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GENETEG
GENETICS

Welsh Sheep Genetics Programme

Farming Connect



Supporting Welsh farmers to adapt and thrive



Ariennir gan
Lywodraeth Cymru
Funded by
Welsh Government

FOREWORD

Genetic improvement is a tool which can be used to effectively improve flock performance, resulting in higher efficiency and greater profitability.

Using performance recording data, and EBVs as a tool to improve specific traits, can have a significant impact on flock productivity. Using the data collected to its full potential allows for farmers to make justified decisions on where they can improve within their flocks - leading to greater financial returns for their businesses.

Benefits of genetic improvement in Welsh sheep flocks include:



By working closely with world-leading genetic experts, Innovis and AHDB-Signet, the Farming Connect Welsh Sheep Genetics Programme focuses on improving the efficiency of Welsh sheep flocks by increasing the number of sheep farmers participating in the genetic improvement of their flocks within Wales.

Participating flocks benefit from various support offered by Farming Connect, including financial support to aid data collection, advice and guidance on achieving targets for flock improvements, opportunities to improve knowledge and understanding of genetics, as well as an opportunity to be involved in breakthrough research projects.

This booklet offers an overview of how genetic improvement can be used to benefit your flock, as well as an insight into the work underway within the programme and how it is driving the development of genetic improvement forward within Wales and further afield.

WHAT IS THE WELSH SHEEP GENETICS PROGRAMME?

95 flocks performance recording as part of the **Welsh Sheep Genetics Programme**

Approx **14,500** ewes performance recorded as part of the **Welsh Sheep Genetics Programme**

2,988 ewes newly DNA recorded for 2024 as part of the **Welsh Sheep Genetics Programme** (not including new manually recorded ewes)

98 sires newly DNA recorded for 2024 as part of the **Welsh Sheep Genetics Programme**

The Welsh Sheep Genetics Programme (WSGP) is a brand new support package by Farming Connect, which offers sheep farmers technical and financial support, guidance and advice to strengthen their flocks performance, improve productivity and increase profitability through improving genetics.



PROGRAMME STRUCTURE

The programme is split into two tiers, Tier 1 and Tier 2.

Tier 1 includes Welsh hill and upland breeds of sheep.

Through Tier 2, the programme also offers support to specific maternal breeds including: Lleyn, Romney, Charmoise Hill and Bluefaced Leicester.

Flocks involved in the programme include a mix of experienced recorders as well as flocks which are new to performance recording.

WHAT DOES THE PROGRAMME INVOLVE?

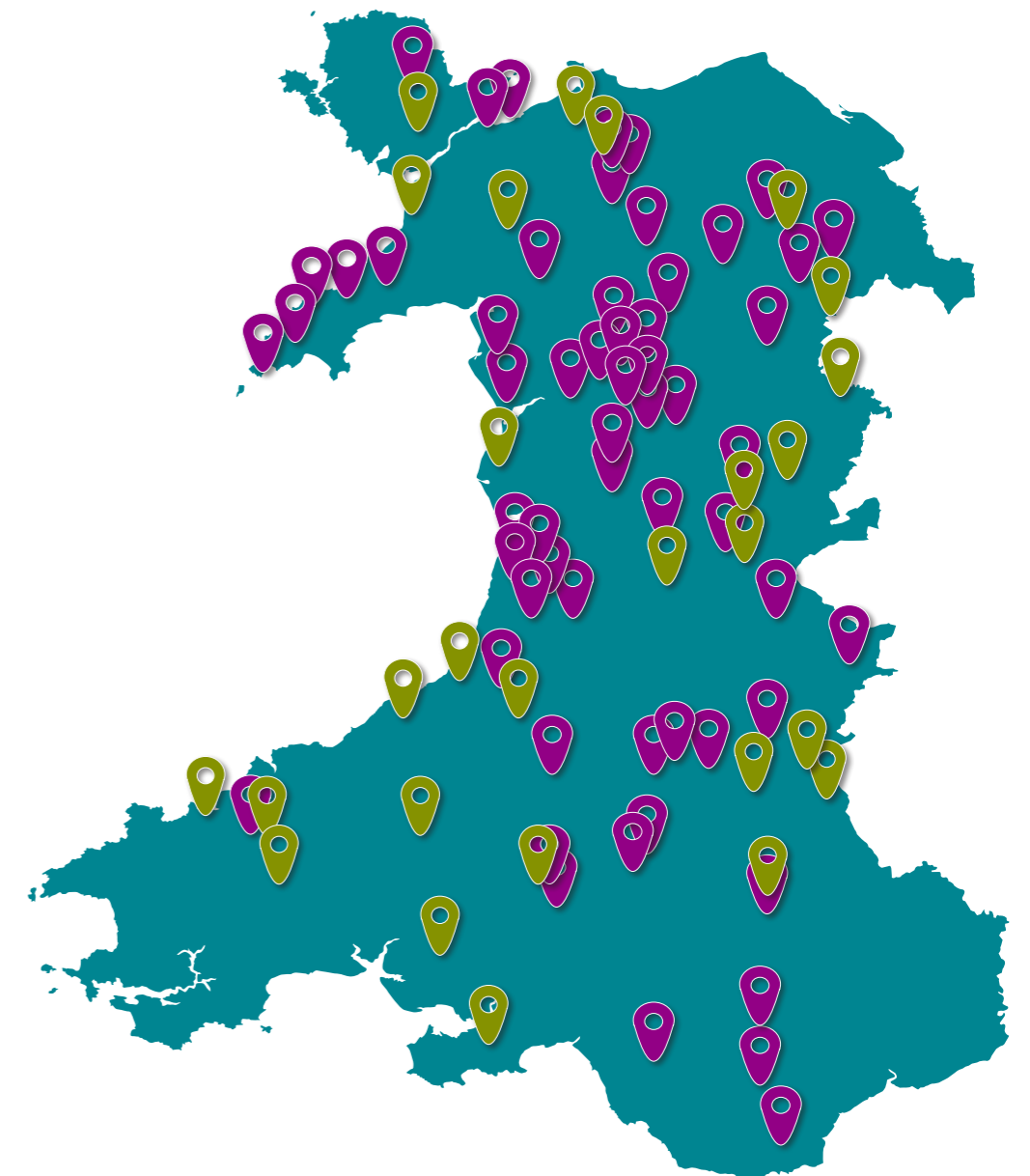
By working closely with world-leading genetic experts, Innovis, and AHDB-Signet, the programme is focusing on improving the economic and environmental efficiency of Welsh sheep flocks by using data collection and analysis, as well as exploring breakthrough research and innovation.

The programme mainly focuses on collecting core performance recorded data, with the key objective of improving flock performance. Participating flocks are supported by Farming Connect to collect vital flock performance data throughout the duration of the programme, with the option of manual recording or using DNA parentage. Ultrasound scanning is also carried out annually on lambs to assess muscle and fat depth.


As well as core performance recording, the programme also explores innovation and new technologies by offering participants the opportunity to take part in ground-breaking research. There are three projects within the programme, focusing on genomics, breeding for lower methane emissions and breeding for worm resistance.



PROGRAMME FLOCKS



 **Tier 1 Flocks**
Hill and Upland Breeds of sheep

 **Tier 2 Flocks**
Romney, Bluefaced Leicester,
Lleyn & Charmoise Hill of
sheep



HOW TO PERFORMANCE RECORD YOUR FLOCK

Collecting basic data on various aspects of your flock's performance is always useful practice. Data such as scanning records, birth records and weights are just some of this data.

RECORDING AT LAMBING

At lambing time, traits such as lambing ease, lamb vigour, lamb birth weight and maternal ability of the ewe are all important as they can impact on lamb survival and also labour costs. These traits have a genetic component to them meaning that selection can be made to improve these traits to assist in reducing lamb mortality and reduce labour costs for example by identifying problem animals through recording these different traits at lambing.

DNA VS MANUAL

The main key points for recording throughout the year for all flocks are shown in the recording timeline. The method of this data capture will depend on whether the flock is manually recorded or DNA recorded. With the main differences taking place at tuppung time, lambing time and tailing where DNA samples are taken from the flock.

RECORDING TIMELINE



SELECTING RAMS USING EBV

Rams are predominantly selected on appearance, with buyers prioritising physical soundness as well as breed type when selecting their rams, with the objective of these physical attributes passing down to future progeny.

Selecting rams on physical appearance is always justified, but how about adding another layer of security to what that ram in particular will produce? This is where Estimated Breeding Values (EBVs) come into play.

Of course, we've all heard about breeding values and a lot of us will think we know what it means - but have you REALLY looked into them properly, and how adding this layer of security when purchasing rams could impact YOUR flock?

Even if you don't intend to performance record your whole flock (although doing this is very beneficial also), you could still purchase rams with breeding values above breed average, meaning that you could

significantly increase the profitability of your flock, in reality, quite easily.

By now, the method of expressing the hill index in Wales has changed. The hill index now represents the economic value of each ram's genetic merit for traits influencing ewe performance. Here's an example:

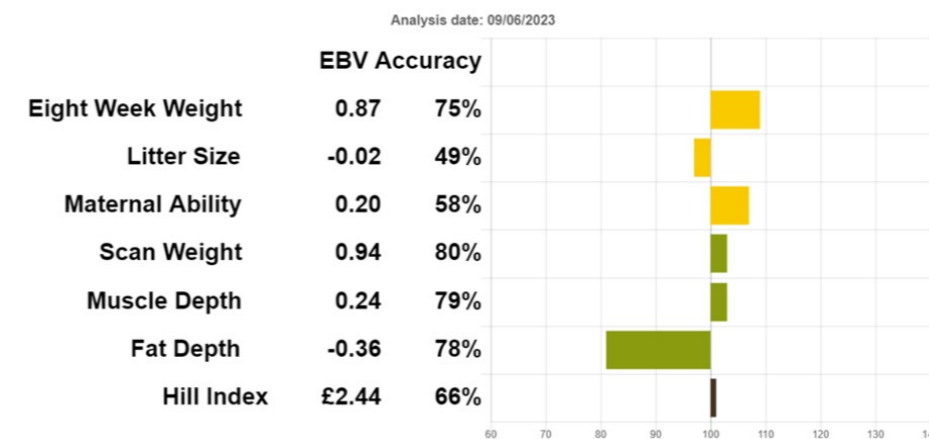
Ram A is breed average and has an index of **£2.44**, whilst **Ram B** is within the top 10% of the breed with an index of **£12.47**, which equates to a difference of over **£10**. Half of their genetics will be passed onto their offspring, so you would predict that **Ram B's** daughters would generate an extra **£5** annually for every year they remain within the flock.

In this instance, breeding values indicate that daughters of Ram B would rear more lambs, which would grow faster and have better conformation compared to daughters by Ram A.

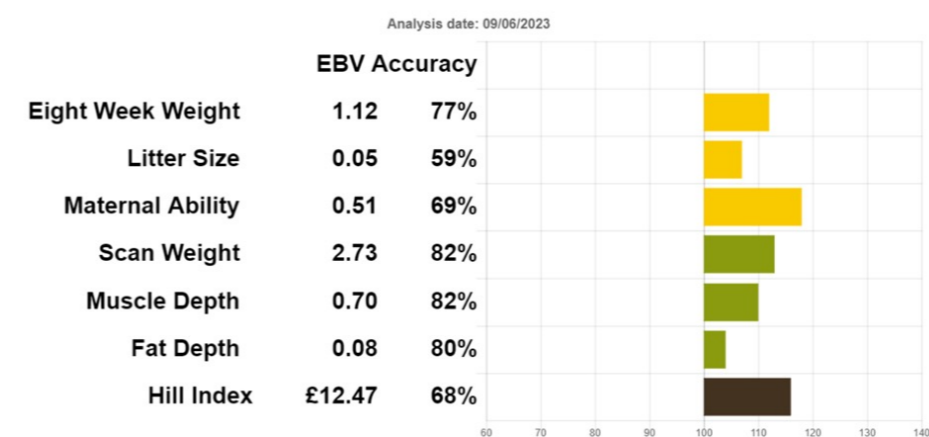
Here are some Top Tips from Sam Boon, Senior Animal Breeding Manager at AHDB-Signet:

- 1 Set breeding objectives that will optimise the profitability of your flock. Talk to the ram breeder about your requirements.
- 2 Select rams with the right EBVs to realise these objectives.
- 3 Go to the Signet website (www.signetdata.com) to get the ram's latest breeding values. Compare the ram's EBVs against the breed benchmark to identify their strengths and weaknesses.
- 4 Remember, EBVs can be compared between flocks, but not between breeds. Buy early to ensure the availability of a wide selection of recorded rams.
- 5 It pays to invest. The difference between an average ram and one with high EBVs could be worth £800 during its lifetime.
- 6 Look after the health and nutritional requirements of your ram to ensure he has a long productive life.
- 7 Don't forget to follow the correct biosecurity protocols when purchasing rams, to minimise the risk of buying in diseases/health issues.

Welsh Mountain Ram A – Breed Average



Welsh Mountain Ram B – Top 10%



THE IMPACT OF GENETIC IMPROVEMENT ON WELSH FLOCKS



ELFYN OWEN, FFRITH-ARW, LLANDDOGED

Mr Owen runs a flock of 480 Welsh Mountain ewes and 70 Bluefaced Leicesters at Ffrith Arw, near Llanrwst, producing lambs solely from grazed grass and marketing recorded sires and replacement ewes at breed sales while also selling fat lambs into the liveweight and deadweight markets.

In five years, the average weight of lamb produced per ewe in Elfyn Owen's flock has increased by 9.3kg, to 47.6kg.

Mr Owen, who farms with his wife, Ruth, recognised the value of achieving genetic gains driven through estimated breeding values (EBVs) long before he started recording the pure-bred Welsh Mountain Cernyw flock in 2019.

“It was a natural progression to record the Welsh ewes when we had the chance to join the Hill Ram Scheme in 2019 and then Tier 1 of Farming Connect’s Welsh Sheep Genetics Programme (WSGP), as well as Tier 2 with the Bluefaced Leicesters,”

says Mr Owen, who is national chair of the Bluefaced Leicester Sheep Breeders’ Association.

Two hundred of the Welsh ewes are recorded using DNA parentage techniques because of the extensive nature of the system.

Pregnancy scanning in the 2023 breeding season showed a scanning percentage of 160%, but Mr Owen says he is aiming for 180%.

“For us recording is about prolificacy too, we are not a mountain farm, we are an upland farm with improved land, and want as many lambs as possible.”

“We are working on getting two lambs per ewe with improvements in muscle depth, conformation and weight, we have the type of sheep that can make it work.”

The Welsh ewes lamb outdoors in May.

At lambing, the twin-bearing ewes are drafted into one field and their progeny are EID tagged and DNA samples taken from their ears.



The analysis of the DNA is matched to that of the ewes and allows parentage to be assigned.

Lambs are weighed at eight weeks and again at 20 weeks of age when scanned.

Having EBVs, which indicate exactly where an animal ranks within the breed for specific traits of economic importance, play an important role in flock profitability, says Mr Owen.

Having those figures allows him to make better breeding decisions, both within his own flock and when breeding rams and replacements for his customers.

Since Mr Owen started recording the flock in 2019, eight week weights have increased from -0.19kg to 0.62kg and muscle depth from -0.12 to 0.22; scanning weights have increased by 1.71kg.

Mr Owen's figures show that in 2020 his flock's average index was £5.16 and performance recording had increased this to £10.11 in 2023.

He is not surprised. ***“We are getting better weights and muscle depth, it is making the ewe more efficient and making her work for us without any concentrates.”***

The value in recording is also evident in his sale of pedigree stock with his yearling tups averaging £1,000 at the 2023 Prohill sale.

Recording is not only helping him to improve his commercial ewes but it is helping the sheep industry overall become more efficient, Mr Owen suggests.

THE IMPACT OF GENETIC IMPROVEMENT ON WELSH FLOCKS



GWYN PARRY, ORSEDD FAWR, PENCAENEWYDD

Lambs produced by an organic hill flock of Welsh ewes are hitting finishing weights two weeks earlier since performance recording was introduced to improve genetics.

The Parry family have been performance recording for four years, in the last year as

Gwyn and Delyth Parry, who have been joined on the farm by two of their children, Eifion and Elen, started performance recording for one simple reason

“We want to have a better flock,” says Gwyn

part of the Welsh Sheep Genetics Programme (WSGP) and prior to that in the predecessor Hill Ram Scheme.

They run a flock of 500 Welsh ewes on an entirely grass-based system at Orsedd Fawr near Pwllheli, recording 80 of these.

Historically they had relied on visual assessment to select replacements but could see major benefits in using estimated breeding values (EBVs).

Their focus has been on improving eight-week weights. “We were quite happy with ewe type and physical soundness-like teeth for example, but we knew we could improve on weights by concentrating on growth and fleshing ability,” says Gwyn.

Welsh rams selected for the EBVs that would help them to achieve this were sourced from Prohill sales at Innovis.

Ewes are tupped in October with a ram to ewe ratio of 1:90, achieving a scanning average of 170% in the last breeding season.

All lambing is outdoors from the end of March with no concentrates or silage fed at any time of the year.

In the past four years, the overall flock average index has increased from £6.13 to £10.35, an increase of £4.22.

By selecting rams with EBVs in the top 25%

for scan weight and eight-week weight, the Parrys are able to finish lambs earlier. **“We get lambs off the farm quicker, by an average of two weeks, and they have more condition,”** says Gwyn.

“It is a win-win situation. It costs money to record but you always get your money back on those improvements.”

Lambs are sold direct to slaughter from the end of June, at an average deadweight of 17kg and capturing the organic premium.

“If the grass is growing well, we will finish them for longer to achieve higher weights,” says Gwyn.

The total value of lamb produced per ewe in the top 25% of the Orsedd flock averaged £100.86 in 2023 while for ewes considered below average for performance it was £88.43, a difference of £12.43.

Recording is one of the strategies the Parrys have been putting in place to make their 283-hectare business more sustainable.



THE IMPACT OF GENETIC IMPROVEMENT ON WELSH FLOCKS

EMYR OWEN, RHUG ESTATE, CORWEN

Farming Connect's Welsh Sheep Genetics Project (WSGP) is helping to facilitate major change in a large-scale sheep flock.

The Rhug Estate near Corwen had been running a flying flock of 3,750 North of England-type mules but is now transitioning to a closed flock of Welsh ewes.

Electronic identification (EID) – based technology is playing a significant role, providing data to help manage breeding decisions while allowing the farm to close its flock and breed its own replacements.

Farm manager Emyr Owen says an advice surgery with independent sheep and beef adviser Matt Blyth arranged, has been integral in the decision to overhaul the whole EID performance recording system.

“That meeting with Matt was a massive help, it got the conversation going,” Emyr recalls. ***“It has been fantastic to have that support.”***

Making the switch to a Welsh ewe was in part because the breed is proven to thrive in the region in outdoor lambing systems.

Historically the lowland Rhug flock has lambed indoors from 15 March but going forward only triplet-bearing ewes will lamb indoors.

The remainder will be lambed outdoors, from the end of March to April 15, to better match the estate's grass growth curve.

“We have an amazing shed for lambing and want to maximise live births so it is sensible to lamb triplets indoors but for the rest of the ewes it will all be done outside,” says Emyr.

Recorded Welsh rams were purchased at the Prohill sale in 2023; these purchases were based on physical correctness and figures, and with consistency with the type of Welsh ewe the team at Rhug is aiming to produce.

The Welsh ewes were sourced from farms that are performance recording, with all three flocks part of the WSGP.

We are really thankful to be part of it, and buying the ewes from farms that are performance recording means we have gained a couple of years straight off the bat,” Emyr says.

EID is very much part of the new sheep system on the Rhug Estate.

A new weigh-head was purchased, support by a 40% grant from the Welsh Government's Small Grants Efficiency Scheme.

“We had been using a weigh-head for the cattle for years but had nothing for sheep,” Emyr explains.

It is used in conjunction with a stick reader and integrated with Agriwebb software.

“The plan is to become a completely paperless business,” says Emyr.

Lambs are tagged at weaning and data including daily liveweight gains and slaughter weights are recorded and monitored.

The benefits of this are already being seen, says Emyr. “We have a young shepherd in charge of lambing the Welsh ewes and he has been using the stick reader to add comments about any ewes or lambs he has concerns about so that we can avoid breeding from problem animals.”

The ambition is to run the flock in three groups in an ABC system. The sheep in the A group will produce the replacements for the nucleus Welsh ewe flock.

Emyr says the trait that is being most closely monitored is ewe body condition score. “BCS tells us so many things in the metric, and we can simply build protocols and key performance indicators around it.”

In the 2024 lambing season the scanning percentage in the indoor lambing ewes averaged 185% and 160% in the outdoor lambing flock. For the Welsh ewes it was 135% but, as two thirds of these were yearlings, the goal is to increase this to 150%.

Five hundred purebred Welsh ewe lambs will be retained this year as replacements

while a big proportion of the fat lambs will be processed on-farm and sold through the Rhug Estate farm shop. The remainder will be marketed through Pilgrims, ABP or Ruthin livestock market.

Although the journey to improving flock genetics and profitability is in its early stages Emyr says his confidence in the targeted outcomes is emboldened by the support received through Farming Connect and the WSGP.



WELSH SHEEP GENETICS PROGRAMME - BREAKTHROUGH PROJECTS

INTRODUCING GENOMIC BREEDING VALUES (GEBVS)

World-first use of genomics in sheep propelling Welsh flocks into new eras

Farming Connect and Welsh sheep farmers are at the forefront of new technologies, as its Welsh Sheep Genetics Programme is the first to implement genomic breeding values on a global level.

The Welsh Sheep Genetics Programme (WSGP) delivered through Farming Connect, is working with 95 flocks pan Wales and collects primary flock performance data, using this data to improve the productivity and the profitability of flocks. Data collected also feeds into three different projects that underpin the genetics programme.

Following on from a feasibility study completed by the WSGP's predecessor, the Hybu Cig Cymru Hill Ram Scheme, genomic breeding values (GEBVs) were rolled out to WSGP participating flocks in June 2023.

Working in collaboration with Innovis, SRUC and AHDB-Signet has allowed access to additional genotypes which has widened the impact and potential of the project. Genomic


data will be used to enhance the breeding values of hill and upland breeds included in the programme.

The objective is to increase the accuracy of performance figures, especially in traits which take longer to be expressed, such as ewe longevity. It is also a brilliant tool to predict the genetic merit of maternal breeds early in their lifetime, and when looking at traits with a low genetic component, such as lamb survival.

The genomic approach will involve using data gathered from DNA parentage assignment and breeding values produced by AHDB-Signet to produce genomic predictors which are more accurate and reliable.

Changes have also been made to the way the hill index is expressed. Originally developed by geneticist Janet Roden, the index will now be expressed in terms representing the economic merit of a ram's daughter.

This approach will make it easier for ram buyers to predict the financial impact of purchasing recorded sires on their flocks. By harnessing the power of genetics and combining it with good management and careful decision making, Welsh sheep farmers can enhance the profitability, and sustainability of their flocks for years to come.



For example, a ram with a hill index of **+£15.00** will breed daughters expected to be **+£7.50** more profitable annually in comparison to a ram which has a hill index of **£0**.

BREEDING FOR WORM RESISTANCE



Aim:

- **To gather data on worm burdens within lambs included in the WSGP, with the objective of developing an EBV for worm resistance which could be used to select sires producing offspring with a reduced susceptibility to worm burdens. By breeding for worm resistance, this will also contribute towards reducing anthelmintic resistance within Welsh sheep flocks.**

- **Identify sheep that are genetically resistant, use that data to make breeding decisions, and breed a naturally healthier flock, reducing reliance on anthelmintics.**

Data collection commenced in September, 2023. Two measurements were taken to assess parasite resistance; individual Faecal Egg Counts (FEC) and blood samples were also taken to measure the level of antibodies a sheep has against parasites it's been exposed to which are measured from IgA levels in the blood.

Using this information, Signet publishes breeding values for:

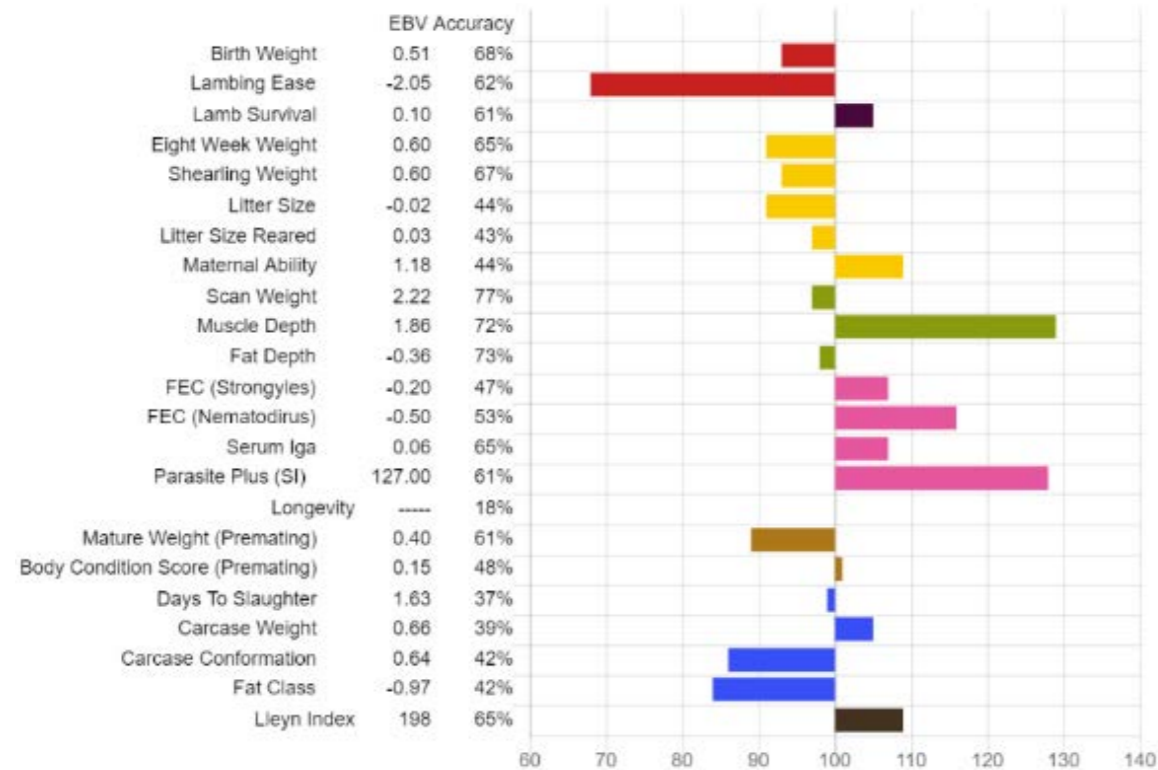
- FEC S (Strongyles FEC)
- FEC N (Nematodirus FEC)
- Serum IgA – Based on blood serum IgA measures



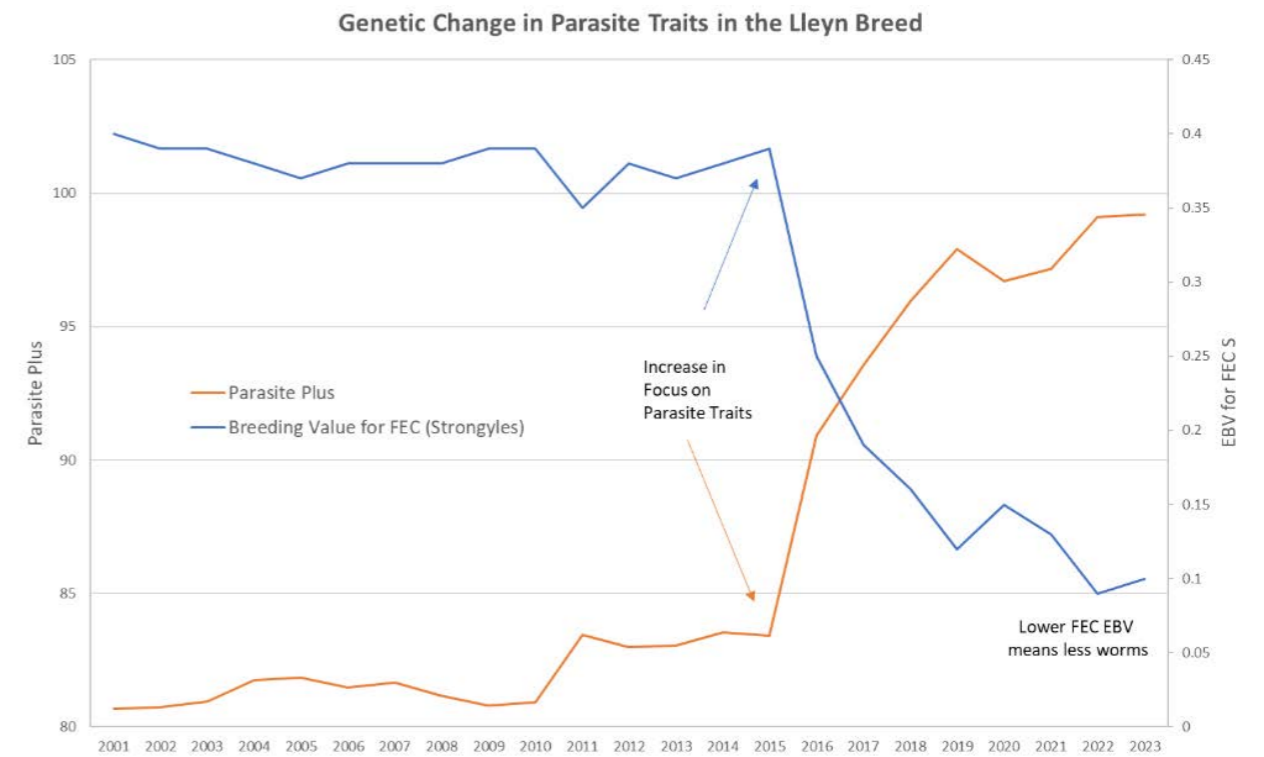
WELSH SHEEP GENETICS PROGRAMME - BREAKTHROUGH PROJECTS

PARASITE PLUS EBV

A breeding index has been produced called “Parasite Plus” which takes into account all three of these breeding values, enabling producers to rank sheep on the basis of their overall genetic merit for parasite resistance.



Below is a graph showing the genetic change in parasite traits within the Lleyn Breed;



Results show there is considerable variation between individual sheep in the strength of their acquired resistance to parasites. Some of this variation is due to their genetic makeup, and this means it is possible to selectively breed sheep that are more resistant to internal parasites.

Heritability values

Values used in Hill Evaluation

Strongyles (FEC S)

15%*

Nematodirus (FEC N)

17%*

Serum IgA

35%

(*similar to heritability values shown in, lamb survival and maternal ability)



Data collection for the worm resistance project work

WELSH SHEEP GENETICS PROGRAMME - BREAKTHROUGH PROJECTS

BREEDING FOR REDUCED METHANE EMISSIONS

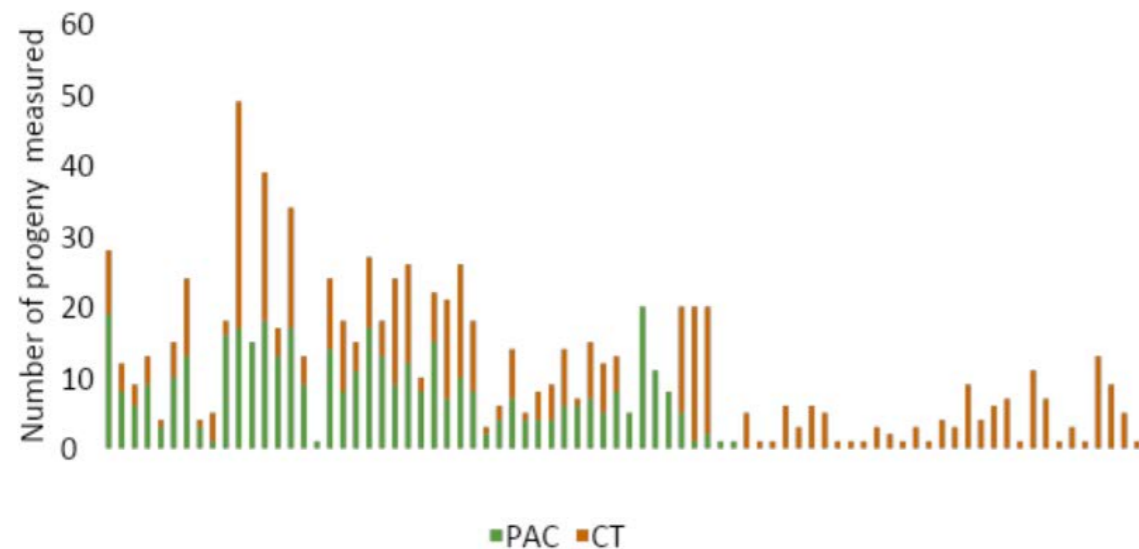
Data collected from
1,153
for reduced methane emissions project in 2023



Aim: To measure methane emissions from lambs included within the WSGP, with the objective of developing an EBV for methane yield which could be used to select sires producing offspring with reduced methane emissions.

Data collection commenced in December 2023 and January 2024, which included CT scanning to measure rumen volume and changes, as well as PAC (Portable Accumulation Chambers) to measure methane emissions.

Data collected:



Progeny from
80
sires measured

47
PAC and CT scanning

8
PAC only

31
CT scanning only

Key results from PAC chambers so far:

- A lot of variation between flocks
- Highest 20% of flock emits 30-50% more methane in comparison to lowest 20% of flock.

CT scanning - gaining a better understanding of the changes in the rumen

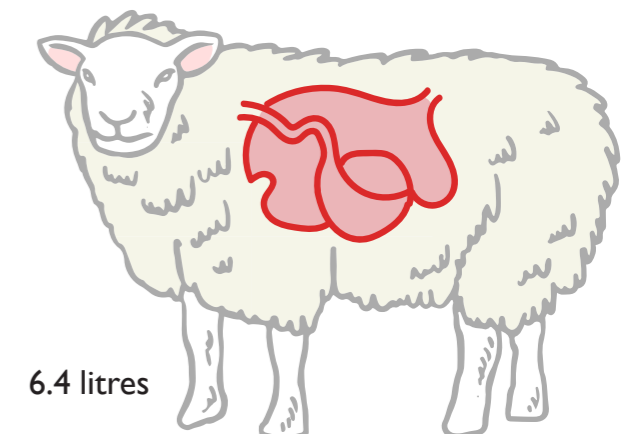
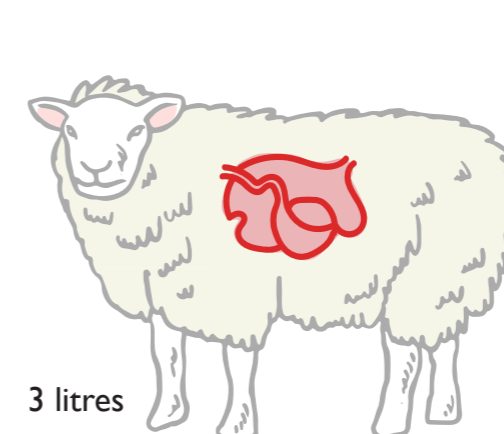
- Mobile scanner at Peithyll in January 2024
- 504 lambs CT scanned
- Full carcase analysis completed in addition to measure of rumen volume



Results from CT scanning:

- Heavier lamb = larger rumen
- Average rumen volume of 4.5 litres (adjusted for LWT)
- Variation of 1-2 litres either side of average within flocks.

Typical variation within flocks in rumen volume



SELECTING LAMBS FOR SLAUGHTER

– BY MEAT PROMOTION WALES



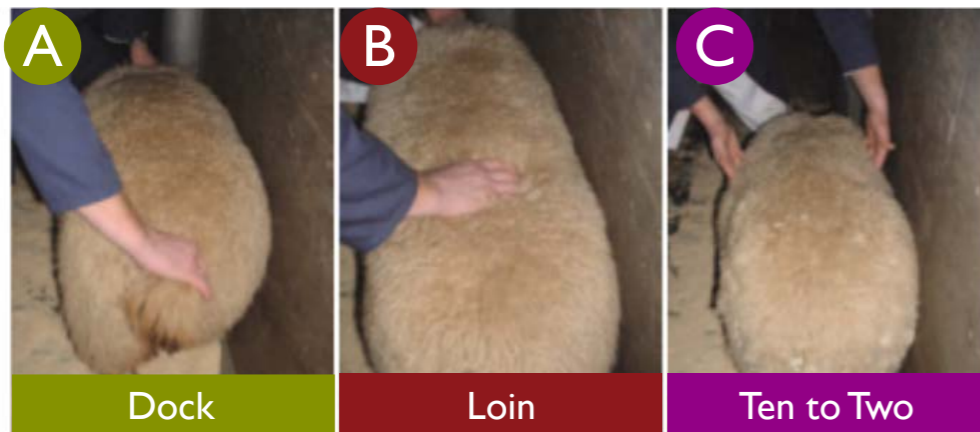
Knowing what the market requires is an important aspect of tailoring a business to get the best returns. It may even require a slight shift in breeding emphasis to achieve lambs or cattle that are better suited to what the market is demanding. Achieving the correct level of finish on an animal is essential. An important skill for any livestock producer is knowing when their animal has arrived at its optimum level of finish. By doing this producers avoid costly overfeeding and the penalties associated with over-fat carcasses. Conversely should livestock be sold under finished (i.e. too lean)

then the maximum carcass value will not be achieved.

The deposition of excess fat in a live animal is an inefficient and expensive process, with fat requiring approximately six times more energy than the same weight of lean meat. Fatty meat is not desired by the consumer and extra time and staff are required in the processing halls to trim the fat. Handle animals regularly and send them to slaughter when they have achieved the desired level of fat cover. It is not advisable to select animals based on weight alone.

ASSESSING FATNESS

Handling live lambs to assess fatness is an acquired skill which can be gained by regular practice. There are a number of important handling points on live lambs which provide reliable guides to the fat class of its carcass: the tail root or dock, the loin and the ribs ('Ten to Two').

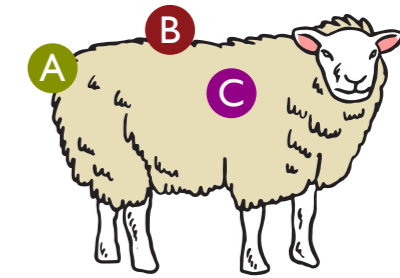


Handling provides a reliable assessment of fatness provided wool thickness is allowed for, but excessive pressure can lead to bruising. This leads to devaluation of the carcasses, so careful handling is important.

Perfecting selection skills can be profitable. Live handling, followed by a visit to examine

the carcasses in the abattoir, is a good way to gain experience and perfect the technique. Regular use of carcass classification provides a sound basis for monitoring selection decisions. Further information and practical training on how to assess live animals is available through Meat Promotion Wales.

KEY HANDLING POINTS TO ASSESS FATNESS FOR LAMB



A Dock

Fat class

1. Individual bones very easy to detect
2. Individual bones easy to detect with light pressure
3. Moderate pressure to detect individual bones
4. Firm pressure to detect individual bones
5. 5 Individual bones cannot be detected.



B Loin

Fat class

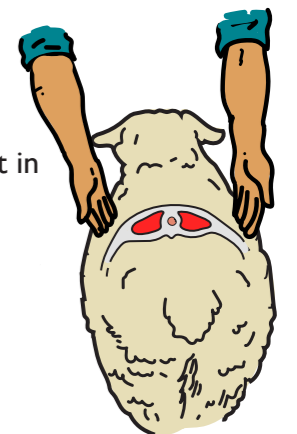
1. Very easy to feel between transverse processes which are very prominent
2. Prominent spinous and transverse processes felt easily
3. Tips of processes rounded. Individual bones felt as corrugations with light pressure
4. Spinous processes felt with moderate pressure – transverse processes with firm pressure
5. Individual processes cannot be felt.



C 'Ten to Two' on last two ribs

Fat class

1. Individual ribs feel very bare, prominent and easy to detect
2. Individual ribs show slight cover but still easy to detect
3. Individual ribs have softer feel, with fat cover becoming more evident in between and over ribs, which are now less easy to detect
4. Individual ribs only detectable with firm pressure
5. Individual ribs undetectable, soft, rolling, spongy feel.



CONTACT US

Already performance recording, or are interested in starting to record or using genetic improvement in your own flock?

Contact our team for a chat today.

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Discover what support is available to all sheep farmers registered with Farming Connect ...

Fully funded e-learning modules. Learn from the comfort of your home at a time that is convenient for you:

- ✓ Breeding Sheep for Parasite Resistance
- ✓ Buying a Performance Recorded Hill Ram
- ✓ Creating a Breeding Programme for the Sheep Flock
- ✓ Sheep Scab and Lameness

Fully funded Animal Health and Welfare Training Workshops, delivered through local vet practices:

- ✓ Flock Fertility Management
- ✓ Improving Post-weaning lamb Performance
- ✓ Sheep Lameness
- ✓ Sheep Parasite Control

Up to 80% funding for accredited training courses:

- ✓ Advanced and Machine Sheep Shearing
- ✓ Safe Use of Sheep Dip
- ✓ Safe Use of Vet and Med
- ✓ Sheep Scanning

The Advisory Service provides advice, with up to a 90% contribution towards tailored advice for your flock. This can be given by your local vet or specialist adviser, depending on your needs. The service may include:

- ✓ Breeding Plans to improve performance
- ✓ Bespoke feeding plans including clamp and silage sampling
- ✓ Animal Health Plans
- ✓ Specialist flock disease investigation including sampling
- ✓ Fertility Management
- ✓ FEC sampling with recommendations

For more information, contact your local Development Officer, or call the Service Centre.

gov.wales/farmingconnect

03456 000 813

Rydym yn croesawu galwadau'n Gymraeg

We welcome calls in Welsh

