness or infestation, eg internal parasites, sheep scab, fly strike, lameness and mastitis, so that these conditions can be recognised and dealt with promptly.

CROSS COMPLIANCE TO RECEIVE RURAL PAYMENTS. Cross compliance is made up of Statutory Management Requirements (SMRs) and standards for Good Agricultural and Environmental Conditions (GAECs). Farmers, who claim under Pillar 1 and 2 (the Basic Payment Scheme (BPS) and agri-environment schemes), have to follow the rules of cross compliance to receive their payment. There are a number of areas of cross compliance that arable farmers with sheep enterprises might need to take account of, eg soil erosion, Ecological Focus Areas and Nitrate Vulnerable Zones (NVZs).

For example, out-wintering and the grazing of winter forage crops can cause soil erosion and soil loss on trampled banks. To avoid this it is advised to choose well-drained, relatively flat fields, move stock regularly and use back fencing, fence watercourses and provide grass run backs. If a farmer has more than 15 hectares of arable land, there is a requirement to have 'Ecological Focus Areas' (EFA), equivalent to at least 5% of the total arable land. These should not be sown with the intention of harvesting or grazing during the set EFA periods. But they can be cut or grazed outside these time frames, ie:

EFA period for catch crops: Established by 31 August and retained until 1 October

EFA period for cover crops: Established by 1 October and retained until 15 January

All farmers in Scotland and 58% of farmers in England with land designated in an NVZ must observe strict guidance on the use of nitrogen (N) fertilisers and organic manures to reduce water pollution. There is a limit of 170kg/ha on the amount of N fertilisers in livestock manure that can be applied (directly by grazing livestock or by spreading) on the holding per calendar year. This limit applies as an average across the farm and is separate from the field limit of 250kg/ha of total N load from organic fertilisers.

There may be other rules and regulations relating to cross compliance in relation to keeping and feeding sheep, and these may differ between the countries of the UK.

For more information check the websites for Defra at www.gov.uk, the Scottish Government at www.gov.scot, The Welsh Government at www.gov.wales and the Northern Ireland Office at www.gov.uk/nio

CASE STUDY

TOBY BAXTER SHEEP AND ARABLE FARMER, GLOUCESTERSHIRE

Toby has been integrating sheep and arable farming for many years, now running 4,250 breeding ewes within his 940-hectare grass and arable unit, which includes stubble turnips for winter grazing.

He plants herbal leys in a three to four-year rotation as part of a Higher Level Stewardship agri-environment scheme, which incentivises the growing of herbal leys and under-sowing arable crops with ryegrass. "I believe introducing livestock back into arable farming is essential. However, if you are not a stock farmer, team up with a sheep keeper and see how you can both benefit from a winter grazing system. Be aware that having sheep on your land, whether they are your own or someone else's, gives cross compliance inspectors more things to pick holes in. But this is certainly not a reason not to do it – just do it properly. Including grass leys in our arable rotations has been invaluable for blackgrass control and has significantly increased biodiversity on the farm, particularly in the herbal leys. There are definitely more insects and pollinators and the flowering of different species, some of which grow quite tall, has allowed birds to nest. The crops that follow a grazed grass ley do a lot better than crops following crops. Taking the sheep off the grass over winter allows it to recover in time for lambing outdoors in the spring. The grass break also provides some clean grazing."

POSSIBLE BUSINESS STRUCTURES

There are a number of different types of agreements that can be used to set up sheep grazing on arable land. Agreements for the occupation of land can become complex, especially when factoring in such arrangements as the Basic Payment Scheme (BPS) and agri-environment schemes.

Arable and sheep farmers should seek legal advice before setting up a working relationship and most certainly before the sheep arrive on the farm. Any agreements made should be in writing, fully stating what each party is intending and expecting from the relationship.

GRAZING LICENCE. This is a personal permission given by the landowner to the sheep owner to use the land for the purposes on a short-term basis – often during the grazing period from May to October. The licence permits the sheep farmer to graze his/her animals on the land in return for a licence fee. The grazier will be bound by a number of obligations, such as to pay the fee and not do anything that is likely to harm the land. At the end of the licence period, the grazier will be required to remove the animals from the land, without argument. Grazing licenses are very flexible and can be for a few weeks or for a year or longer. The landowner will claim BPS payments.

PROFIT A PRENDRE. A profit a prendre is a right to take something from another person's land. This could be part of the land itself, such as peat or something growing on it, such as grass, which can be taken by the grazing of animals. Similar to a licence, it must however be prepared by deed and therefore usually needs the input of a solicitor.

AGISTMENT/TACK/BED AND BREAKFAST. This is a short-term arrangement where the landowner takes onto their own land sheep from another person, to allow them to be fed and looked after. The grazier pays a fee, which is usually based on the number of animals over the period of occupation. The agreement should record who is responsible for all aspects of husbandry and care.

SHARE FARMING. A farmer, often referred to as the owner, with land and fixed equipment enters into an agreement with another farmer such as a young sheep producer, who provides labour, non-fixed equipment and animals. The profit from the agreement is split between the two. The agreement needs to record who is responsible for what and who the BPS claimant is - usually the landowner.

SHORT-TERM TENANCY. A Farm Business Tenancy (in England and Wales) gives the tenant, who pays rent, exclusive occupation of the land during the period of the agreement and he/she will claim BPS.

PARTNERSHIP. Forming a Partnership allows several partners in the business to have a say in day-to-day running and to share their profit. Partners are also liable for each other's debts. Farming families often operate their business as a Partnership.

IN SCOTLAND. A Seasonal Let in Scotland is essentially a Grazing Licence (Licence to Occupy for a specific purpose) or a Grazing or Mowing Let in most circumstances, with a Short Let being under 365 days. A longer let takes the form of A Short Limited Duration Tenancy or Limited Duration Tenancy/ Modern LDT (changes are still being made. Consult Scottish Government or an adviser). A 1991 Act Traditional Tenancy is possible but rarely used. An SLDT could in theory work for a cropping of more than 364 days or short term grass parcels, as there is no requirement for the tenant to claim BPS. The claimant has to be able to show control, which is where a Licence to Occupy is preferable. Be aware that activating a farming venture in your own right can count against future new entrant grants and incentives. It is worth taking professional advice on getting involved in ventures in terms of size and undertakings.

QUESTIONS TO ASK WHEN CHOOSING THE BUSINESS MODEL

WHO WILL LOOK AFTER THE SHEEP? The person looking after the sheep should see themselves as being responsible for meeting cross compliance conditions, whether sheep or soil related, even though the claimant will be the person liable for any penalties. This person may not be the stockowner, so it is important that responsibilities are recorded to make clear who the keeper is.

WHO WILL BE CLAIMING BPS? The legal occupier of the land can claim the Basic Payment as long as cross compliance has been met and that BPS entitlements exist. In most of the short-term agreements, the legal occupier remains the arable farmer. If the agreement involves a short-term tenancy, the sheep farmer can claim it.

IS TAX AN ISSUE? The landowner may need to keep farming to qualify for certain tax reliefs.

HOW WILL DISPUTES BE RESOLVED? It is important that in any agreement includes a dispute resolution clause to help resolve any disagreements.

CHECKLIST FOR ARABLE FARMERS

Do you want to run the enterprise/ animals or rent the land out to another livestock keeper?

Either way, who will look after the sheep on a day-to-day basis?

Do you have the required infrastructure and if not, does the sheep keeper have the right equipment? This will include sheep-proof fencing, adequate sheep handling facilities and access to fresh water every day.

Is housing needed or provided?

What type/breed of sheep do you want? Store lambs to finish and sell? Breeding ewes to have lambs and then finish and sell. What breed are you looking for? Pedigree or Easycare/low input?

What is the intended market? When will you buy or sell the stock or when will you welcome the grazier's sheep onto the land and when do they have to leave?

What crops are going to be grazed? Grass leys or cover crops?

What grazing system will be used? Set stocking or managed grazing such as rotational or cell grazing?

Do you understand all the rules and regulations pertaining to livestock keeping?

Will livestock detract from the main arable enterprises or add value to subsequent crops?

How will this affect farm profits?

CHALLENGES FOR ARABLE FARMERS

- Having animals on the farm – for the first time or after a long period without any
- Arranging for fencing, handling facilities and water and possibly shearing
- Understanding all the rules and regulations of sheep keeping
- Growing new crops and managing them – possibly with a reduced range of pesticides in future
- Carrying out strict biosecurity
- Finding a trustworthy shepherd
- Setting up the legal agreements/understanding the implications on cross compliance
- Future uncertainty with Brexit

CASE STUDY

ANDREW FOULDS

SHEEP FARMER, NORFOLK

Andrew has finished thousands of store lambs over the past 30 years on rented keep from arable farmers across East Anglia.



The lambs are bought from across the UK, with many coming from the Scottish Borders. They arrive from the end of August to the end of January. Most are kept for 17 weeks, before being sold to one processor on forward selling agreements. Some are marketed in early November and some are still being finished in May.

"The lambs are kept in groups of 500 and graze a wide variety of crops from sugar beet tops and vegetable waste like harvested cauliflowers and brussel sprouts," says Andrew. "We also give arable farmers 1,000 acres of stubble turnip seeds to sow. They take the risk of growing them and then we come in to graze them."

Andrew employs an excellent team of four shepherds who look after the sheep on the various parcels of land. They are young (average age of 23) and enthusiastic and they work hard.

"The whole system works incredibly well," says Andrew. "But there is a lot of risk too. There can sometimes be not a lot of return for the effort put in. And as I do not own any of the land, I have to make money without the help of any subsidies. I pay the arable farmers a fee for the number of sheep on the field, paying more in the winter than in the spring.

"I am pleased to be providing a real market for lambs from many upland sheep farmers who cannot finish them. And the arable farmers benefit from having their fields cleared and manured at the same time. I am just the middle-man making it all happen!"



CONCLUSIONS

Encouraging arable farmers to run sheep flocks within their farming system can be a triple win situation:

- They benefit from rejuvenated soils, fewer problem weeds and improved yields from following crops
- Young shepherds are offered the first steps onto the farming ladder and this brings more working capacity and watching eyes onto farms
- Grazing livestock quickly bring life back to the wider countryside

One of the main questions for arable farmers to ask themselves is how much they want to be involved with looking after the animals. Do they want to keep them at arm's length and let other professional stock people do the work? Or can they devise a system where the sheep jobs do not clash with the arable jobs? All systems can be catered for – it just needs thinking about carefully.

Whichever system is chosen – the sheep have to be looked after properly. Even Easycare sheep require a certain level of care.

Before setting up a full-scale sheep enterprise, it is important to investigate the potential markets for the end products, and make sure the farm can produce lambs to the weight and grades required.

Finally, it is important to work out the financial implications of having sheep on the farm.

While margins in the sheep world are as tight as most other livestock farming, sheep on arable systems can offer more than, for example, just the returns from the slaughter lambs. Bear in mind the savings in fertiliser and herbicides and increased yields of subsequent crops, the rental income from the sheep if looked after by someone else, and the possibility of securing new income streams from agri-environment payments.

There is potential investment required in fencing, handling and water provision, although where farmers are working with other sheep farmers, they may bring their own.

For many arable farmers, having sheep back on the farm may be a big step. But with the right business structures and strong working relationships, now might be the time to welcome more mixed farming back into the UK.

CASE STUDY

STEVE TOWNSEND SOILS MANAGEMENT ADVISER, THE SOIL FIRST FARMING

There is a growing movement on arable farms to improve soil health, particularly by reducing tillage to stabilise soil structure and by encouraging soil biology to increase.

“There have also been moves to keep the soil covered with residue and keep as many live roots in the ground from cash and cover crops, for as long as possible throughout the year. Sheep increase the diversity of soil through their excreta and are essentially incubator units producing a biologically active fertiliser. It is very much logic and common sense.

“Begin soil regeneration with no-till methods and crops with a narrow root structure to increase root penetration per square metre, such as mustard and linseed. The next stage can be crop mixtures such as kale and stubble turnips. There are many arable farmers now looking to use livestock as a one to three-year ‘break crop’ that can be rotated around their farms. This offers a tremendous opportunity for sheep farmers to expand or start up in the industry.”



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