



EIPWALES

Cydweithio er ffyniant gwledig
Collaborating for rural success

EIP Wales

Collaborating for rural success

Winter 2018





eip-agri
AGRICULTURE & INNOVATION

EIP – A new approach to innovation

The European Innovation Partnership for Agricultural productivity and sustainability (EIP-AGRI) was launched by the European Commission in 2012. It aims to foster a competitive and sustainable agriculture and forestry sector that *“achieves more from less.”*

Menter a Busnes delivers the EIP Wales scheme on behalf of the Welsh Government, and has received funding through the Welsh Government Rural Communities – Rural Development Programme 2014-2020, which is funded by the European Agricultural Fund for Rural Development and the Welsh Government.

What is EIP Wales?

The aim of EIP Wales is to solve common agricultural and forestry problems by bringing people from practical and scientific backgrounds together.

Each project can access up to **£40,000** and can run for a maximum of **3 years**.

It's an opportunity for farmers and foresters to put their ideas into practice by testing new technologies or techniques.



The Requirements

The project must be **innovative** and be looking to tackle on **farm problems**. The results should benefit the wider agricultural and forestry sector. It should be looking to further apply the outcomes of primary research.

Each project group must contain:

- At least two farmers or foresters from separate businesses registered with Farming Connect.
- At least one additional ‘non-farmer’ member which could be a researcher, advisor, academic, non-governmental organisation or agri / forestry business member.

Innovative Projects

EIP Wales is eager to fund 45 projects in Wales by 2023.

The main focus of projects:

- Technical solutions to increase productivity or resource efficiency
- Ecosystem services
- Soil functionality
- Water management
- Integrated supply chain solutions
- Benchmarking and managerial innovation for producers
- Development of new food quality and livestock health care schemes

The Importance of Innovation

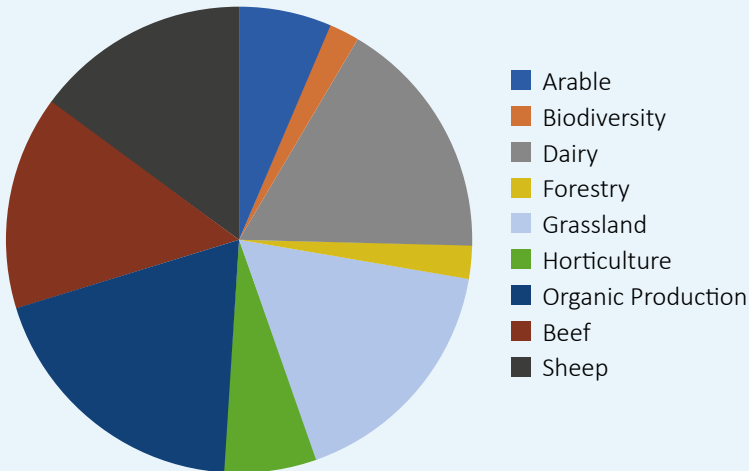
With many unknowns about the future of agriculture in the UK after March 2019, EIP Wales offers the chance for farmers and foresters to invest in what is known, the knowledge and innovation that has come from research, to ensure long-term productivity.

“Farmers often think that innovation must be something ‘technical’ or complicated but in fact it is often the simplest concepts that are the most successful. It could be a technique or technology that’s proven in one sector, or in other parts on the world, but could be of benefit in another sector.”

Owain Rowlands, EIP Wales Officer
















EIP Wales is excited to work with such novel projects that are looking to tackle a variety of issues facing the agricultural and forestry sector.

Themes covered by the approved projects



Our project locations



- | | | |
|--|---|--|
|  Reducing Antibiotics |  Alternative Forages |  Robotic Weeder |
|  Cambrian Beef |  Organic Asparagus |  Night Milk |
|  Low Impact Forestry |  Potato Blight |  Omega-3 |
|  Squill |  Dock Control |  Foliar Feed |
|  Genomic Testing |  Pasture for Pollinators |  Trace Elements |

Reducing antibiotic use on sheep farms at lambing time through best practice management, by improving nutrition and hygiene



The global burden of antimicrobial resistant infections is growing and poses a serious threat to human and animal health. This project is making changes to flock management, mainly through improved nutrition and hygiene, to reduce the need for antibiotics and at the same time increase production, while maintaining high standards of animal health and welfare. It also provides a safe and healthy food supply when there are concerns that food producing animals may contribute to the development of human antibiotic resistance.

There is potential for global targets to be put in place to reduce antibiotic use in treated livestock, to an agreed level for each country. There is also likely to be restrictions on usage in livestock of those antibiotics that are critically important for human health. Taking measures now to reduce antibiotic use will make it easier to manage when these targets are applied.

Project aims

- Promote responsible use of antibiotics to maintain the effectiveness of drugs and control costs
- Increase farmer confidence in ration formulation and management practices, reducing prophylactic use of antibiotics at lambing time while maintaining and improving health and welfare
- Improve nutrition and management practices in order to improve vigour, reduce mortality and reduce investment in finishing
- Empower the next generation of farmers to adopt alternatives to the use of antibiotics, helping them become more resilient

Activity and findings after 2018 lambing season

Silage Quality

TARGET: DM 30-35%

D-value 69-72%

ME 11-11.5 MJ/kg DM

CP 15-18%

Rations were formulated for each flock based on individual silage analysis

Colostrum Intake

Generally lambs were receiving adequate levels of colostrum apart from a couple of lambs

Management processes were assessed to check reasons why these lambs had not received enough

Bedding Sampling

Samples taken from pre-lambing pen, post lambing pens + pet lamb pens

Farmers could assess levels of bacteria including; Staphylococcus, Streptococcus and E.Coli, and adjust pen management if levels were high

Metabolic Profiling

Undertaken 2-3 weeks pre lambing

Energy levels were good, indicating that rations were correctly formulated

Low albumin levels were found indicating a recent disease challenge. This was investigated and showed various issues including fluke, roundworms and cryptosporidiosis

Outcomes so far:

The tests and subsequent advice enabled farms to alter management and improve nutrition and health of ewes + lambs

Prophylactic use of antibiotics at lambing was reduced

There was a reduced incidence of joint ill and scours



Innovation Broker: Emma Jones (ADAS)

Developing the Cambrian Mountains Beef group to manage and expand their short supply chain

Short food supply chains occur when farmers sell their produce directly to consumers or with minimal intermediaries. They are becoming increasingly more popular as consumers want fresh, seasonal produce and want to know where their food comes from. They represent an alternative to conventional longer food chains where small farmers often have little bargaining power and the consumer cannot trace the food to a known producer or local area.



In 2015, the Cambrian Mountains Beef Group established a successful, short supply chain with a large catering butcher who supplies hotels and high-end restaurants. The five farming businesses in the group have worked hard to get to this stage and would like to develop their group further in order to manage and expand their market in a self-sustainable manner. Through the project, the farmers will develop the skills and knowledge they need to sustain the short supply chain in the long term by taking part in a number

of workshops that will look into the following areas:

- Customer relationship management
- Product promotion
- Understanding the requirements of the end user
- Red meat processing and butchery
- Effective engagement in the supply chain
- Managing social media
- Website management
- Invoicing, tax returns and administration

The group will use the resources they have developed to manage their supply chain, approach and develop relationships with potential new customers, market their own produce and manage their own website.

The project will encourage the next generation of primary producers to develop their business skills and encourage self-sufficiency.

Innovation Broker: Emma Jones (ADAS)

Comparison of the relative environmental benefits of low impact machinery in small scale farm woodlands

Small woodlands, scattered over the countryside are a feature of the Welsh agricultural landscape. Many of these woodlands are under-managed due to their size as the high cost of larger forest machinery makes it uneconomical to manage or harvest. This also has implications for biodiversity as single age structures of trees are less diverse than varied age structures.



Areas choked by brambles restrict natural regeneration of trees and structural diversity. Another disadvantage of larger forest machinery is the challenge of minimising environmental disturbance. Timber harvesting can leave deep ruts where heavy machinery sink, leading to poor regeneration because of soil compaction and sedimentation in waterways because of soil surface runoff.

The use of low impact machinery has the potential to offer great benefits to the small woodland owner in Wales. These are small light weight machines such as tracked skid steers

and articulated alpine tractors that have less impact on the topsoil and can also be used in less favourable weather conditions. The project is investigating the benefits of low impact machinery to identify the most appropriate methods of minimising environmental disturbance.

Project Design

- The woodlands were surveyed earlier in 2018 and four study areas in both woods were identified based on their uniformity in soil type, slope, and soil density
- In September 2018 the 4 treatments were carried out in both woodlands. These included a control (no harvesting), conventional harvesting (County tractor), and two low-impact forestry methods using an alpine tractor and a tracked Bobcat
- The project will seek to quantify the volume of water and sediment concentration losses from the four treatment areas over the winter months

Innovation Broker: Will John (ADAS)

Feasibility study on Squill production in north Wales

White squill (*Drima maritima*) is a perennial herb that is native to the Mediterranean region. The bulbous portion of the base contains several steroid glycosides (*Bufadienolides*) which are key compounds in many anti-cough syrups. In recent years, the plant has been subject to severe uprooting and collection in its native country of origin by pharmaceutical companies. The demand for bufadienolides is increasing.

Recent small-scale research has shown that this specific variety of squill can be grown in Gwynedd and has been proven to contain twice the active constituents than the varieties produced overseas. Five farmers are involved in the project that will investigate the ability to grow squill at various locations across North Wales. The aim is to understand the optimum growing conditions as well as harvesting and extraction techniques. During spring 2018, a total of 200kg of squill bulbs were planted across the sites, all with differing terrain, altitude, pH, and agronomy. The plants are now growing and will be ready to harvest in spring 2019.



Project objectives:

- **Growing** – Plant trial plots of squill at a range of locations across north Wales
- **Production** – Investigate ways of harvesting and processing squill for isolating the bioactive target compounds
- **Agronomy** – Establish data and analysis from the growing trials
- **Market Evaluation** – Identify suitable markets for the bio actives
- **Business Model** – Develop and evaluate a financial model of the business opportunity.

Innovation Broker: Elaine Rees Jones (AgriPlan Cymru)

Assessing the potential of genomic testing dairy heifers to increase genetic gains and financial returns



Through EIP Wales, eight North Wales farmers are aiming to maximise farm profits by accelerating the breeding progress of their dairy herds.

The reliability of traits being inherited from the traditional pedigree index is **35%**. By using genomic testing to measure DNA for production, type, fertility and health traits this can increase the reliability to **70%**.

“Bringing this modern innovation to farm scale will be very valuable to the industry by accelerating herd progression, boosting farm competitiveness and sustainability.”

DNA samples have been taken from 410 predominantly Holstein-Friesian heifers to assess their genetic potential. The eight farms have listed the traits they’re aiming to improve within their herd and progress towards these will be assessed over their first lactation.

Innovation Broker: Will Jones (Kite Consulting)

The aims of the project:

- Produce a decision tree for using genomics
- Determine the correlation between genomic PTA’s and actual performance
- Gain a better understanding of the herd’s genetic profile, direction of travel and impact of breeding decisions for each participating farm
- Produce a cost benefit analysis of genomic testing for each farm scenario

“Through the small investment in genomic testing, breeding plans can be restructured to get the best output from the most valuable resource on the dairy farm, the herd.”

The next step in the project is to wait for the heifers to calve before comparing actual performance to that of the genomic results.

Alternative forage systems for marginal land



Three upland farms near Blackmill, Bridgend are investigating if species-rich pastures, which were once common across the UK, will be more productive on their land compared to the standard one/two species ley.

In spring 2018, each farmer selected a 4-5 ha field to be reseeded, half with a multi species ley and the other half with a conventional ryegrass/white clover ley. Some of the fields selected in the project reach up to 280 m in altitude, some have limited soil depth in places, and one field is wet with a clay soil structure. The mixed species ley contains ryegrass and clover, but also includes legume and herb species such as timothy, meadow fescue, chicory and plantain.

The first to be reseeded was at Gellifeddgaer in April 2018. The varying root structures of some of the legume species meant that the mixed species ley

Innovation Broker: Will John (ADAS)

established extremely well under the dry conditions in late spring/early summer compared to the conventional ley.



Comparison of both leys in mid August 2018

The group will continue to work closely with grassland specialist Chris Duller over the next two years to monitor establishment, grass growth, productivity and persistency of both leys now that all fields are being grazed.

An examination of the practical and financial potential for growing small scale asparagus organically at 2 locations in south Wales

Asparagus has good potential in Wales as it is a high value crop which is a good draw for farm gate sales. The crop falls into the hungry gap period from the end of April to the end of June when few other crops are available in the UK. While there is a great demand for asparagus, the high establishment costs and long period before first harvest can make growing the crop unattractive to small scale growers.



The aim of this project is to monitor outputs and benchmark organic asparagus growing from establishment through to first harvest on two farms in Monmouthshire at a field scale. This will allow a thorough understanding of the practical and financial requirements of growing the crop.

- The asparagus crowns were planted in April 2018 and monitored for % emergence, fern numbers and height. The crop established well and has outcompeted the main weed, fat hen. As the first growing season draws to a close, more detailed

observations will be made to assess the development of the crop

- In 2019, depending on the fern volume in year 1, a light pruning cut may be made, and then the fern will be left to develop. If the fern is not sufficiently strong the crop will be left to develop and fern number, height and quality will be assessed
- In year 2 a light crop is likely to be taken at the end of May, so yields of 3 grades can be taken, jumbo, medium and sprue. Data will be gathered on weed/pest incidence, performance and costs of crop management to allow the financial benchmarking to be carried out
- In the final year, the crop is likely to be cut in late June. A projection of the first major harvest of the crop will be made through assessing the plants from the previous autumn to early spring. Current organic retail prices will be utilised along with standard harvesting costs

Innovation Broker: Will John (ADAS)

Potato blight control using components of indigenous non-food waste plants

This project is aiding the development of a new, environmentally sensitive product for control of late blight in potatoes, based on a saponin (Hederin) extracted from common Ivy.



Potato blight can hit farm profits hard as the disease can lead to complete crop failure. Recent estimates show that the control of the disease can cost the industry a staggering £70m across the UK in a bad blight year.

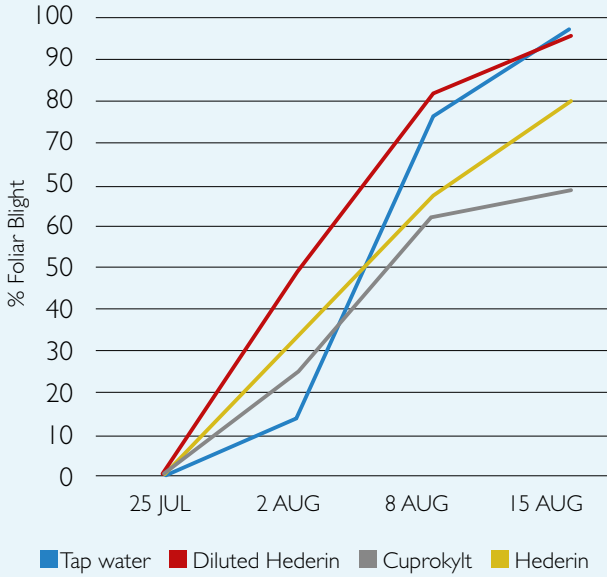
So far, in 2017 and 2018 trials have been carried out at Tyn yr Helyg, an organic farm near Aberystwyth and at Henfaes farm, at Bangor University. Because of differences in production systems (organic and conventional), different treatments were applied on each of the two sites.

Each treatment had 4 replicates, making a total of 16 plots at Tyn Yr Helyg and 20 at Henfaes, each with a total of 20 plants each of the variety Maris Piper which has moderate blight resistance.

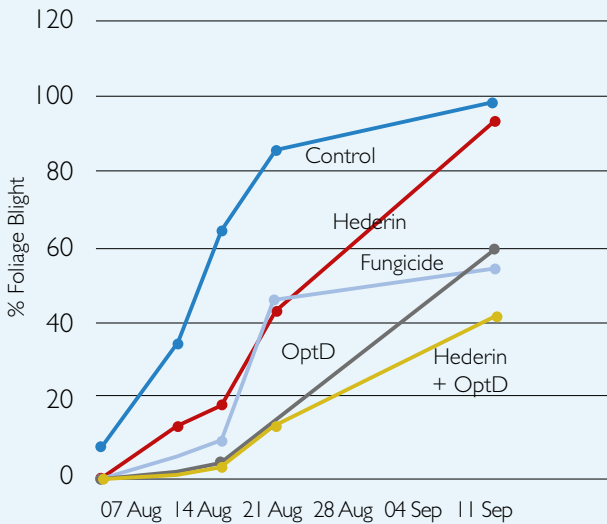
The blight infection advanced rapidly at both sites as 2017 was such a wet year. The results showed that the extract was effective in slowing down the progression of the blight epidemic, especially when combined with a bio stimulant (OptD). In 2018 the focus has been on testing different application rates of the Hederin and to ensure full coverage of the leaves of the plants on application. Blight arrived at both sites by the end of August 2018 and its progression has been monitored. After harvesting, the next step will be to assess the tubers and analyse the results of the second year.

Treatment	Tyn yr Helyg	Henfaes
1	Hederin (1g/l)	Hederin
2	Cuprokylt	OptD
3	Diluted Hederin (0.1g/l)	Hederin and OptD
4	Tap water (control)	Commercial fungicide
5		No treatment (control)

Results at Tyn yr Helyg



Results at Henfaes



Innovation Broker: Tony Little (ADAS)

Electrophysical Dock control

Docks are a major problem in grassland systems. Infestation can reduce grass yields, utilisation and performance as docks only have 65% of the feed value of grass. The use of herbicides to control docks can have a negative effect on clover in pasture and implications for the wider catchment ecosystem if used incorrectly. A reduction in the use of herbicides in grassland would benefit water and soil quality and preserve biodiversity.

Electrophysical destruction offers the potential benefits of controlling docks while reducing the need for herbicides. This project will be looking at the effectiveness and financial viability of using a machine that uses electrical currents to control docks on two dairy farms near Raglan, South Wales. The machine uses high-energy electrons to apply an electric current through the leaves of the docks causing the death of all the tissues.

The electrical treatment is applied using a tractor-mounted system and is powered by the PTO. The boom which holds the set of electrodes has a width of 3-6m. The electrodes must make contact with the dock plant for control, so the boom will be on a flexible height system.

The machine will be hired over a period of two years and will compare its effectiveness and financial viability against the use of herbicides in a high input dairy situation.



Innovation Broker: Will John (ADAS)

Pasture for pollinators



Six dairy farmers who are members of the Calon Wen Milk Co-operative are aiming to boost pollinator numbers on their farms through a 3-year project. Little attention has been given to how different farm management options in grass-based livestock farming, which is heavily dominant in Wales, can benefit pollinator populations.

Two acres of a dual purpose herbal four year ley from Cotswold Seeds was sown in spring 2018 on all six farms. The mix contained 17 different grasses, herbs and legume species including bird's-foot trefoil, clovers (red, white, sweet and alsike), yarrow, and other species which enhance pollinator populations.

During the 2018 silage season the farmers were leaving a 2 m wide uncut strip along the hedgerow to ensure that bumblebees and other pollinators have a constant habitat to forage in. On grazed fields the group are also looking at how delaying grazing can increase the flowering period which will extend the foraging season for pollinating insects.

The Bumblebee Conservation Trust have been collecting baseline data on pollinator populations on all farms during spring/summer 2018 and will be assessing how these simple grassland management options can enhance habitats for pollinating insects over the next two years.

“We’re surprised with how well the mixed species ley has established in its first year and we’re looking forward to seeing how they come on during the next two years”

Innovation Broker: Tony Little (ADAS)

An analysis of the use of a computerised robotic weeder in small scale horticultural operations at 2 locations in South Wales

This project aims to compare the financial cost of two weed control methods on two small scale, organically managed horticulture units. Both Square Farm and Trealey Farm are mixed organic farms near Monmouth which grow a variety of vegetables.

As the use of herbicides are prohibited in organically managed systems, robotic equipment could hold significant benefits in undertaking crop maintenance activities such as weeding. These weeders are commonplace in larger operations but their effectiveness, and financial viability, in small scale situations has not been analysed. By trialling a computerised robotic inter-row weeder on two farms the project aims to determine the savings in terms of labour cost and time that can be made when compared with the current methods of labour intensive hand hoeing.

At each of the two sites, different treatments will be compared by doing the two different cultivation techniques in different crop types:

- Hand hoeing in field vegetable crops – Control
- Vision guided robotic weeding in field vegetable crops

During a second season the farmers will work with the machinery providers to see if improvements can be made to its in-field performance.



“This project has been challenging both in terms of weather conditions with the dry summer and the suitability of the weeder on farm. Initial findings suggest that the weeder performs well on flat ground which is precision planted, but struggles on sloping ground with crops planted with a traditional planter. The weeder needs to be used at a specific time in crop development and the camera struggled on some crops to differentiate between weeds and the crop”

Will John (ADAS)

Innovation Broker: Will John (ADAS)

Night Milk – Assessing the reliability and economic benefit

With farm-gate milk prices affected by erratic markets and decreasing demand, the need to identify unique selling points (USP'S) is more crucial than ever.

Reaching for a glass of milk is the most common go-to sleep remedy to help those struggling with sleeplessness, and there is good reason for this. Melatonin, a hormone that occurs naturally within bovine milk can help control sleep and wake cycles. Recent studies have shown that melatonin is produced in the cow's pineal gland at a higher concentration at night as there is less light hitting the cow's eye, which signals the cow's body to produce melatonin.

Two dairy farmers in the Bridgend area are using this knowledge to form an EIP project which could potentially find the best milking system to increase melatonin in their herds' milk. Both farms milk 3 times a day at 8-hour intervals. At present the milk from the three milking's is pooled together, but in this 13-month project the milk produced during daylight and darkness will be sampled separately for the melatonin levels.

To brand milk for its sleep inducing properties, levels of melatonin must be higher than 1mg per 250g of milk. This project will determine whether milk collected at night will reach this level. Factors such as seasonal variations, environmental factors and nutrition will

all be monitored in order to discover the best system to increase melatonin levels.

This project could potentially offer dairy farmers in Wales the opportunity to consider developing a premium milk product that has added value and competitiveness.



“I have always been interested in the link between melatonin in cow's milk and the potential beneficial impacts this could have for consumers in aiding sleep. EIP Wales provides the opportunity to finally conduct a study into this area and provided funding to commission Fera Science Ltd. to conduct the laboratory testing.”

Rhys Lougher, Ty Tanglwyst Farm

Innovation Broker: Russell Thomas (Kite)

Investigation of the effect of contrasting dairy production systems in West Wales on the profile of milk fatty acids (especially omega-3 and 6)



Twenty dairy farmers from south west Wales have come together to investigate whether milk from their production systems contain valuable levels of omega-3.



They aim to identify which pasture-based management practices produce the optimum levels of the fatty acids. The results could give dairy farmers the opportunity to consider forage-based options as a way of producing milk with enhanced levels of omega-3. This could provide a marketing advantage without going to the extra cost of adding supplements to their forage. The group supply their milk to several different milk buyers and processors. These milk outlets could potentially take advantage of the project results by marketing the products for their high omega-3 content.

Throughout 2018 farmers have been providing monthly bulk-tank milk and feed samples for the 24-month project. Samples will be tested for their fatty-acid profile with particular emphasis on omega-3 and omega-6. Four dairy production systems are being examined, each consisting of five farmers representing each type of production system. These productions systems are:

- Conventional Housed Winter/ Grazing Summer
- Herds housed all year round
- Organic herds
- Spring Block Calving

In Year 2 of the project, the same milk sampling and feed sampling process as in Year 1 will continue. Additional focus will be given to testing rations where systems are producing higher levels of omega-3 fatty acids to provide further information on the cow nutrition that produces optimum levels.

Innovation Broker: Jeremy Bowen Rees (Landsker Business Solutions)

Foliar feed for grassland

The majority of nitrogen (N) fertilisers are applied to grassland systems in solid, or prill form with a spreader. The nutrients are applied to the ground before being washed into the topsoil by rain and then taken up by the root system of the plants. A host of factors including, soil compaction, drainage, bio-activity, soil temperature and rainfall, can affect the nutrient release and uptake by the grass with this method.



There is another, quicker, method of getting nitrogen directly into the grass, which is through the leaves of the plant. Leaves have pores between cell structures which can be good entry points for nutrients. Previous trials have proven that foliar feeding fertiliser directly to the grass can decrease the amount of total nitrogen necessary whilst minimising nitrogen losses through runoff.

This project, involving four farms, aims to assess the extent to which using a foliar feed that is based on urea and humic acid can reduce the application

of conventional N fertiliser to grass. For it to be successful, the quality and quantity of dry matter of the grass, as well as the clover content must not be compromised.

On each of the four farms, one large field will be split into three sections of equal size and the following treatments will be compared:

- Nitrogen fertiliser, as per current/standard practice
- Foliar feed
- No fertiliser

The performance of each plot will be measured in terms of:

- Dry matter yield
- N content of fresh grass tissue
- Costs of N application per tonne of dry matter
- Clover content to assess the impact on species composition of the sward

Innovation Broker: Tony Little (ADAS)

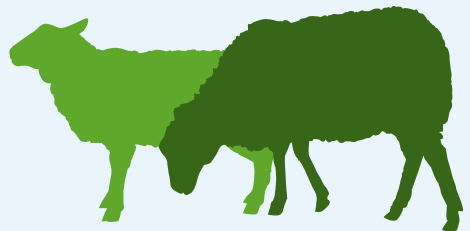
Implementing advanced nutritional management in the Welsh sheep industry

Grass alone may not provide all the nutritional elements required by ewes and sometimes nutritional supplementation is required to improve productivity. Traditionally in the UK this has been carried out by taking blood samples from a sample of sheep. However, the only way to assess whether **the sheep are supported nutritionally is to investigate the nutrient concentrations within the sheep** and compare them to established norms. Blood concentrations can respond to diet changes within days and may also be influenced by other disease processes.

Live animal liver biopsies provide different information to blood in that it provides a much longer-term historical estimation of trace element status. The technique is proven to be quick, safe and reliable. Blood analysis is still useful in conjunction with this as it can provide short term information indicative of current supply and response, as well as information regarding element competition. The blood and liver samples taken in parallel provide the most comprehensive indication of historic and current trace element status and the best information to formulate management advice for future dietary adjustments.

In this project twelve farms from across north Wales are using this dual sample approach in the Welsh sheep context, together with an analysis of the available forage. The project aims to utilise an intelligent and progressive approach to nutritional planning in breeding ewes.

- Liver and blood samples have been taken from 8 ewes from the 12 flocks before the breeding season commences in 2018 to assess trace element levels
- The available forage will be analysed on each farm. Nutritional planning advice will then be formulated using the results of the liver/blood and forage tests
- At scanning time blood samples will be taken to determine energy, protein and copper status. Adjustments to the diet will be made if necessary
- Liver and blood samples will be taken after weaning to monitor the success/failure of the nutritional advice



The EIP Wales Process

Step 1 – The first step is to share your idea with us through the enquiry form on the Farming Connect EIP Wales web page.



Step 2 – We will discuss your idea with you to see if it falls within the scope of EIP Wales.



Step 3 – The Knowledge Exchange Hub at IBERS will undertake background literature searches to see what is already known about your subject area to help inform a potential project.



Step 4 – If your idea is within the scope of EIP Wales, you will have the opportunity to work with an Innovation Broker. An Innovation Broker will help you turn your idea into a project and guide you through the application process, and if your application is successful, facilitate the project throughout its lifetime.



Step 5 – At the end of the project, hopefully a solution to the problem has been found. The results will then be shared with the wider agriculture and forestry sectors across Europe.



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Cronfa Amaethyddol Ewrop ar
gyfer Datblygu Gwledig
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European Agricultural Fund for
Rural Development
Europe Investing in Rural Areas



Llywodraeth Cymru
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