EIPWALES
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Collaborating for rural success

menter a busnes

European Innovation Partnership Wales project

Reduced Antibiotics Use at Lambing Time

Final Report

Operational Group:

Jack Foulkes, Marchynys

Aled Williams, Ysgellog

Arwyn Jones, Plas Farm

Rhys Owen, Brwynog

Gareth Thomas, Tregynrig Fawr

Gareth Roberts, Myfyrian Isaf

Gwilym Jones, Fferm Ty Fry

Pearson Farm Supplies

Specialists:

Kate Hovers, Independent Sheep Veterinarian

Kate Phillips, Independent Nutritionist

Karen Wheeler, Nutritionist, ADAS

Loree Jones, Technical Support, ADAS

Innovation Broker: Emma Jones, ADAS

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Cronfa Amaethyddol Ewrop ar gyfer Datblygu Gwledig:
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Llywodraeth Cymru
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Contents

Project Description

The global burden of antimicrobial resistant infections is growing and poses a serious threat to human and animal health. This project is building on work already undertaken in the sector, improving flock management, mainly through improved nutrition and hygiene. The project principles relate to the need for antibiotics and at the same time increasing production, while maintaining high standards of animal health and welfare. Assessing antibiotic use in a sheep production system helps to develop a safe and healthy food supply, particularly 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 (per kg/animal weight) 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.

Experimental Design

Seven farmers from across Anglesey participated in the project. In the first and second years of the project all the group members received the following analysis and support:

- Analysis of silage to be fed to breeding ewes at lambing time
- Rationing advice from Kate Phillips and Karen Wheeler with respect to the silage analyses
- Visits from Kate Hovers to discuss health issues within their flocks and to provide an action plan for lambing time
- Metabolic profiling of pregnant ewes carried out by local vets
- Colostrum absorption testing of lambs carried out by local vets during lambing
- Bedding sampling of pre-lambing, post-lambing and pet lamb pens during lambing
- Faecal sampling of lambs and post mortems of lambs when problems occurred

Conclusions

The analyses carried out, and the subsequent advice provided to the farmers in the group enabled them to make informed choices with reference to improving nutrition, resulting in an improvement in colostrum quality and quantity.

Anecdotally, group members have commented that the nutrition advice provided motivated them to select better supplementary feeds and feed them at higher rates, as required.

The veterinary advice and testing provided enabled the farmers in the group to embrace management changes at lambing time. These changes included cleaning sheds between batches of ewes or during lambing, wearing gloves when assisting at lambing and when handling sick lambs, and reducing castration and docking, as this can be a risk factor for joint ill.

During the second lambing season, improved management of ewe health and nutrition alongside improved hygiene at lambing time significantly reduced bacterial counts on all farms.

Furthermore, as a result of the work done in the first and second lambing seasons, members of the group reduced the prophylactic use of antibiotics at lambing time. The results show that there was a large decrease in antibiotics use between 2017 and 2018 (49.5% drop), then a further decrease in antibiotic use of 20.3% between 2018 and 2019.

Benchmarking across several farms in the group over the duration of the project showed, improved rearing rates and reductions in variable costs.

The farmers reported that they have seen more even growth rates within triplet groups as a result of the range of management changes implemented, and a reduced incidence of joint ill and scours.

Methodology and results

Silage analysis & rationing advice

Methodology

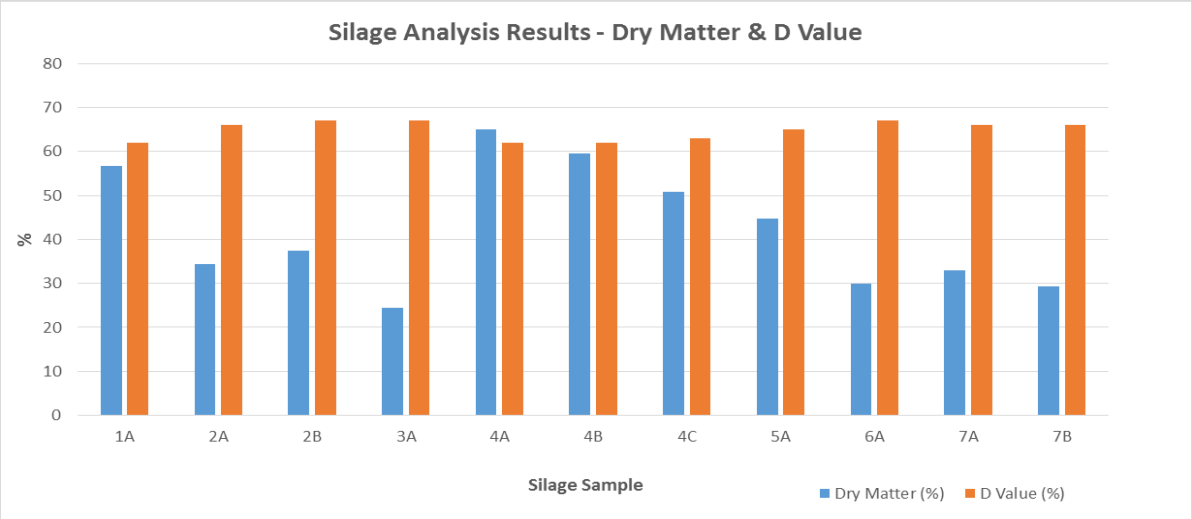
Silage analyses were carried out on the samples provided by the farmers in the group, of silage that would be fed to their ewes at lambing time. Standard analyses were carried out on the silage alongside full mineral analysis (except iodine) in Year 1.

In Year 2 it was decided that standard analyses only would be carried out on the silage samples provided by the members of the group.

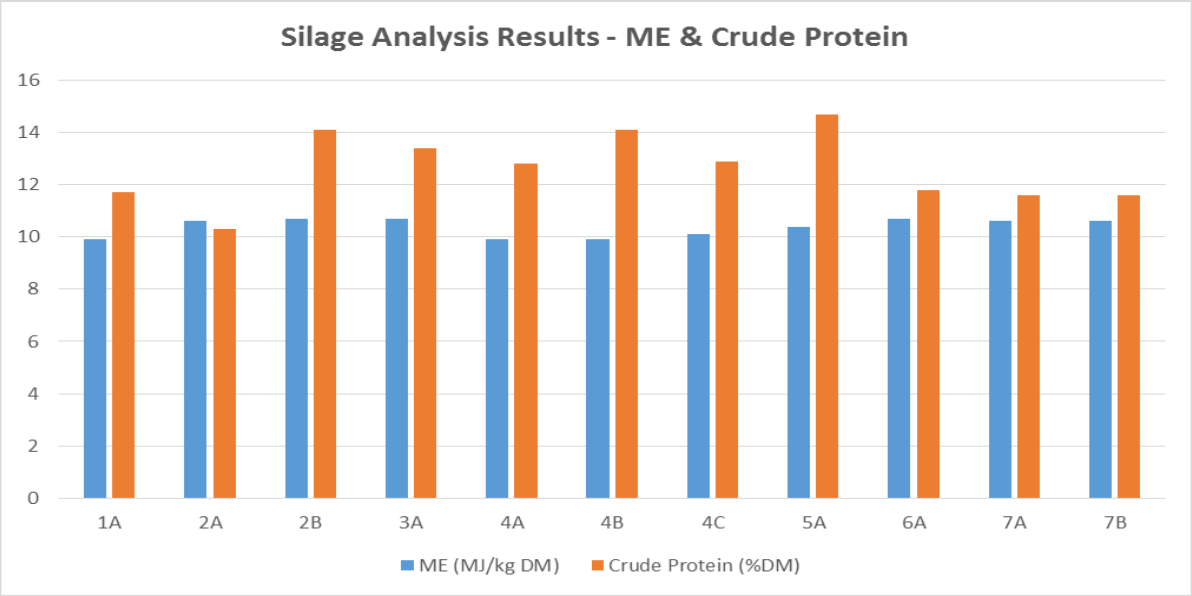
The farmers in the group were also asked to provide the ingredients lists from their chosen compound feed for their ewes at lambing time. This along with the silage analyses were then used by Karen Wheeler and Kate Phillips to provide ration recommendations for each farmer.

Year 1 Results

The top-line results of the silage analyses are shown below.

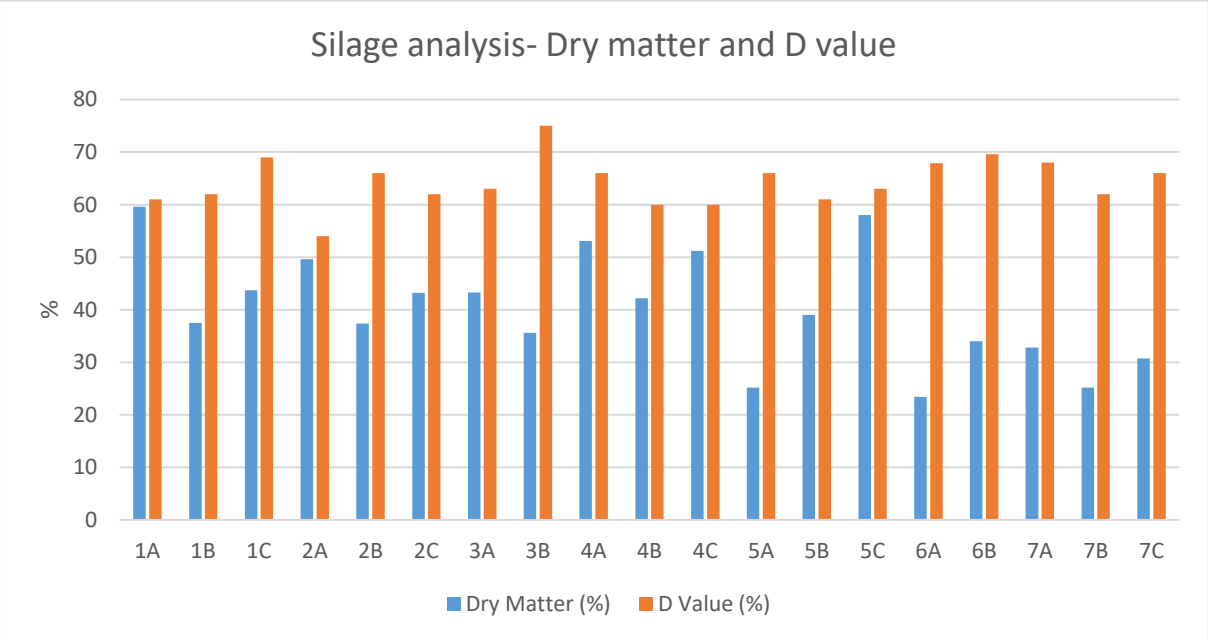


The graph above shows the dry matter and D values for the silage samples collected and analysed from the 7 farms. Target dry matter (DM) 30-35% and target D-value 69-72%. This highlights that the silages analysed were generally dry with the results from farm 4 up at 50% - 65% dry matter. Meanwhile, the D-values for all the silages sampled were over 60% but under the target.



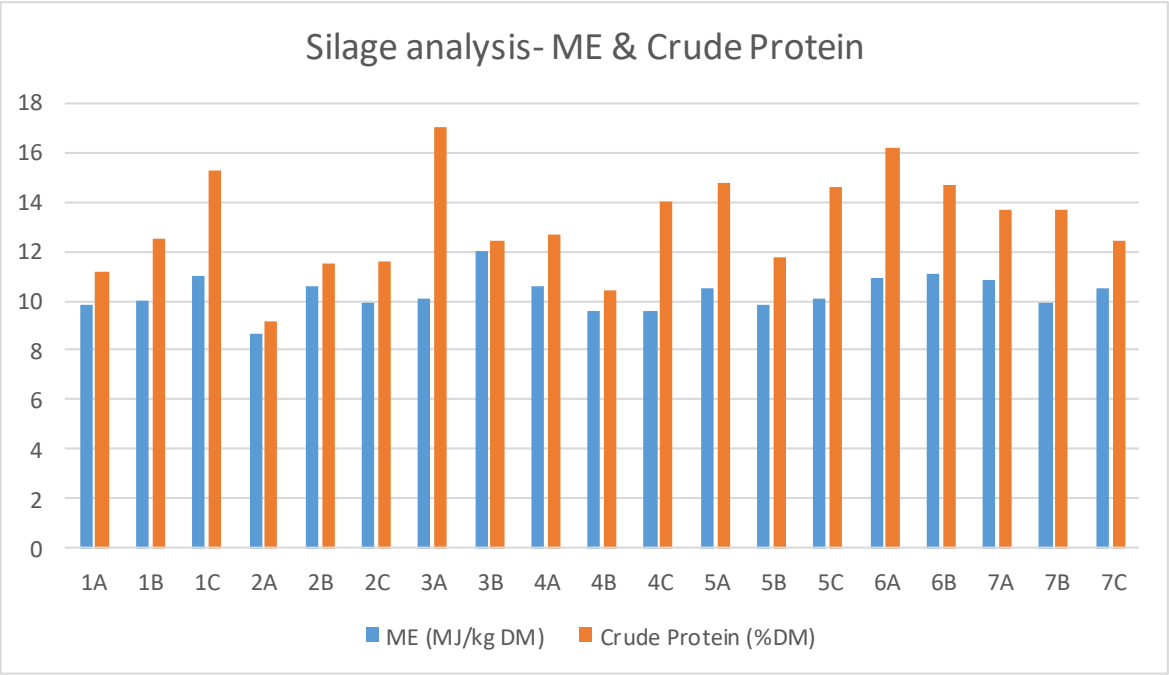
The graph above shows the metabolisable energy (ME) and crude protein in the silages analysed. The target ME is 11-11.5MJ/kg DM and the target crude protein is 15-18%. Although the majority of the silages analysed had ME values of over 10MJ/kg DM, none of the samples were on target. In addition, none of the silages analyses had crude protein levels on target.

Year 2 Results



The graph above shows the dry matter and D values for the silage samples collected and analysed from the 7 farms in the second year of the project. The dry matter results ranged from 23% - 59%, with 16 of the silages sampled having dry matter of 30% or higher. The D values ranged from 52% to

72%, with 18 of the samples at 60% or above. However only 3 samples hit the D value target of 69% - 72%.



The graph above shows the metabolisable energy (ME) and crude protein in the silages analysed in Year 2. The target ME is 11-11.5MJ/kg DM and the target crude protein is 15-18%. Although 10 of the samples analysed had ME values of over 10MJ/kg DM, 3 of the samples reached the 11MJ/kg DM target or better. With regards to crude protein, 3 of the silages sampled were on target.

Between years one and two there was an improvement in the quality of the silage provided to the sheep. This cannot be attributed to one specific reason for improvement.

Recommendations and Action taken

As a result of analysing the silage which would be provided to the ewes. Supplementary rations could be tailored to the requirements of the ewes in the lead up to lambing and once they had lambed.

The subsequent metabolic profiling of the ewes, carried out 2-3 weeks prior to lambing, was used as a tool to confirm whether nutrition was adequate. The metabolic profiling results in Year 1 and Year 2 showed that energy and protein balances were generally adequate or better.

Where there were issues with energy and protein balance of individual ewes on individual farms, actions such as increasing the amount of forage space for ewes was recommended.

Metabolic profiling

Methodology

Blood samples were taken from up to 20 ewes on each farm (a mixture of twin, triplet and single bearing ewes) for metabolic profiling, 2 to 3 weeks before lambing. Within the metabolic profiles the following analyses were carried out.

- The ß-hydroxybutyrate (BOHB) analysis showed energy balance. A negative energy balance can lead to the onset of pregnancy toxaemia and poor production of colostrum.

- Urea-N analysis provided Effective Rumen Degradable Protein (ERDP) intake information in order to determine current protein intake levels. Low protein intakes can lead to poor quality and quantity of colostrum, leading to poor lamb growth rates.
- Albumin analysis provided long term protein status results and highlighted any underlying disease issues such as liver fluke, gut worms or long term under-nutrition.
- Mineral status analysis for magnesium and copper were also provided. Magnesium analysis also determines the uptake of calcium. Copper deficiency in late pregnancy can lead to 'Swayback' in lambs and over supply of copper can lead to toxicity problems.
- In year 2, vitamin B12 analysis was also carried out in order to identify any cobalt deficiency. Cobalt deficiency can be associated with stillbirths and neonatal mortality.

Year 1 Results

Low albumin results were found across all the farms. This indicated a past or present disease process which affected the sheep in the last few months before lambing. Endoparasites may have been the cause, however low albumin results can be an indicator of other diseases such as lameness, mastitis and Johne's.

In general, there were reasonable to good magnesium results and no evidence of copper deficiency across all the farms. This demonstrated that levels of nutrition were fairly good at this stage prior to lambing. In some cases, copper levels were elevated which highlighted that there may be some underlying inflammatory disease issues.

Three of the farmers in the group carried out worm egg counts (WEC) and Fluke counts.

Year 2 Results

BOHB and urea-N results were good across all the farms. Albumin levels were also much improved from year one and demonstrate improvements in protein and energy levels.

There was no evidence of magnesium or copper deficiency. Some samples showed slightly elevated copper levels, which highlighted that there may be some underlying inflammatory disease issues.

The additional testing for Vitamin B12 showed good results and therefore no cobalt deficiency.

Recommendations and Action taken

Based on the results provided, Kate Hovers provided guidance to the farmers in the group to send ewes for post mortem and/ or carry out worm egg counts (WEC) and fluke counts in order to establish the cause of the low albumin levels.

Lambs from one farm were sent for post mortem during this lambing season and Border Disease was diagnosed.

Three of the farmers in the group carried out WEC/ Fluke counts on ewes before or around lambing and found some level of rumen and liver fluke present.

One farm also saw elevated pathogenic E.coli in faecal samples and two farms had Cryptosporidium oocyst counts in scouring pet lambs (generally any crypto can be significant as it has a low infective dose).

Colostrum absorption

Methodology

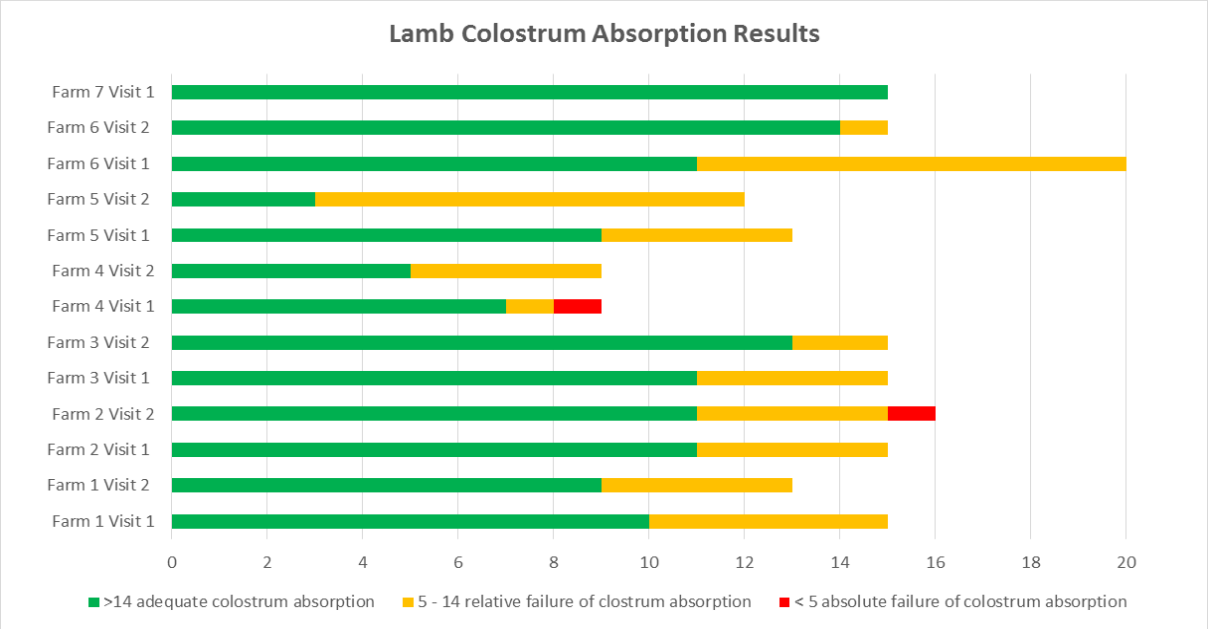
Blood samples from up to 30 lambs per farm were taken by the local vets over 2 visits, 2 weeks apart (with the exception of Farm 7 which received one visit) in year 1. In year two, up to 45 lambs were

sampled over three visits on each farm, 1-2 weeks apart during the lambing period. The blood samples were analysed for zinc sulphate turbidity (ZST) in order to establish levels of colostrum absorption.

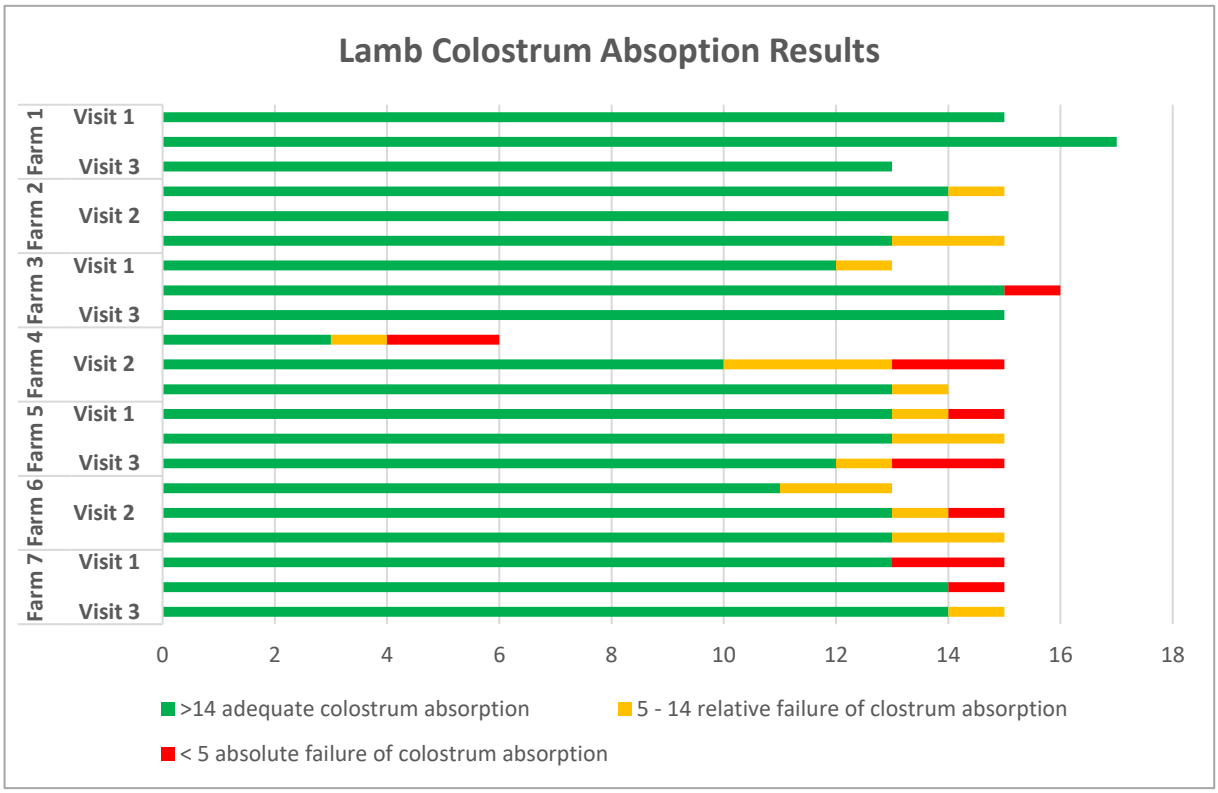
Results

Year 1 Results

The results varied, with results from Farm 7 showing adequate colostrum absorption across all the lambs sampled, while Farm 2 and Farm 4 had individual lambs with absolute failure of colostrum absorption. The level of colostrum absorption also varied between visits and there was no clear evidence of a trend.



Year 2 Results



There was some variation in the results, with Farm 1 demonstrating that all lambs tested had adequate colostrum absorption, and Farm 4 having the most colostrum absorption failures. However, the first visit to Farm 4 may have been slightly too early and the lambs were only just 24 hours old. The proportion of lambs with adequate colostrum absorption increased across all farms compared to year 1. Farms 5 and 6 demonstrated significant improvements in colostrum absorption.

Recommendations and Action taken

The number of visits to test colostrum absorption in lambs was increased from 2 visits to 3 in Year 2. There was a general improvement in results from Year 1 to Year 2. Improved management of nutrition and health status of ewes contributed to this improvement.

The group discussed using refractometers to monitor the quality of colostrum available to the lambs at birth. Used regularly, this can help farmers assess whether lambs are receiving colostrum, from their mothers or from other sources, which is of adequate quality.

Anecdotally, one of the farmers in the group purchased a refractometer to look at the consistency of colostrum produced by the flock. The farmer monitored colostrum quality across the majority of their ewes in Year 2 and also used the refractometer to analyse the quality of powdered colostrum and cow colostrum purchased.

Bedding sampling

Methodology

As with the colostrum absorption blood sampling, bedding samples were taken at each farm on up to 2 occasions, 2 weeks apart. Bedding samples were taken from the pre lambing pen, post lambing (individual) pens and pet lamb pens in year 1.

In year 2, samples were only taken from the pre-lambing and post-lambing pens. Bedding samples were analysed for total bacteria count, streptococcus, staphylococcus, coliforms and E.coli counts.

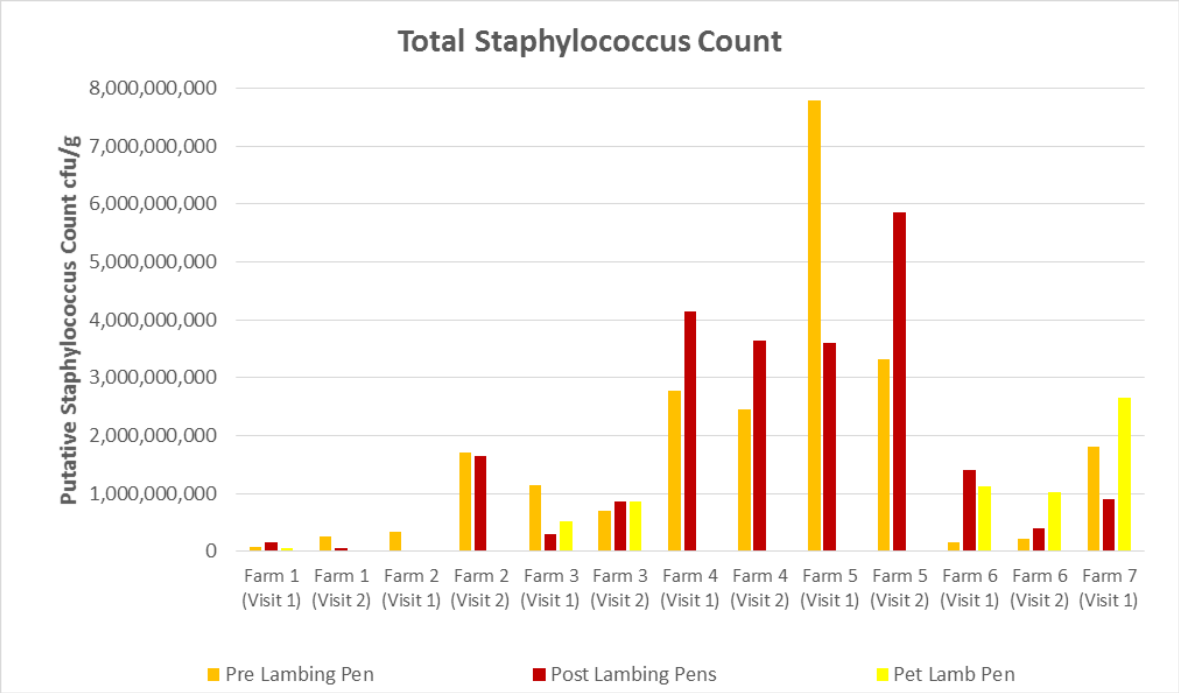
On Farm 7, additional samples were carried out on pre lambing pens – 1 batch of pens being treated with hydrated lime and the other batch treated with Stalosan F disinfectant. This was done to look at the differences in bacterial counts between the different treatments.

Staphylococcus results

Staphylococcus causes mastitis in ewes and can be a cause of infections in new born animals.

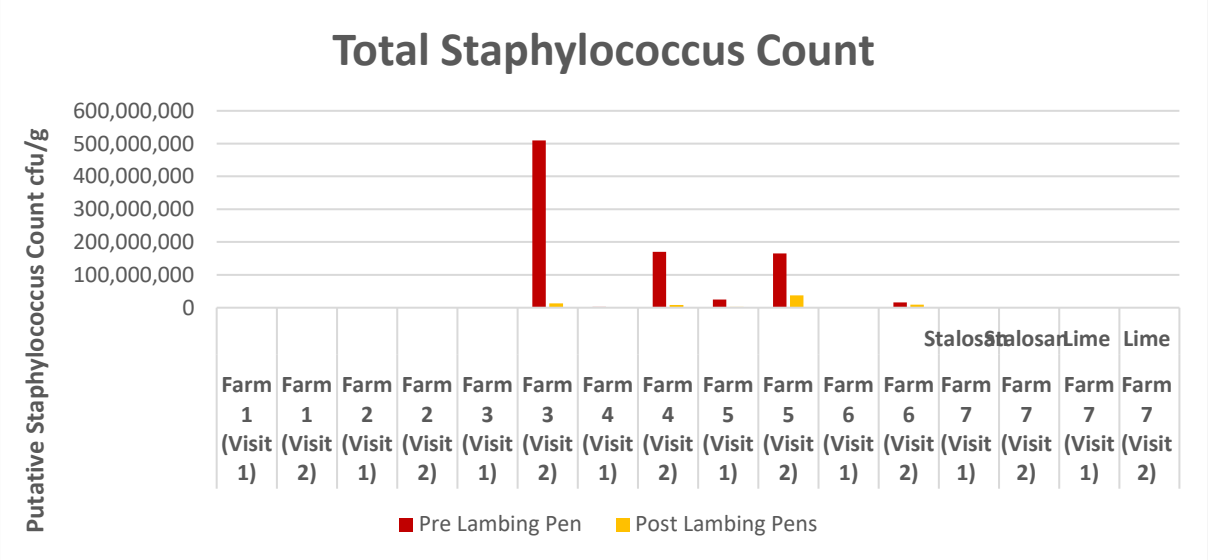
Staphylococcus (Staph.) aureus is the third most commonly isolated bacterium from milk samples sent to the VLA / SAC. Staph aureus can cause a wide variety of signs including a severe, toxic mastitis, but it is as a cause of high cell count problems that it is most commonly encountered. This is because *Staph aureus* often sets up a chronic, grumbling, walled-off infection deep in the udder**.** These can be very difficult to treat. (Source: NADIS)

Year 1 Results



In year 1, farm 5 had the highest level of staphylococcus bacteria in their pre lambing pen on the first visit, this had reduced by the second visit, however the staphylococcus count in the post lambing pens increased. Farm 4 also had fairly high levels of staphylococcus in their post lambing pens on both visits. Conversely, Farm 1 had very low staphylococcus levels on both visits, as did Farm 2 on the first visit.

Year 2 Results



In year 2 the Staphylococcus counts were generally lower across all farms, and well below 100,000,000cfu/g, with the exception of Farm 3 which saw a big jump in the Staphylococcus count in their pre lambing pens at the second visit. Farm 4 and Farm 5 also saw increased Staphylococcus counts in their pre lambing pens at the second visit, but to a much lesser extent than Farm 3 and at lower levels than in year 1.

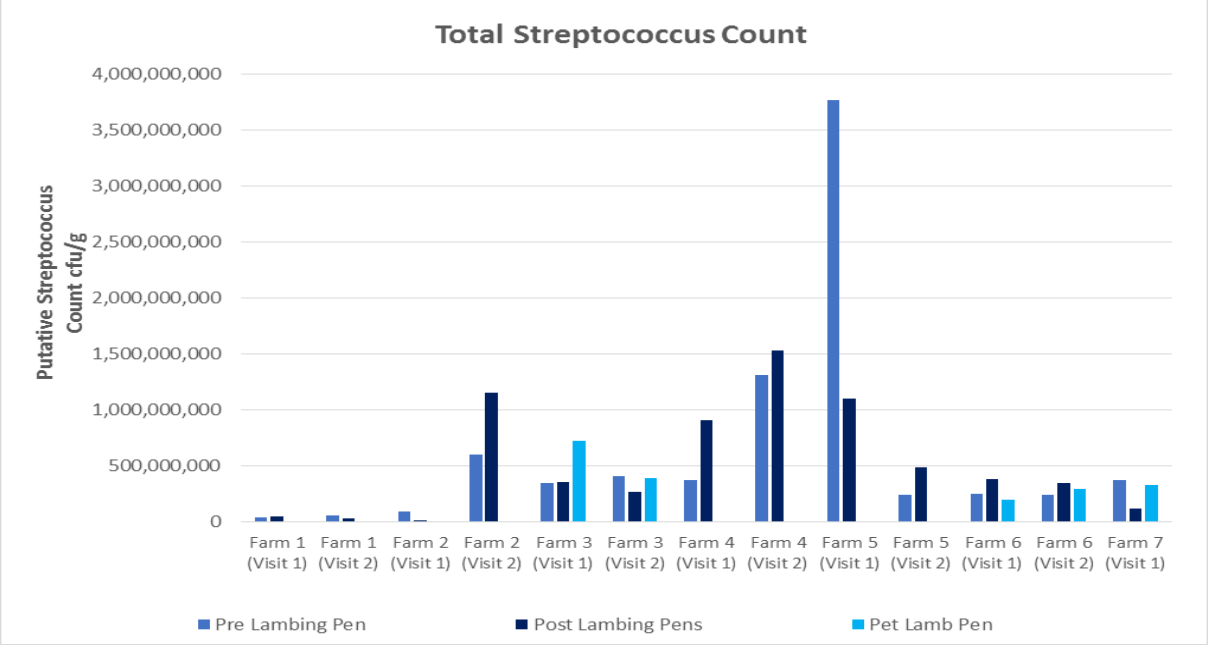
On Farm 7 there was very little difference between the pre lambing pens treated with Stalosan F disinfectant and the pre lambing pens treated with lime.

Streptococcus Results

Streptococcus dysgalactiae is the bacteria which causes joint ill. The analysis carried out on the farms details general Streptococcus count, and is not classified into type.

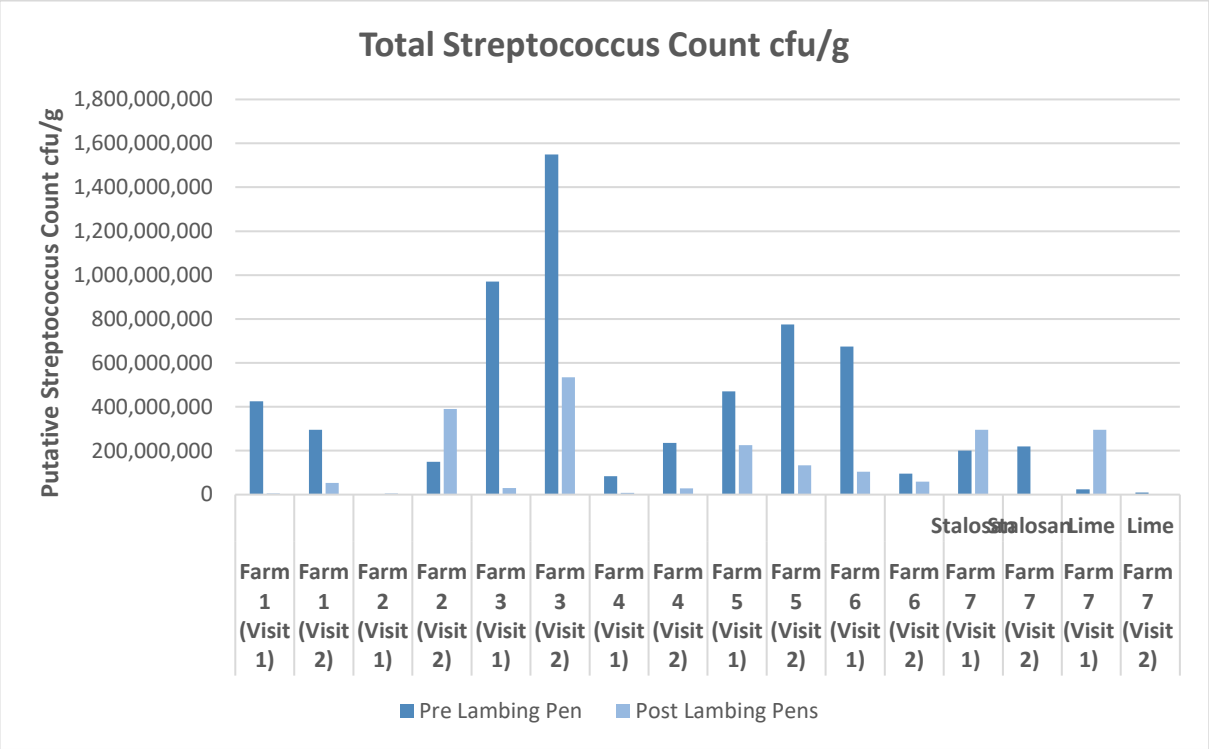
Joint infections with the bacteria *Streptococcus dysgalactiae* are acquired during the first few days of life with lameness visible from five to 10 days old. The number of infected joints varies; only one joint is affected in approximately 50 per cent of lambs with two to four joints in the remainder. The joints most commonly affected, with decreasing frequency, are the carpus (the "knee" on the front leg), hock, fetlock, and stifle joints. The affected joint(s) are swollen, hot, and painful. Infection causes considerable muscle wastage due to lack of use of the limb, and after only one week lambs with polyarthritis are smaller than their twin and in poorer body condition. (Source: NADIS)

Year 1 Results



In year 1 farm 5 had very high streptococcus levels at the first visit in the pre lambing pen, however this was much lower by the second visit. Farm 4 saw counts increase by the second visit, in pre lambing and post lambing pens. Farm 1 had very low streptococcus counts at both visits and Farm 2 had low counts at the first visit but saw a big increase by the second visit. Farm 3 had the highest streptococcus counts in their pet lamb pen on both visits.

Year 2 Results



In year 2, Streptococcus counts were also down on the previous year. Farm 3 saw the highest count in their pre lambing pens at the first and second visits, these counts were also higher than the previous year.

The remaining farms showed lower Streptococcus counts compared to year 1, and all counts were under 800,000,000cfu/g and lower than the year 1 results.

On Farm 7, the pre lambing pens treated with Stalosan F disinfectant showed higher Streptococcus counts compared to the pre lambing pens treated with lime.

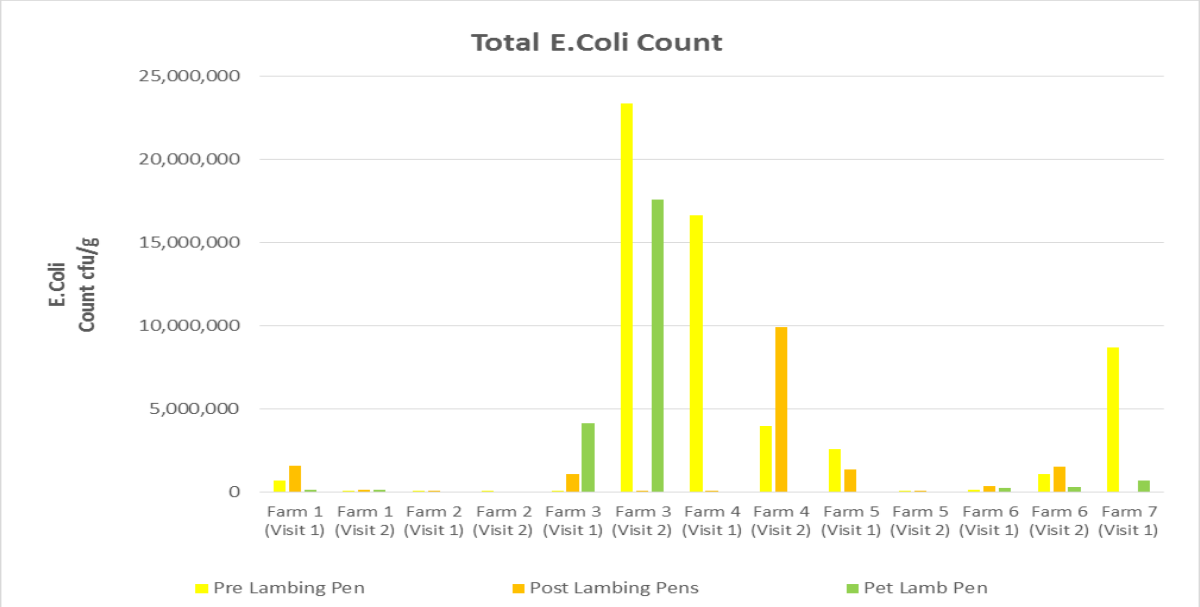
E.Coli results

E.coli bacteria cause scours and watery mouth in sheep.

Watery mouth disease is a colloquial term (others include rattle belly) used to describe a collection of clinical signs in newborn lambs which includes lethargy, failure to suck, profuse salivation, bloating and retained meconium. The condition is caused by colonisation of the small intestine by *E. coli* with rapid multiplication and release of toxins.

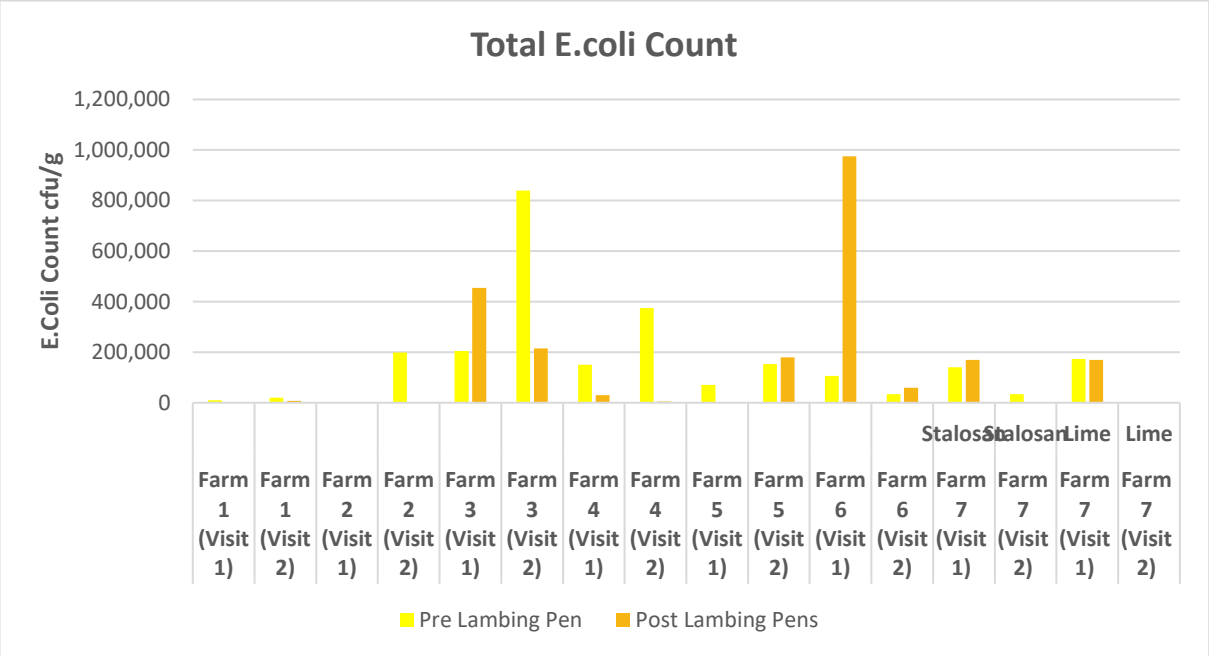
Initial infection results from a high environmental bacterial challenge from dirty, wet conditions in the lambing shed and pens, and from ewes with faecal staining of the wool of the tail and back end. Colonisation of the gut and rapid bacterial growth is facilitated by inadequate or delayed colostrum intake. These risks are higher in lambs of low birthweight, from ewes in poor condition or ill health, in multiples, following difficult births and due to mismothering. (Source: NADIS)

Year 1 Results



In year 1 farm 3 had the highest counts for E.coli at their second visit in their pre lambing and pet pens, while Farm 4 had high E.coli counts at their second visit. Farm 7 also had a high E.coli count in their pre lambing pen. Farm 2 had very low E.coli counts, as did Farm 1, Farm 6 and Farm 5 (second visit).

Year 2 Results



The E.coli count results in year 2 were much lower than the year 1 results. Farm 6 had the highest E.coli count in their post lambing pens at the second visit, however this was still much lower than counts in the previous year. All E.coli counts were below 1,000,000 cfu/g.

On Farm 7, the E.coli counts for pre lambing pens treated with Stalosan F disinfectant had slightly lower counts compared to the pre lambing lens treated with lime, at the first visit. At the second visit

the E.coli counts in the Stalosan F treated pre lambing pens were slightly higher than the counts for the lime treated pre lambing pens.

Recommendations and Action taken

As a result of the sampling carried out, alongside the visits and support provided by Kate Hovers, the farmers in the group developed their own management routines to improve hygiene at lambing time and reduce bacterial load in lambing areas. The actions taken included the following:

- Pre-lambing pens were cleaned out and limed/ disinfected prior to the next batch of ewes coming in. Water troughs were also cleaned out regularly.
- Lame ewes were treated promptly and managed separately, to avoid spread of infection.
- Castration and tailing of lambs in the first week of life was discouraged to avoid stress and wounds where joint ill bacteria could enter.
- Wearing gloves when assisting at lambing and when handling ill lambs was implemented.
- Feed tubes were washed in warm soapy water then disinfected in baby bottle solution.
- Some lambing pens for sick ewes or lambs, or aborted ewes were set up in a separate area from the main lambing pens.
- The farmers were encouraged to use ewe colostrum to top up lambs, where possible.
- Where cow colostrum was used, assessment with a refractometer was carried out and only colostrum with a reading over 22 was provided to lambs.
- The use of probiotic, natural yogurt was considered on one farm, rather than prophylactic antibiotics for lambs. More research is required on this treatment.

Use of Antibiotics at Lambing Time

Over the course of the project, the farmers in the group provided their antibiotic use records during lambing time. Five of the seven participating farmers in the project provided records of their antibiotic use during lambing time in 2017, 2018 and 2019. The tables below shows the total and average amount of antibiotics used by the farmers each year.

2017	
Type of Antibiotic	**Volume used at lambing (ml)**
Ultrapen	7800
Bimoxyl	5800
Oroject	5100
Spectam Scour Holt	2400
Baytril oral 2.5%	1600
Tetroxy	5200
Cevaxel RTU	400
Tilan 200	2400
Tetroxy spray	1800
Norocilin	2400
Clavubactin	500
Pen Strep	1600
Eye ointment	100
Betamox LA	2700
Alamycin LA	350
TOTAL	**40150**
Average/farm	**10037.5**

2018	
Type of Antibiotic	**Volume used at lambing (ml)**
Terramycine	800
Zactran	100
Ultrapen	4200
Bimoxyl	3600
Oroject	630
Spectam Scour Holt	800
Baytril oral 2.5%	600
Tetroxy	3600
Tilan 200	1200
Tetroxy spray	600
Norocilin	1200
Clavubactin	500
Pen Strep	400
Betamox LA	5160
Alamycin LA	350
TAF Spray	1500
Clamoxyl rtu	100
TOTAL	**25340**
Average/farm	**5068**

2019	
Type of Antibiotic	**Volume used at lambing (ml)**
Terramycin	200
Ultrapen	3600
Oroject	2100
Spectam Scour Holt	1200
Baytril oral 2.5%	100
Tetroxy	1800
Tilan 200	300
Norocilin	1000
Pen Strep	600
Betamox LA	6600
Engymycin & TAF Spray	1800
Clamoxyl RTU	100
Alamycin LA	800
TOTAL	**20200**
Average/farm	**4040**

*Please note that data is from 4 farms in 2017, then 5 farms in 2018 and 2019.

The tables above show the volume of each type of antibiotics used at lambing time by farmers in the group. The results show that there was a large decrease in antibiotics use between 2017 and 2018 (49.5% drop), then a further decrease in antibiotic use of 20.3% between 2018 and 2019.

Recommendations and Action taken

Anecdotally, the farmers in the group commented that they had tried to reduce their prophylactic use of antibiotics, targeting triplets or weaker lambs for treatment.

As well as improved nutrition and hygiene in the lambing areas, it is also important to note that the weather during lambing season was better in year 2 compared to year 1.

Development of Management Changes at Lambing Time

Independent sheep vet, Kate Hovers, visited the farms several times throughout the duration of the project and supported the farmers to embrace management changes, bespoke to their farm situations. The management changes were developed to encourage improved nutrition and hygiene, in order to reduce their reliance on antibiotics. Examples of the management changes discussed and implemented are detailed below.

- Forage and concentrate space for ewes was measured on all farms during the first year visits. Where necessary, the farms developed ways of improving access to forage and concentrates.
- Pre-lambing pens were cleaned out and limed/ disinfected prior to the next batch of ewes coming in. Water troughs were also cleaned out regularly.
- Lame ewes were treated promptly and managed separately, to avoid spread of infection.
- Castration and tailing of lambs in the first week of life was discouraged to avoid stress and wounds where joint ill bacteria could enter.
- Wearing gloves when assisting at lambing and when handling ill lambs was implemented.
- Feed tubes were washed in warm soapy water then disinfected in baby bottle solution.
- Some lambing pens for sick ewes or lambs, or aborted ewes were set up in a separate area from the main lambing pens.
- The farmers were encouraged to use ewe colostrum to top up lambs, where possible.
- Where cow colostrum was used, assessment with a refractometer was carried out and only colostrum with a reading over 22 was provided to lambs.
- The use of probiotic, natural yogurt was considered on one farm, rather than prophylactic antibiotics for lambs. More research is required on this treatment.

Benchmarking

Several farmers in the group participated in sheep enterprise benchmarking exercises, before and during the EIP project. The results for three of the farmers in the group are shown below.

EIP4 Sheep Benchmarking Data						
	Farm 1		Farm 3		Farm 6	
KPIs	16/17	18/19	16/17	18/19	16/17	18/19
Rearing Rates	147%	156%	126%	146%	113%	115%
£ per lamb sold/ retained	115.12	105.88	97.10	96.50	97.64	90.17
Feed £/ewe	29.96	24.92	26.75	24.87	23.92	25.62
Vet & Med £/ewe	11.85	6.95	8.61	8.39	6.30	1.53
Livestock sundries £/ewe	18.97	16.87	18.09	11.52	6.96	7.45

The results of the benchmarking show that all three farmers saw an increase in lambs reared from the 16/17 season to the 18/19 season. However, the price per lamb sold or retained reduced. Farms 1 and 3 reduced their feed, vet & med and livestock sundries costs over the period. Farm 6 saw an increase in feed and livestock sundries costs, alongside a big drop in vet & med costs.

Conclusions

The analyses carried out, and the subsequent advice provided to the farmers in the group enabled them to make informed choices with reference to improving nutrition, resulting in an improvement in colostrum quality and quantity.

Anecdotally, group members have commented that the nutrition advice provided motivated them to select better supplementary feeds and feed them at higher rates, as required.

The veterinary advice and testing provided enabled the farmers in the group to embrace management changes at lambing time. These changes included cleaning sheds between batches of ewes or during lambing, wearing gloves when assisting at lambing and when handling sick lambs, and reducing castration and docking, as this can be a risk factor for joint ill.

During the second lambing season, improved management of ewe health and nutrition alongside improved hygiene at lambing time significantly reduced bacterial counts on all farms.

Furthermore, as a result of the work done in the first and second lambing seasons, members of the group reduced the prophylactic use of antibiotics at lambing time. The results show that there was a large decrease in antibiotics use between 2017 and 2018 (49.5% drop), then a further decrease in antibiotic use of 20.3% between 2018 and 2019.

Benchmarking across several farms in the group over the duration of the project showed, improved rearing rates and reductions in variable costs.

The farmers reported that they have seen more even growth rates within triplet groups as a result of the range of management changes implemented, and a reduced incidence of joint ill and scours.