

Farming Connect Management Exchange

Catherine Nakielny

UK July-August 2019

Ireland November 2019

Spain December 2019

How actions which deliver ‘public goods’ can also be used to improve the productive capacity of a sheep farm and to improve business resilience

Background and introduction

Having grown up on a sheep farm in west Wales, I now work as an independent sheep adviser and I have to admit that I have a passion for the species. Sheep are amazing animals, delivering food and fibre from land that cannot be used for producing other sources of protein and calories for human consumption.

However, as much as I promote and defend the sector, it’s important that in the future, sheep farming can be seen to work in tandem with the environment and to meet government and consumer demands for the delivering of ‘public goods’, as well as food production. A quick Google search (Dec 2019) shows a number of articles viewing sheep as a destructive force to biodiversity and contributing to climate change.

www.spectator.co.uk › 2013/06 › meet-the-greatest-threat-to-our-cou... ▼

[Meet the greatest threat to our countryside: sheep | The ...](#)

29 May 2013 - **Sheep** have done more damage to **Britain's environment** than all the ... Given its remarkably low output, it's possible that hill **farming** creates a ...

www.standard.co.uk › Lifestyle › Wellness › Nutrition & gut health ▼

[which foods have the highest and lowest environmental ...](#)

12 Jul 2019 - **So** how can we minimise our diet's impact? ... **Lamb** is more **damaging for the environment** than beef (Photo by Sara Dubler on Unsplash) ...

www.theguardian.com › environment › georgemonbiot › may › britai... ▼

[Why Britain's barren uplands have farming subsidies to blame ...](#)

22 May 2013 - A farmer can graze his land to the roots, run his **sheep** in the woods, ... uplands there is an even faster average rate of **loss** (65% of **species** are ...

Are they right? No, but unfortunately there are challenges when it comes to sustainable sheep farming in Wales. Over-grazing from sheep will reduce wildflower numbers and they can contribute to increased speed of water run-off from land during periods of high rainfall. Without some consideration to land management decisions, sheep-only farming can also reduce biodiversity as the range of habitats is reduced.

So, what are the options when wanting to:

- a) Farm sheep profitably,
- b) Increase biodiversity, reduce carbon footprint and provide 'public goods',
- c) Promote lamb as a sustainable source of protein and calories to consumers,
- d) Combat the negative headlines associated with sheep farming in Wales?

This question led to the aim of completing this Management Exchange: how actions which deliver 'public goods' can also be used to improve the productive capacity of a sheep farm and to improve business resilience. I spoke to a range of organisations throughout the UK and also travelled to Ireland to look at how collaborative farming on a catchment scale can deliver public goods. Finally, I visited Spain to get a better understanding of the environmental and societal challenges facing the sheep farming industry.

What are public goods?

According to the Collins English Dictionary, public goods are defined as *'services such as national defence, law enforcement, and road building, that are for the benefit of, and available to, all members of the public'*.

According to a paper produced by the Institute for European Environmental Policy (Provision of Public Goods through Agriculture in the European Union), there are a wide range of public goods associated with agriculture. These include:

- agricultural landscapes
- farmland biodiversity
- water quality
- water availability
- soil functionality
- climate stability (greenhouse gas emissions)
- climate stability (carbon storage)
- air quality
- resilience to flooding and fire
- food security
- rural vitality
- farm animal welfare and health

Ecosystem services is another term linked to sustainable sheep farming. According to the Collins English Dictionary, ecosystem services are defined as *'the important benefits for human beings that arise from healthily functioning ecosystems, notably production of oxygen, soil genesis, and water detoxification'*.

In practice and when related to livestock production in Wales, the two terms are often used interchangeably and therefore this report can be considered to describe the opportunities to address both 'public goods' and 'ecosystem services' in terms of improving the productive capacity of a sheep farm and to improve business resilience.

A positive message from considering the positive outputs of sheep farming on delivering public goods and ecosystem services is the range of potential benefits provided by sheep farming. Speaking with

researchers in Spain, the relationships between agriculture and these services were described using the following diagrams.

Figure 1. Valuation and payment for ecosystem services of sheep and goats

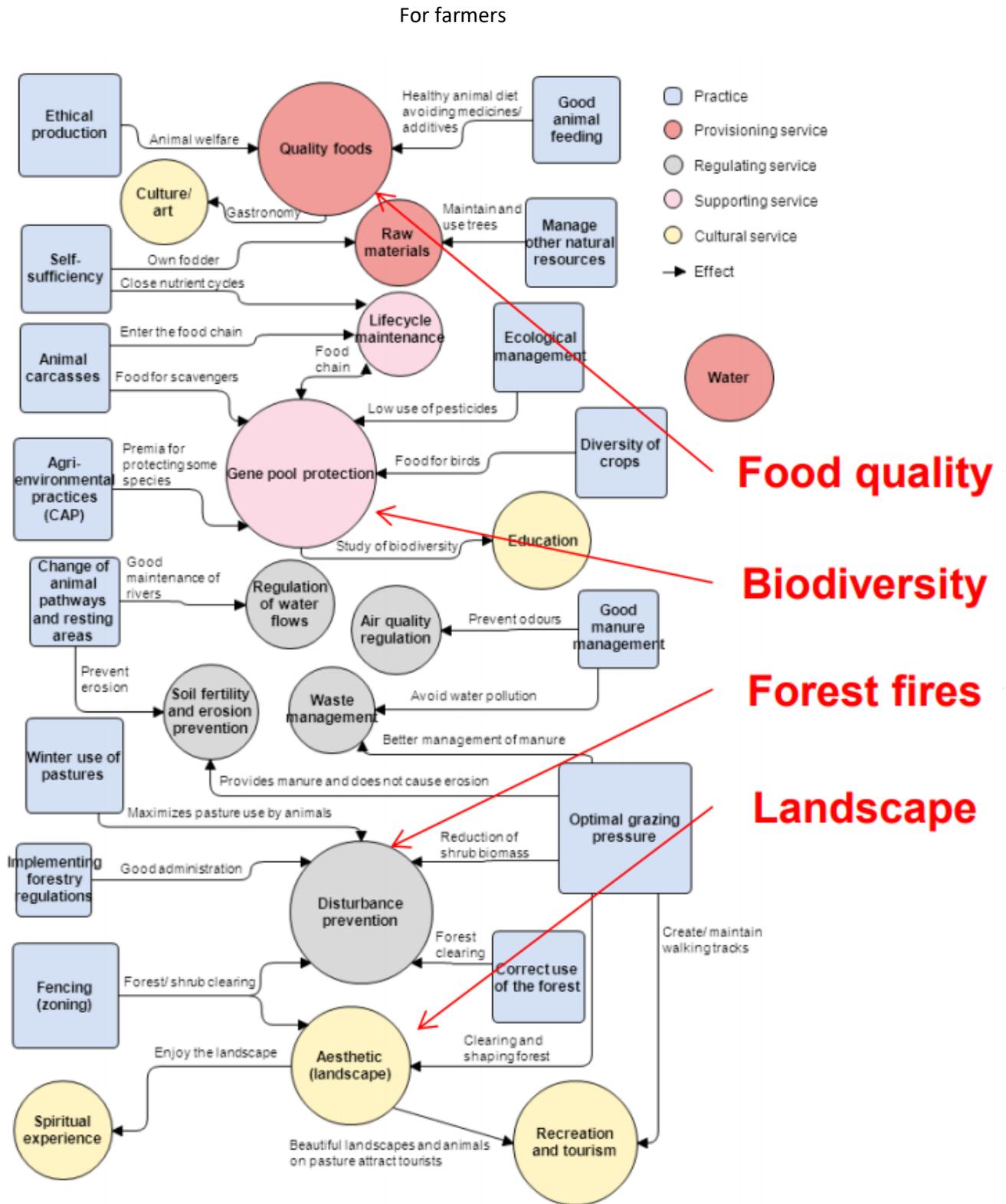
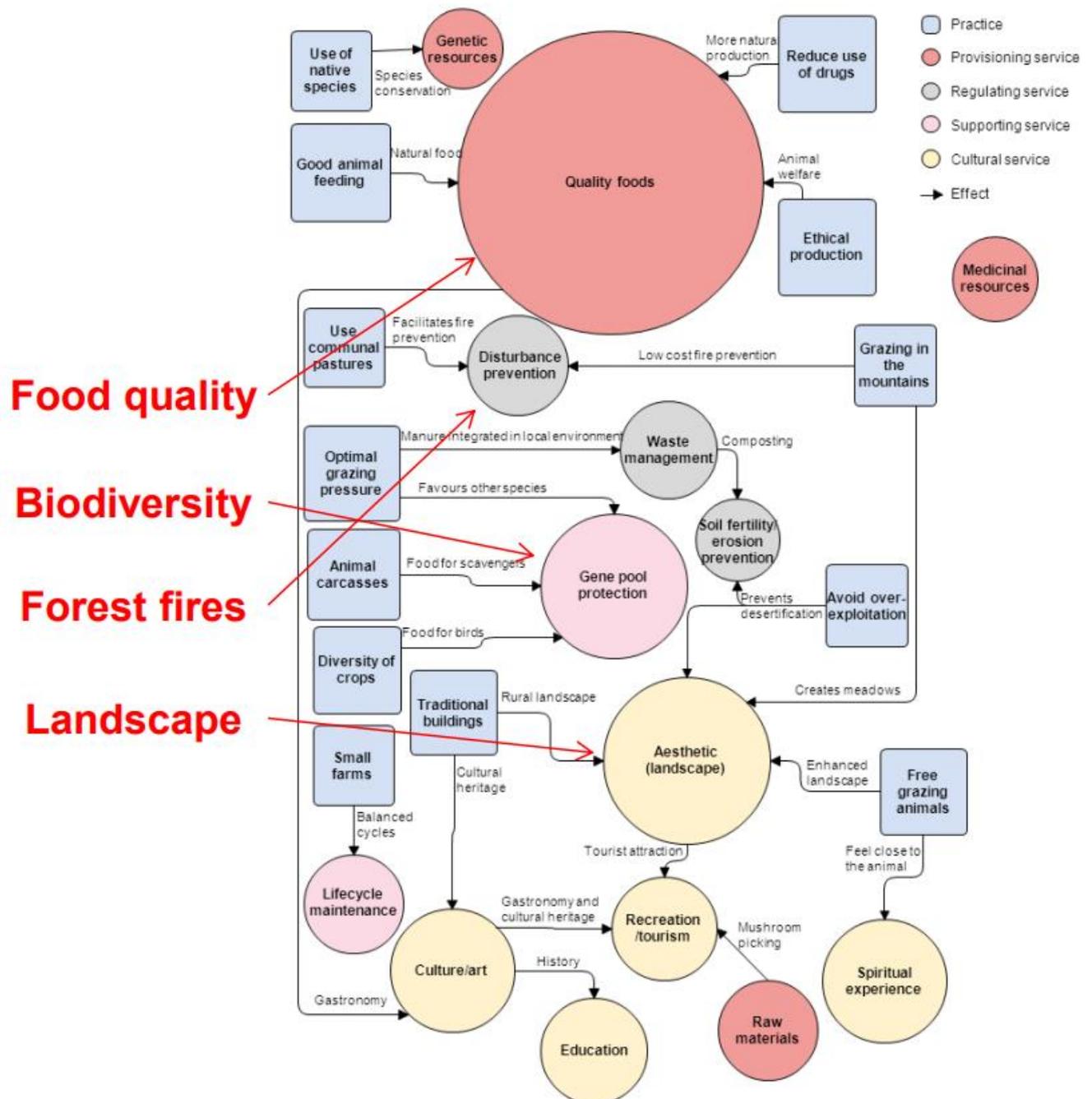


Figure 2. Valuation and payment for ecosystem services of sheep and goats
For consumers and society



Information gained



Figure 3. The Mediterranean Agronomic Institute of Zaragoza (Spain)

Travelling within the UK and then to Ireland and Spain meant that lots of information was gained on how different farming systems and different countries can deliver public goods and ecosystem services. Focusing on actions which also delivered improvements to economic viability and business resilience does however allow a more focused approach to describing just some of the knowledge gained and recommendations made. This report will therefore focus on the 'big three'.

1. Better grass management

With many parts of the UK and the whole of Ireland being well suited to growing grass, this was the focus of these visits and the term 'grass' in this instance also includes non-ryegrass forage species along with a variety of herbal species.

The three big opportunities for better 'grass' management are:

1. Using diverse 'grass' species including herbs, non-ryegrass varieties such as Timothy and introducing and looking after white and red clovers
2. Soil testing to optimise any nutrients used
3. Rotationally graze to increase the quality and quantity of dry matter grown in a given area

The environmental benefits of better 'grass' management include:

1. More flowering species that provide food and nectar for bees and a range of other invertebrates
2. More efficient use of fertilisers (if needed at all) to reduce risks of diffuse pollution
3. Higher animal performance from a given area of land, which in turn, allows more flexible management of habitat land

The business benefits of better 'grass' management include:

1. A diverse sward able to cope with extreme weather conditions
2. A more balanced energy and protein balance of the diet consumed to help increase lamb growth rates and ewe performance
3. Reduced land area needed to farm a given number of sheep, leading to reduced capital costs (e.g. land rented) and/or access to 'payments for ecosystem services' for an increased area of land
4. Increased efficiency of nutrient use and reduced fertiliser costs*
5. Reduced feed costs with reduced reliance on concentrate feeds and supplements*

* There are more than three business benefits of better 'grass' management!

2. Planting more trees

The future of farming in the UK can't escape conversations about tree planting. The good news is that it is possible to significantly increase the number of trees in Wales without reducing the area of productive land for food production.

The three big opportunities for tree planting are:

1. Introducing small copses in the corner of fields
2. Planting land with challenging grass growing conditions e.g. wet, steep or shallow soils
3. Introducing individual 'specimen' trees into fields

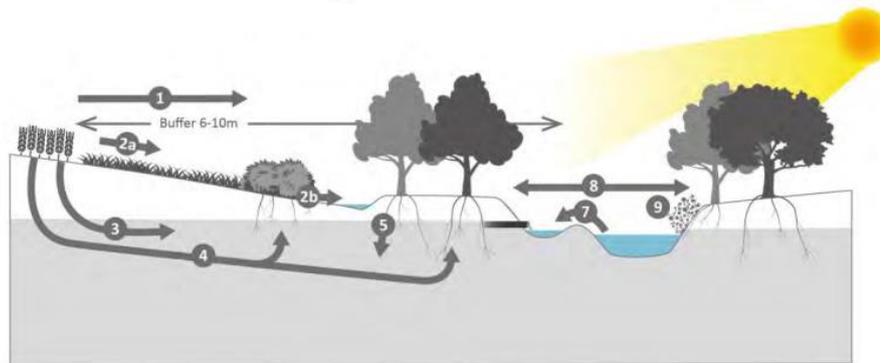
The environmental benefits of planting more trees include:

1. Improved diversity of habitats offered to wildlife
2. Carbon sequestration and storage
3. Improved water and nutrient retention

The business benefits of planting more trees include:

1. Reducing input costs on land with limited production potential
2. Improved shelter for stock, particularly during lambing
3. A potential for diversified income either through grant payments or future harvesting

Elements of 'designed' structure



- | | |
|----------------------------------|---|
| 1 Interception of spray drift | 6 Interception of soil artificial drainage waters |
| 2 Surface runoff control | 7 Altered bank profiles |
| 3 Within-soil processing | 8 Interactions between terrestrial and aquatic ecosystems |
| 4 Nutrient uptake into biomass | 9 Bank stabilisation |
| 5 Increasing soil organic matter | 10 Riparian shading |

Figure 4. Trees as part of the buffer zone solution (James Hutton Institute)

Tree planting

- Mainly native broadleaved trees
Can use fast-growing biomass species
- Needs design, establishment time and management



Riparian alder for stream shade, NE Scotland



Riparian wooded buffer, U.S.: USDA, Environmental Quality Incentives Program (EQIP)

Willow riparian SRC systems in Canada: <https://cfs.nrcan.gc.ca/projects/134/2>



Figure 5. Types of trees used as part of the buffer zone solution (James Hutton Institute)

Integrated buffer designs



See: Zak, Stutter, Kronvang et al (2019) A review of the multi-functionality of integrated buffer zones in Northwest Europe. JEQ. 48: 362-365.

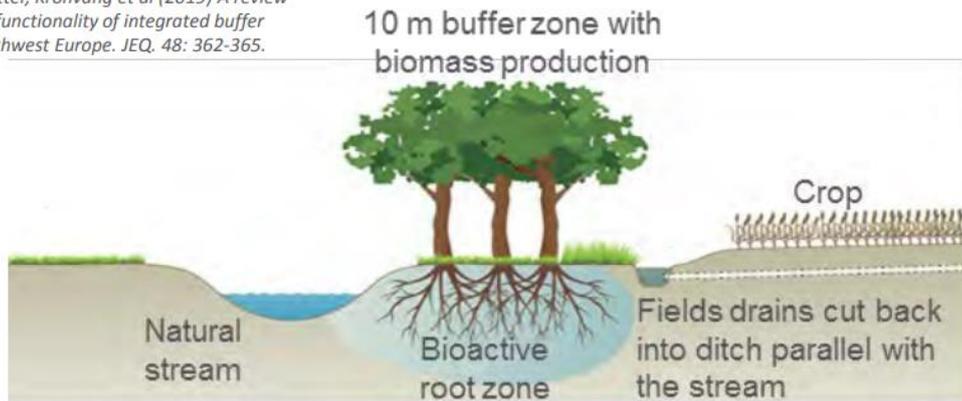


Figure 6. Integrated buffer design (James Hutton Institute)

3. Working together on a catchment scale

One of the clear messages from both visits to Ireland and Spain was the need for farmers to work together.

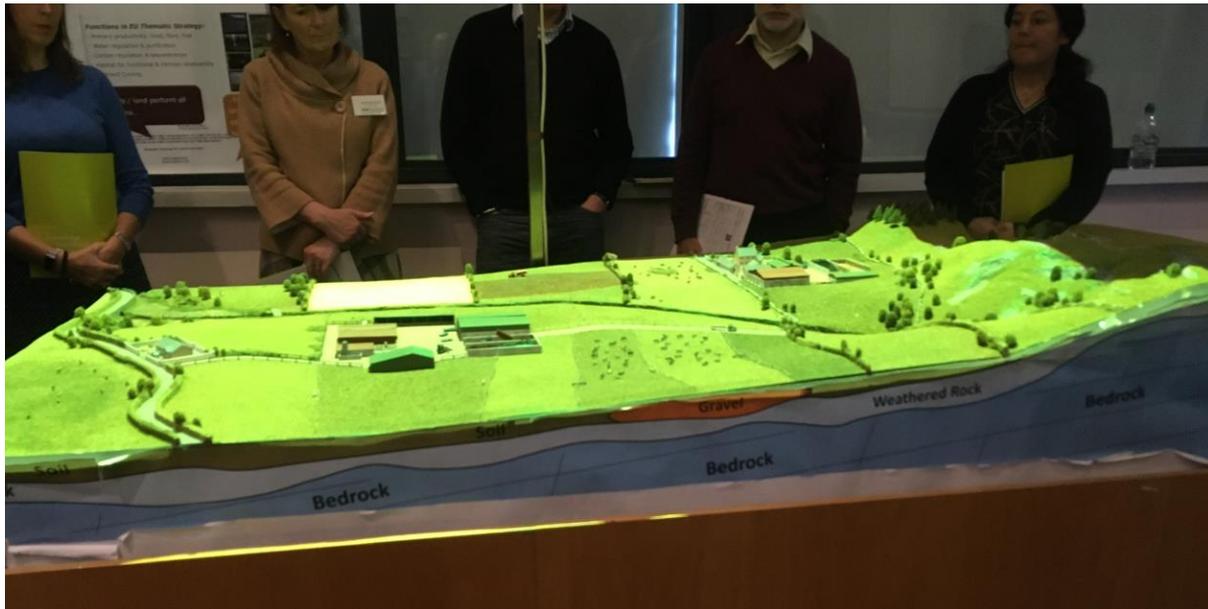


Figure 7. An exercise in small scale catchment management in Ireland

Working at catchment scales



HEADWATERS with a stronger focus on diffuse pollution and riparian-channel physical diversity

Narrow, continuous buffers everywhere have limited natural process functioning

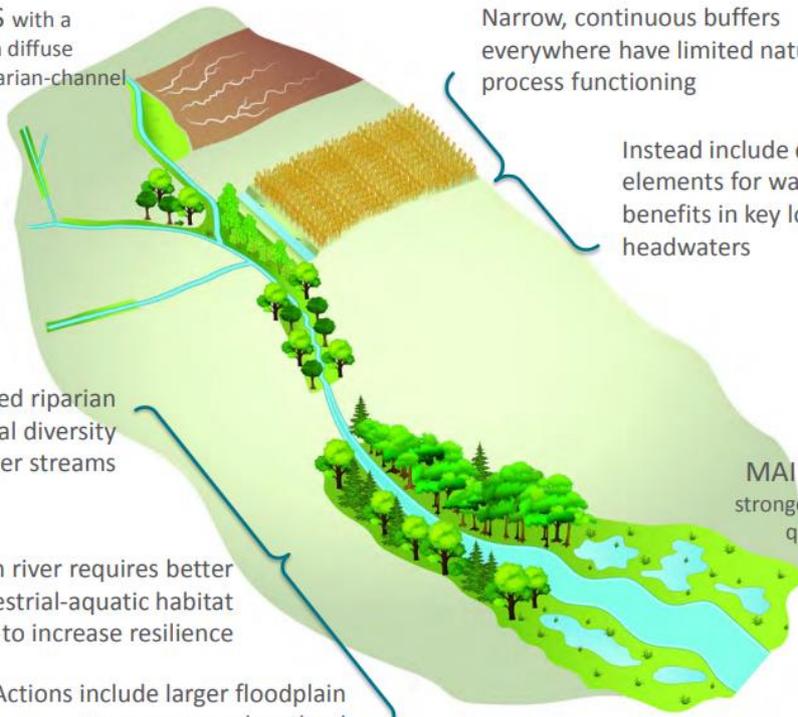
Instead include designed elements for water quality benefits in key locations in headwaters

Increased riparian structural diversity benefits larger streams

MAIN RIVERS with a stronger focus on habitat quality and linkages

Down river requires better terrestrial-aquatic habitat connectivity to increase resilience

Actions include larger floodplain measures and wetland reconnection



Stutter, Kronvang, Ó hUallacháin, Rozemeijer (2019) JEQ 48, 236-247

Figure 8. Working at catchment scales (The James Hutton Institute)



Figure 9. A large lamb finishing cooperative in Northern Spain

The three opportunities for working together on a catchment scale are:

1. Neighbouring farmers and landowners working together to deliver a wider range of habitats and on a bigger scale
2. Tackling water management so that upstream landowners can help reduce the risk of downstream flooding
3. Introducing individual 'specimen' trees into fields

The environmental benefits of working on a catchment scale include:

1. Improved scale of habitats offered to wildlife in a given area
2. Improved water quality
3. Improved water and nutrient retention

The business benefits of working on a catchment scale include:

1. Reduced risk of animal disease through testing, coordinated treatments and better biosecurity
2. Possibility of sharing resources to reduce both variable and fixed costs
3. A potential for diversified income either through local marketing or branding



Figure 10. The value of good marketing of 'ham' (Madrid Airport)

Key messages to the industry

There are a number of messages for the industry, and the main ones can be best described as the following:

1. Focus on good grassland management

This will deliver the following ecosystem services:

- Agricultural landscapes = tourism ✓ social wellbeing ✓
- Better water management = improved biodiversity ✓ more cost-effective provision of drinking water ✓ reduced risk of flooding ✓
- Farmland biodiversity = tourism ✓ social wellbeing ✓ improved reputation of farmers and livestock farming
- Soil functionality = better crop production ✓ reduced greenhouse gas emissions ✓ improved carbon storage ✓
- Food security = better societal health ✓
- Rural vitality = more profitable sheep farms ✓
- Farm animal health and welfare = improved reputation of farmers and livestock farming ✓ more profitable sheep farms ✓

2. Use trees and woodland to improve shelter for sheep and lambs

This will deliver the following ecosystem services:

- Agricultural landscapes = tourism ✓ social wellbeing ✓
- Better water management = improved biodiversity ✓ more cost-effective provision of drinking water ✓ reduced risk of flooding ✓
- Farmland biodiversity = tourism ✓ , social wellbeing ✓ improved reputation of farmers and livestock farming ✓
- Soil functionality = better crop production ✓ reduced greenhouse gas emissions ✓ improved carbon storage ✓
- Food security = better societal health ✓
- Rural vitality = more profitable sheep farms ✓
- Farm animal health and welfare = improved reputation of farmers and livestock farming ✓ more profitable sheep farms ✓

3. Work together for catchment scale management

This will deliver the following ecosystem services:

- Agricultural landscapes = tourism ✓ social wellbeing ✓

- Better water management = improved biodiversity ✓ more cost-effective provision of drinking water ✓ reduced risk of flooding ✓
- Farmland biodiversity = tourism ✓ social wellbeing ✓ improved reputation of farmers and livestock farming ✓
- Soil functionality = better crop production ✓ reduced greenhouse gas emissions ✓, improved carbon storage ✓
- Food security = better societal health ✓
- Rural vitality = more profitable sheep farms ✓
- Farm animal health and welfare = improved reputation of farmers and livestock farming ✓ more profitable sheep farms ✓

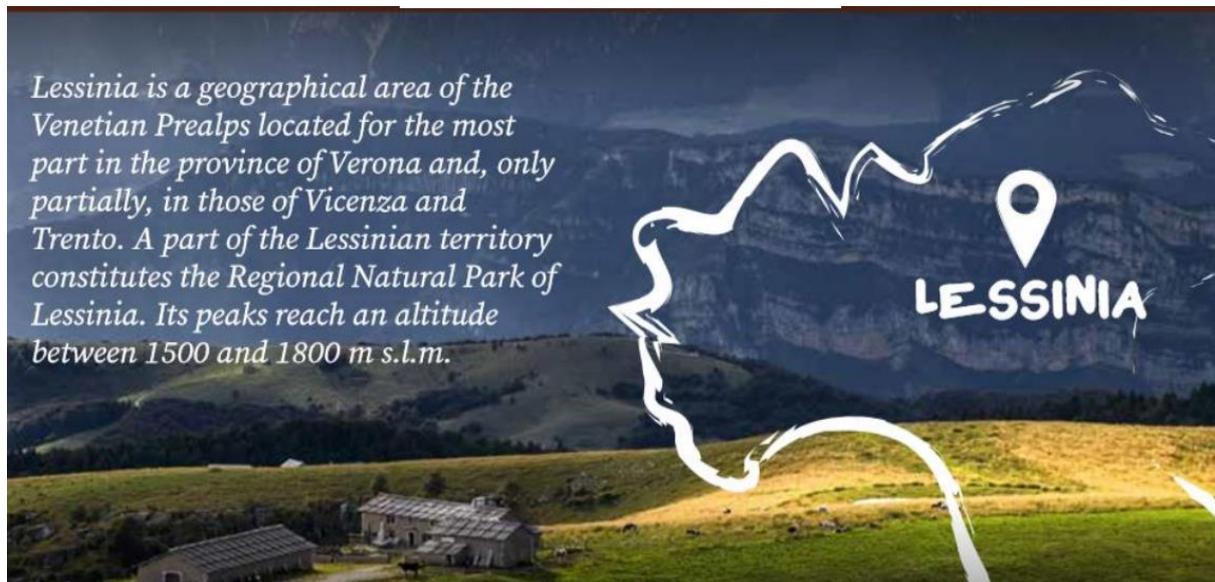
** The repetitive list of the benefits shown above is deliberate. Individual actions can deliver multiple benefits and by putting a value on these gains, the profitability and long-term outlook for sheep meat production will be improved **



Figure 11. A Spanish Chef demonstrating how to use lamb in a quick ready to eat form

Case Study 1: implementation of an innovative strategy for the sustainability and viability of the Brogna Sheep (Lessinia, Verona)

Antonio Compagnoni, Marcello Volanti (ICEA) Raffaele Zanolì (UNIVPM)



THE BROGNA SHEEP ASSOCIATION

The Brogna Sheep Association is a supply-chain local association including farmers, butchers, restaurants, processor, consumer and experts, cantered into the recovery of an old breed multipurpose (meat, milk and wool) and its strong territorial approach in the Lessinia mountain.

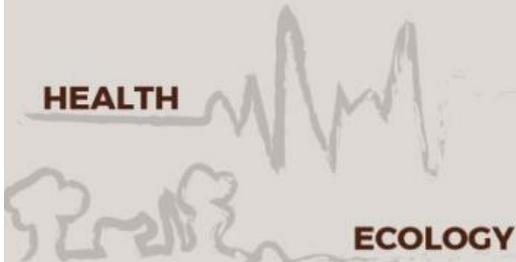


SCOPE AND PRINCIPLES OF THE STANDARD

Food and non-food identification with brand

Respect of Organic Agriculture principles (IFOAM):

HEALTH



ECOLOGY

FAIRNESS



CARE

WHAT IS P.G.S.

"Participatory Guarantee Systems (PGS) are locally focused quality assurance systems. They certify producers based on active participation of stakeholders and are built on a foundation of trust, social networks and knowledge exchange."

TRUST

SHARED VISION

TRANSPARENCY



LEARNING PROCESS

PARTICIPATION

Art. 7



USE OF THE BRAND

Stakeholders who request it: verified by P.G.S., commitment to contribute to costs

Art. 8

P.G.S.

- control system implemented locally : trust, social networks and knowledge exchange (Ifoam 2008)
- guarantee committee nominated by the association: a breeder, a restaurateur, a technician, a processor, a consumer (Slow Food local chapter)
- prepares the regulation for the controls and organizes and its implementation

Potential of the innovation to enhance farm sustainability

- The model development of the Brogna Sheep Association, being a multi-stakeholder and locally based organization, helped defining and implementing an innovation that reinforce and promote outside the reliability of the association in the promise of delivering a clear direction toward farm sustainability enhancements.

- In the side of the **environment**, through:

- **Maintaining and increasing Biodiversity:**

- a) ancient and endangered sheep breed
- b) marginal lands meadows in hill and mountain territories (mostly in protected park)
- a) traditional geographical and cultural landscapes.



Potential of the innovation to enhance farm sustainability

In the side of **economics**, and the **social** one:

- **Increasing farm welfare, both in the economical-financial dimension and in the social one.** With adding value at farm level, (more processing and direct sales) improving short supply chain and integrated supply chain opportunities. With offering more opportunity of connection to the farmers to the local communities and the city as well.



More opportunities offered to the whole territory for increased visibility and attraction of tourism and contrasting abandon of rural areas.

Another value that the innovation is helping demonstrate is **Animal welfare**, guaranteeing the respect of the rues that requires most of their feeding based on grazing and grass/hay, most of the year in meadows moving from lower lands to mountain ones.



Limitations

- Economical means of the association are limited, not allowing for an adequate communication campaign; possibly the expected success of the implementation of the innovation and its diffusion, would allow the system to better finance itself.

Drivers and constraints for a successful implementation of the Innovation

- The innovation will be successful if it is well communicated to consumers, adopted by more restaurants and processors.
- Possible involvement and support by local public administration (from Region to Park and Municipalities) will be a relevant factor.
- A critical point is the full adoption of the standard by the farmers, especially on the lamb weight, since currently not all farmers are doing so.
- Another critical point is the limited size of the association, it the project will be successful, especially on the adequate availability of meat it would need to increase the numbers of animals.



Case Study 2: the development of a ‘public goods’ (PG) tool which aims to describe sustainability in its broadest terms, not just in relation to Carbon Footprint. Developed through an Europe-wide project, Innovation for Sustainable Sheep and Goat Production in Europe (iSAGE)

Marion Johnson, Chiara Tuoni, Lisa Arguile | ORGANIC RESEARCH CENTRE Nicola Noble | NSA

What is the PG Tool?

- Multi criteria, analysis based assessment
- Immediate results
- Mixture of quantitative and qualitative indicators
- Simple programming in Excel-spreadsheet

Non weighted averages

Public Goods ‘spurs’

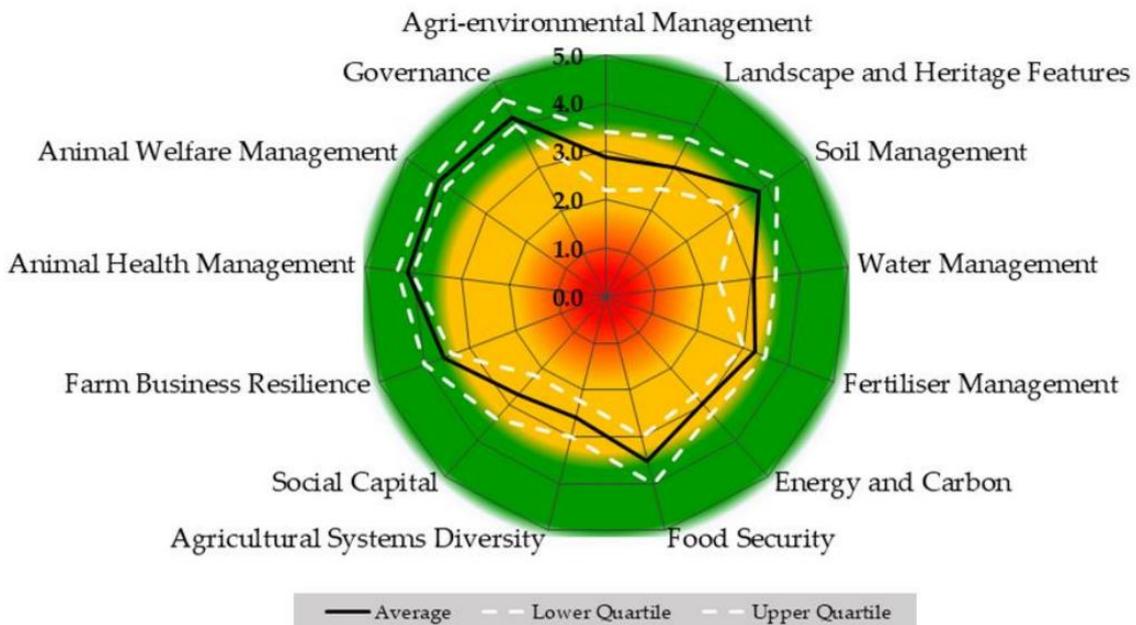
Environmental integrity	Social wellbeing	Economic resilience	Good governance
<ul style="list-style-type: none">• Agricultural Systems Diversity• Agri-Environmental Management• Animal Health Management• Animal Welfare Management• Energy and Carbon• Fertiliser Management• Soil Management• Landscape and Heritage Features• Water Management	<ul style="list-style-type: none">• Social Capital	<ul style="list-style-type: none">• Farm Business Resilience• Food Security	<ul style="list-style-type: none">• Governance

How does it work?

- Farmers answer questions associated with the 13 spurs
- Each answer is ranked on a **1-5 scale**, cumulatively generating an overall average for each spur
- The results are presented in a radar diagram



Spanish PG Tool Results





1. SIGNPOSTS TO SUSTAINABILITY – results summary

Environmental Integrity						
Soil	Erosion	Red	Compaction	Green	Quality	Red
Water	Use	Red	Availability	Red	Water Quality	Red
Atmosphere	Direct pollutants	Green	Indirect pollutants	Red	Management of pollutants	Red
Farmland Biodiversity	Flora and fauna	Green	Diversity of production	Green	Trees and hedgerows	Green
Cultural and Heritage	Historical features	Red	Genetic diversity	Red	Traditional livestock management	Red
Environmental Management	Conservation plans	Green	Ecosystem connectivity	Green	Ecosystem enhancing practices	Green
Fertiliser	Soil testing	Green	Fertiliser plan	Green	Nutrient balance	Red
Energy and Carbon	Renewable energy	Red	Vehicles	Red	Carbon	Red
Waste Management	Recycling	Green	Reducing	Green	Hazardous products	Green
Livestock						
Flock	Breed	Red	Body Condition Score	Red	Replacements	Red
Health Plan	Health plan	Green	Antibiotics	Green	Parasites	Green
Disease Incidence	Flock/herd health	Green	Quarantine	Green	Proactive management	Green
Feeding Systems	Intensive systems	Red	Concentrates	Green	Forage	Green
Housing Characteristics	Condition of housing	Green	Space	Green	Water Availability	Red

Conclusion

There is no downside to delivering many of the public goods/ecosystem services that are currently being asked of sheep farmers in Wales. Many of the changes required can be linked to tangible increases in both the profitability and resilience of Welsh farming businesses.

The challenge for farmers and industry organisations will be to develop a system whereby sustainable lamb production can be measured, marketed and potentially branded.

In the meantime, there are many opportunities to further understand the link between providing public goods and ecosystem services and maintaining a profitable and resilient sheep farming business.

The top five recommendations from this Management Exchange are therefore to:

1. **Understand the role of good grazing management and rotational grazing on carbon sequestration and storage**
2. **Develop easy-to-implement schemes for small-scale tree planting which provides benefit to livestock and the environment**
3. **Identify systems for buffer strips using a range of vegetation types and tree planting**
4. **Support and foster collaborative schemes which help deliver catchment management and associated improvement in the efficiency of farming systems**
5. **Help develop branded marketing opportunities based on a combination of public goods, provenance and support for rural vitality**