

Sheep grazing within arable rotations

The Innovation for Sustainable Sheep and Goat Production in Europe (ISAGE) project contributed to a larger study of the role of sheep in arable rotations in conjunction with Honingham Thorpe Farms, Jack Peacock, Frontier Agriculture and Brown and Co. **Marion Johnson, Lisa Arguile (ORC), Nicola Noble and Wendy Jones (National Sheep Association)** report on lamb growth rates and the effects of different leys.

“They are given the title of the ‘Golden Hoof’, throughout history, as farmers used the sheep to increase fertility of poor ground by allowing them to graze rich fertile land then moving them onto the poor land, so they transferred the nutrients over in their gut and deposited them in their droppings. The soil bacteria and fungi utilise the nutrients held in the droppings to build soil that could then support better crops.” Brian Barker¹



Photo: Marion Johnson

Historically sheep were kept on arable farms to help control weeds within cereal crops. In addition to applying grazing pressure to weeds, their manure provided essential nutrients for the following crop. Following World War II, the drive towards intensification, specialisation and an increased use of machinery led to an increased reliance on artificial herbicides and fertilisers, consequently, phasing out the original need for sheep.

Over the years, intensification has led to the loss of habitats both above and below ground and UK arable soils have experienced a 70% decline in soil carbon since the industrial revolution. The incorporation of diverse swards into a rotation, which have beneficial effects both above and below ground when managed correctly can help promote biodiversity. In contrast to a single species grass ley, diverse herbal leys are associated with complex root and shoot architecture. This complexity reduces soil compaction and increases water filtration rates, in conjunction with the creation of organic matter. Carefully chosen diverse leys provide a broader diet and have a reputation for reducing parasite burden within flocks due to the anthelmintic properties found within certain species.

With the turn of the tide and the current global focus on building soil carbon there is room for sheep to return to arable systems. The environmental benefits of mixed farming systems are well known, and the opportunity for facilitating benefits within arable systems is not to be forsaken. With little evidence and a lot of uncertainty, current adoption rates are low despite the promotion of the benefits by national advisory boards. By considering sheep

in arable from the perspective of both the arable farmer and the sheep farmer, this study aimed to assess the benefits of reintroducing livestock into arable rotations.

Honingham Thorpe Farms

Honingham Thorpe Farms are a mixed farming and contracting business based five miles west of Norwich. The farm has a rich and diverse cropping background but at present focuses on contracting and a simple cropping system. The Honingham Thorpe business is extremely keen to explore ‘shared’ farming models “where the landowner seeks to share the benefits of spreading costs and the most up to date technology”. The estate has also diversified into several smaller businesses including livery, potato storage and a food enterprise park.

Two flocks of Cheviot cross ewes and their twin lambs (Cheviot cross x Beltex) were grazed on either a herbal ley or a grass-clover ley. Lamb weight gains and parasite burdens were measured to see if herbal leys provided a benefit to the livestock. Pasture performance and soil characteristics were assessed to consider any benefits accruing to the arable system.

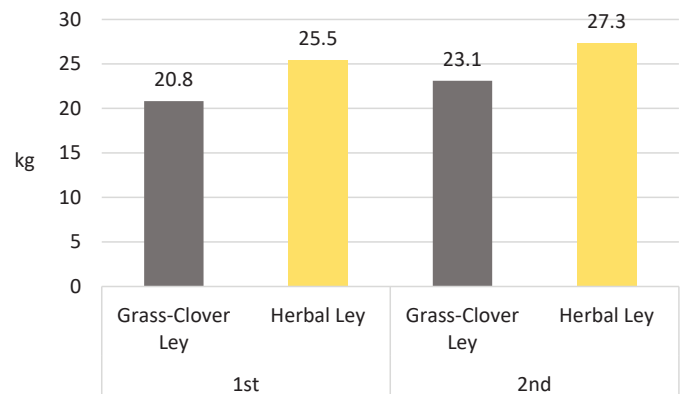


Figure 1: Average lamb weight at 1st and 2nd weighing in relation to grazing regime

Livestock performance

The average weight of lambs reared on the herbal leys was greater than those reared on grass/clover leys, supporting previous research. Faecal egg counts (FECs) were lower in the lambs grazed on the herbal ley than on the grass/clover.

Arable impacts

Initial establishment across both leys was poor, due to drought conditions during the early summer of 2018. On inspection the herbal mixture had a higher plant population and incorporated fewer weeds than the grass/clover mixture. Dry matter (DM) measurements taken in March 2019 following over-sowing were similar in both pastures, however from April the DM yield of the herbal ley was greater than the grass/clover mixture.

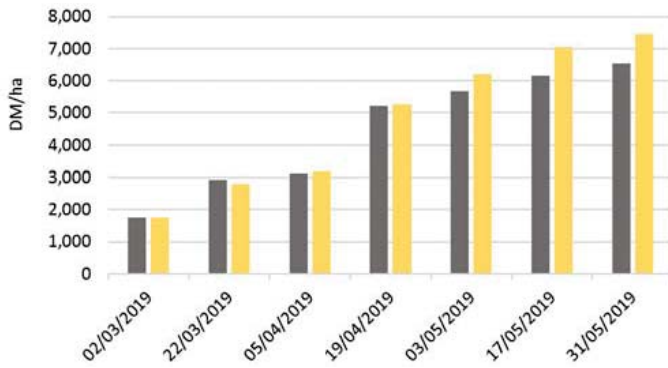


Figure 2: Estimated grass yield across pasture (kg DM/ha)

Herbal leys had deeper rooting systems than the grass/clover mixtures. Worm activity was recorded as low within both mixtures.



Herbal ley 2019 recovery

Sheep and arable relationships

All joint enterprises of this nature should be thoroughly investigated, and careful contracts drawn up, preferably with experienced advice and a clear understanding of expectations on both sides. For many arable farmers finding an experienced stockperson is difficult and sheep farmers may struggle with contract lengths and uncertainty of grazing. Attention must be paid to requirements for fencing, water and animal welfare. In this study the sheep had to be removed from the pasture as feed ran out in the drought; fortunately an alternative was available, but this may not always be the case. Provision should be made for as many unexpected events as possible when entering sheep-arable arrangements.

Conclusions

Integrating sheep into arable rotations is beneficial for arable farmers, helping to reduce weeds and improve soil fertility and quality. Sheep farmers benefit from clean grazing and if herbal leys are available good growth rates and lower rates of parasitism can be expected.

Reference

1. Barker B (2019) <https://cereals-blog.ahdb.org.uk/the-return-of-the-golden-hoof/>



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100% organic conversion – greenhouse gas (GHG) impacts

A 100% shift to organic farming in England and Wales would yield up to 40% less food if the nation did not change its diet, leading to increased imports and a net increase in GHG emissions, researchers have found. The study, published in *Nature Communications* was principally conducted by Dr Laurence Smith, whilst at Cranfield University (now of the Royal Agricultural University) and supported by ORC, with Professor Guy Kirk and Dr Adrian Williams of Cranfield University and Philip Jones of Reading University. Although organic farming generally creates lower GHG emissions per commodity, up to 20% lower for crops and 4% for livestock, it also produces less food energy output per hectare. Assessing the need for imports to make up the shortfall, and assuming that food diets and demands stay the same, the academic team estimated that the overseas land area needed to be changed to food production for England and Wales would increase by a factor of five. This additional land would likely be of sub-optimal quality and therefore not as productive as higher-quality land. Laurence Smith commented: "Although resource use can be improved under organic management, there is a need to consider the potential effect on land-use. Under a 100% organic scenario in England and Wales, a net-reduction in greenhouse gases would only be achievable if accompanied by a major increase in organic yields or widespread changes to national diets."

There has been considerable reaction to the paper and the headlines it has generated in the press. Criticism from organic commentators includes that it lacks a holistic perspective of what is needed to transition toward sustainable food systems, e.g. tackling food waste, diets and structural issues of our food system. Roger Kerr, OF&G Chief Executive and ORC Council member said: "Although the research recognises the benefits an organic system brings to soils and biodiversity, it fails to take a joined-up approach, which has proved to be great fodder for the advocates of 'business as usual' - something the IPCC and the UN have agreed is no longer an option."

Innovations to improve sustainability in the sheep and goat sector

The Horizon 2020 project iSAGE (Innovation for Sustainable Sheep and Goat Production in Europe) concluded their UK training and workshop week on the 6th December after four days of presentations discussing the European sheep and goat industry, in conjunction with a field trip to Yorkshire Dairy Goats. A collective audience of students, farmers, vets, academics and industry members facilitated constructive discussions surrounding the projects outputs and the future sustainability of the Industry. ORC presented findings from research into supply chain, sustainability and on-farm innovation providing greater detail on the current functioning of the industry with the hope of supporting policy recommendations in the near future.