Animal &
Grassland Research
and Innovation
Programme

Teagasc National Sheep Conference 2021

Tuesday | 26th January 2021
Thursday | 28th January 2021

Virtual Sheep Conference 2021
Venue: Online

Teagasc
Agriculture and Food Development Authority

Teagasc National Sheep Conference 2021

Tuesday 26th January

&

Thursday 28th January

8pm to 9pm

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Foreword

The year 2020 was a year that had many potential challenges to all sectors in the economy, including sheep production. The year started off with the fear of a no deal Brexit outcome threatened until a deal (the EU-UK Trade and Cooperation Agreement) was agreed just prior to Christmas. The concerns associated with the ongoing Covid-19 pandemic commenced in January with the first cases of Covid-19 in China. Covid-19 spread very rapidly and Ireland, together with many other countries, entered a 'lock down' in March 2020. The 'lockdown' created new challenges to exporting agrifood produce, including transport, availability of refrigerated units and a major shift from catering to retail sales. These challenges initially had negative consequences for farm gate prices. However, as 2020 progressed, prospects improved in the sheep sector. Prices received from processors increased, with price per kg of lamb carcass increasing on average by 57c/kg (12%) relative to the average price received in 2019; there was a strong demand for breeding stock, both as ewe replacements (either as lambs or hoggets) and rams, which reflects a renewed interest in sheep production by Irish farmers.

Data from the Teagasc National Farm Survey (NFS) show that sheep production has consistently delivered higher average margins per hectare than beef cattle enterprises, but that margins are considerably lower than those earned in dairying enterprises. The most recent NFS data (2019) show that mean gross margins of €630, €430, €479, and €2,513 per ha for lowland sheep, suckler beef, cattle finishing and dairying, respectively. The top third of sheep producers had a gross margin of €1,163/ha (compared to €189/ha for the bottom third). The difference in profitability between the top and bottom producers is due to many reasons, including the adoption of proven technologies which are known to increase farm profitability.

The latest published CSO sheep statistics (Dec 2019) indicate that there were 2.64 million breeding ewes (a decrease of 4% from 2018) in Ireland which reared an average of 1.37 lambs per ewe joined (NFS 2019). In 2020 sheep meat, valued at €357m was exported, making Ireland the largest net exporter of sheep meat in Europe and the fourth largest sheep meat exporter worldwide. The main markets for Irish sheep meat are EU27 and the UK which accounted for 72% and 10% of exports respectively in 2020. Exports to other markets accounted for 10% of export value. China is becoming a major importer of sheep meat, consequently New Zealand exports to the EU in 2020 were almost 13% lower than in 2019. These trade developments have had a positive impact on the price received by Irish sheep producers. Six Irish sheepmeat processing plants are now eligible to export to China.

This is the 9th Annual Teagasc Sheep Conference which forms an integral part of Teagasc's knowledge transfer programme to stakeholders involved in sheep production. There are four papers, each of which have important take home messages. Professor Paul Kenyon from Massey University, outlines lamb production from pasture in New Zealand, including grazing management, inclusion of white clover and mixed herb species. Dr Aine O'Brien, Teagasc, Moorepark, discusses the potential to reduce labour at lambing by improving lamb vigour and ewe mothering ability through breeding. Ms Nicola Fetherstone, Teagasc, Athenry, presents results from the INZAC flock which is evaluating New Zealand ewes and the Replacement Index from Sheep Ireland. Finally, Dr Ben Shrugnal from the UK discusses Laryngeal chrondritis (Texel Throat), which is an obstructive disease of the upper respiratory tract in sheep caused by abscesses on the larynx, which, along with swelling and inflammation of the throat, restrict the windpipe.

I would like to thank all the speakers, the Teagasc organising committee, the Editor and local Teagasc advisory staff.

Director, Teagasc.

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INZAC: An Irish versus New Zealand animal comparison

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Take home messages

- The INZAC flock is composed of three treatment groups: high genetic merit New Zealand (NZ), high genetic merit Irish (High Irish) and low genetic merit Irish (Low Irish) ewes
- New Zealand ewes surpassed the performance of both Irish groups for litter size, ewe survival, lambing dystocia and lamb vigour
- High genetic merit lambs (Irish and NZ) outperformed lambs from low genetic merit ewes post-weaning with higher growth rates and reduced days to drafting
- New Zealand and High Irish ewes were capable of producing a greater amount of lamb live-weight per kg of ewe live-weight at 40 days post-lambing and also gave birth to and reared a greater total number of lambs than Low Irish ewes
- Greater total number of lambs born and reared over the 4 years of the study, lamb growth post weaning, days to drafting and lamb live-weight produced per kg ewe live-weight at 40 days were detected in High Irish compared to Low Irish animals, however further development of the national genetic indexes, is required to detect differences in other maternal traits

Introduction

Sheep producers in Ireland and New Zealand operate predominately grass based, seasonal and export focused production systems. The similarities in production systems are reflected in both the traits and the emphasis placed on these traits within the respective genetic indexes. However to date, Irish and New Zealand ewes of high genetic merit have not been compared in a common environment. Genetic indexes are now used as a tool for selecting animals across dairy, beef and sheep in Ireland, however ongoing validation of such indexes is required to ensure that animals of superior genetics result in superior performance. The Sheep Ireland €uro-star replacement index is a tool available to farmers to select maternal genetics, however a wide scale validation of this index has not been undertaken to date. Although genetic gain is cumulative and permanent, the progress in the maternal index reported to date in Ireland has been low (€0.28/lamb/year) compared to the corresponding gains reported in New Zealand (€1.16/lamb/year). Therefore, the INZAC flock was established to firstly validate the Sheep Ireland €uro-star Replacement index and secondly to compare Irish and New Zealand genetics across a range of ewe and lamb traits.

Background

Phase one of the INZAC study was carried out over a four year period at Teagasc Athenry, Co. Galway from 2016 to 2019. Three separate groups were established, each containing 60 ewes; New Zealand ewes of high genetic merit (NZ), Irish ewes of high genetic merit (High Irish) and Irish ewes of low genetic merit (Low Irish). The NZ ewes were selected based on their maternal genetic merit in the New Zealand Maternal Worth Index and were imported to Ireland in 2014 and 2015. The two Irish groups were selected based on the Sheep Ireland €uro-star Replacement Index; the High Irish group representing 5 star ewes and the Low Irish group representing 1 star ewes. Each group consisted of 30 Suffolk and 30 Texel ewes, all of which were pedigree animals.

Flock management

In early October each year ewes were artificially inseminated (laparoscopic AI) to a synchronised oestrus according to genetic merit and breed, e.g. High Irish Suffolk ewes were mated to High Irish Suffolk rams. Each ewe received 400 IU of PMSG (Chronogest and Folligon; Intervet Ireland, Ltd.) via intramuscular injection. Rams were introduced to ewes for two repeat cycles following AI. In early December, ewes were housed. The ewes were shorn within days of housing and were ultrasound pregnancy scanned between day 80 and 90 of gestation.

All ewes received grass silage *ad libitium*, while concentrate supplementation was provided based on silage quality and ewe energy requirements, according to litter size from eight weeks prior to the predicted lambing date. Regardless of breed ewes carrying singles, twins and triplets received a total of 7.4 kg, 24.5 kg and 29.4 kg, respectively. Lambing commenced in the last week of February each year. Post-lambing, ewes were individually penned for 48 hours to encourage ewe-lamb bonding. Within the first 24 hours post-lambing all lambs were weighed, sexed, tagged and linked to their genetic dam; litter size, date and time of birth were also recorded. After 48 hours, ewes and lambs were turned out onto a perennial ryegrass and white clover sward at a stocking rate of 12 ewes/ha. All three groups (i.e. NZ, High Irish and Low Irish) grazed separate farmlets throughout the grazing season. No supplementation was offered to ewes at pasture, with the exception of Spring 2018 when adverse weather conditions reduced grass availability.

Lamb live-weight was measured at birth and fortnightly from 40 days of age. Lambs were on average 96 days of age when weaning weights were recorded. Average daily gain (g/day) was calculated across key time points, i.e. from birth to 40 days, from 40 days to weaning and from weaning to drafting. Weaning coincided with the first draft, whereby lambs were drafted from their group at a target live-weight of 43 kg; an additional kilogram was added to the target draft weight per month thereafter. The number of days from birth until drafting was calculated and reported as days to drafting. Although drafted as fit for slaughter and removed from the management system, the majority of lambs were retained for breeding purposes and therefore carcass data was unavailable. For this reason, ultrasound scanning was carried out, at an average of 142 days of age, to measure muscle and fat depth and act as a proxy for slaughter grade and fat class.

The total number of lambs born and reared was used to measure the impact of ewe maternal genetic merit on the ewe's rearing ability, i.e. the difference between number of lambs born and reared per ewe in a system where the maximum number of lambs reared per ewe was 2. The total number of lambs born was the sum of all lambs born per ewe over the period of the study, i.e. four years. The total number of lambs reared was the sum of the lambs reared per ewe until weaning over the four years of the study. For ewes with a litter size of three or more, excess lambs were removed and placed into an artificial rearing unit or cross fostered. Any lamb that was fostered away from a ewe was fostered onto another ewe within the same genetic group, e.g. High Irish lambs only High Irish ewes only. The fostered lamb was assigned to the ewe that gave birth to it for the total number of lambs born trait and to the ewe that reared the lamb until weaning for the total number of lambs reared trait. Lambs that were artificially reared were included within the number of lambs born but were not included within the total number of lambs reared per ewe, as they were not reared by a ewe. Ewes were present for 2.5 lambing events on average across the four years. Dry matter intake (kg DM per day) was estimated using the n-alkane technique and ewe live-weight (kg) were measured at 40 days post-lambing. From this, ewe efficiency measures were calculated. Lamb live-weight (kg) produced per kg of ewe live-weight at 40 days post-lambing was calculated, by dividing lamb live-weight (kg) by ewe live-weight (kg). Lamb live-weight (kg) produced per kg of estimated ewe DMI at 40 days post-lambing was calculated, by dividing the average daily gain (kg/day) of the litter by the estimated daily DMI of the ewe at 40 days post lambing (kg DM/day) to determine if there was a difference in the ability of the various genetic groups to produce more lamb live-weight from the same level of feed intake. Overall, the effect of maternal genetic merit on reproductive, lambing, lamb and ewe productivity performance was undertaken to detect differences between the three groups.

Reproductive performance

Ewe genetic merit (i.e., NZ, High Irish or Low Irish) had no impact on conception to first service, with rates ranging from 74 to 83% to laparoscopic AI. Barren rates did not differ and averaged 7.4% across the three groups (Table 1). Ewes within the NZ group had a greater litter size than the Low Irish ewes, but similar to the High Irish ewes. Furthermore, ewes of high genetic merit, whether NZ or Irish, reared a greater number of lambs per ewe joined compared to the Low Irish ewes (Table 1). A greater proportion of NZ ewes (70.4%) survived from one lambing to the next compared to the High Irish (64.0%) and Low Irish ewes (63.8%), which had similar survival rates.

Table 1. The effect of ewe maternal genetic merit (High New Zealand (NZ), High Irish, Low Irish) on ewe reproductive traits

	Ewe maternal genetic merit				
	NZ	High Irish	Low Irish	SEM	*P*-value
Reproductive traits					
Conception to first service (%)	83	78	74	2.47	NS
Barren rate (%)	6.7	7.5	8.1	0.07	NS
Litter size (lambs per ewe lambing)	1.96^{a}	1.76^{ab}	1.73^{b}	0.050	0.05
Weaning rate (number of lambs per ewe joined)	1.34^{a}	1.26^{a}	1.11^{b}	0.043	<0.001
Survival (%)	70.4^{a}	64.0^{b}	63.8^{b}	5.27	0.05

Lambing performance

Although lamb live weight at birth was similar across the three groups (Table 4), one in four Irish ewes, whether of high or low genetic merit, required considerable assistance at lambing, compared to only one in eight New Zealand ewes; increasing labour demand on farm during an already busy time. In comparison to the NZ ewes, Low Irish ewes were 4 times more likely to suffer from lamb mal-presentation at birth and the High Irish ewes were 4 times more likely to have oversized lambs. Lamb mortality rates within the first 24 hours post-lambing were similar across each of the three groups, averaging at 5.6% (Table 2). A greater proportion (up to 69%) of the litters born from Irish ewes required assistance to suckle compared to those born from NZ ewes, where 51% assistance was required (Table 2). Mothering ability was measured based on how easily the ewe followed the lamb(s) when being moved from a group pen to an individual pen post-lambing. Scores were similar across the three groups, with an average of 76% of ewes following their lambs with little to no hesitance. Lambs born to a ewe with a litter size greater than 2 or to a ewe that was unable to rear one or more of her lambs were removed from the ewe and either cross fostered onto another ewe within the same genetic merit group or artificially reared, where on average 9.3% of lambs were not reared on their birth mother.

Table 2. The effect of ewe maternal genetic merit (High New Zealand (NZ), High Irish, Low Irish) on lambing performance traits

	Ewe maternal genetic merit				
	NZ	High Irish	Low Irish	SEM	*P*-value
Lambing traits					
Gestation length (days)	147. 9	148.2	148.4	0.17	NS
Lambing difficulty (% required considerable assistance)	13[a]	24[b]	24[b]	3.12	0.01
Litter vigour (% required assistance to suck)	51[a]	65[b]	69[b]	3.11	<0.001
Ewe mothering ability (% followed)	79	76	74	2.81	NS
Lamb mortality within first 24 hours (% died)	5.1	4.7	6.7	1.12	NS

Lamb performance

Across the three genetic groups, no differences were reported for lamb live-weight up to 40 days of age with lamb live-weight averaging 5.3 kg at birth and 17.1 kg at 40 days, respectively. Lambs born from NZ ewes were heavier at weaning (32.9 kg) compared to lambs born in either Irish group (31.9 kg (High Irish) and 31.7 kg (Low Irish)). This trend continued post-weaning, with lambs born from NZ ewes 1.2 kg and 1.9 kg heavier than lambs born from High Irish and Low Irish ewes at ultrasound scanning, i.e. 142 days of age, respectively.

Between birth and 40 days of age, lambs born from NZ ewes had a higher average daily gain (312 g/d) compared to lambs born from High (305 g/d) and Low (303 g/d) Irish ewes (Table 3). The same trend continued between 40 days and weaning where lambs born from NZ ewes continued to surpass their Irish counterparts. Post-weaning, i.e. from fourteen weeks post-lambing up until drafting, lambs born from NZ ewes grew at a faster rate than either group of Irish lambs. However, the performance of lambs from Irish ewes of high genetic merit outperformed the lambs from Irish ewes of low genetic merit by up to 22 g/day post-weaning.

Lambs were an average of 161 days old when drafted. Lambs born from either NZ ewes or High Irish ewes were drafted 13 and 8 days earlier than lambs from Low Irish ewes. Lambs from NZ ewes had greater muscle and fat scores at ultrasound scanning compared to those born from Irish ewes, demonstrating the ability of lambs born from NZ ewes to reach the desired carcass weight, conformation and fat cover in the run up to slaughter as part of an Irish production system.

Table 3. The effect of ewe maternal genetic merit (High New Zealand (NZ), High Irish, Low Irish) on lamb growth, days to drafting and ultrasound scanning

	Ewe maternal genetic merit				
	NZ	High Irish	Low Irish	SEM	*P*-value
Live-weight (kg)					
Birth	5.24	5.34	5.28	0.078	NS
Weaning	32.9[a]	31.9[b]	31.7[b]	0.37	0.01
Average daily gains (g/day)					
0-6 weeks	312[a]	305[b]	303[b]	4.36	0.05
6-14 weeks	271[a]	261[b]	258[b]	3.07	0.05
14 weeks to drafting	243[a]	215[b]	193[c]	4.17	<0.001
Days to Drafting (days)	155[a]	160[a]	168[b]	2.46	<0.001
Ultrasound scanning (mm)					
Muscle depth	25.90[a]	24.84[b]	24.45[b]	0.215	<0.001
Fat depth	1.49[a]	1.34[b]	1.27[b]	0.035	<0.001

Figure 1 illustrates the proportion of lambs that had been drafted by a given date within the drafting season, i.e. 92% of NZ lambs and 90% of High Irish lambs were drafted from the group by the 31st September compared to 86% of Low Irish lambs. The drafting pattern demonstrated the ability of lambs of high genetic merit to reach target drafting weight earlier than those of low genetic merit. Furthermore, all NZ lambs were removed from the system by the end of October, while lambs remained within both Irish groups until the end of November.

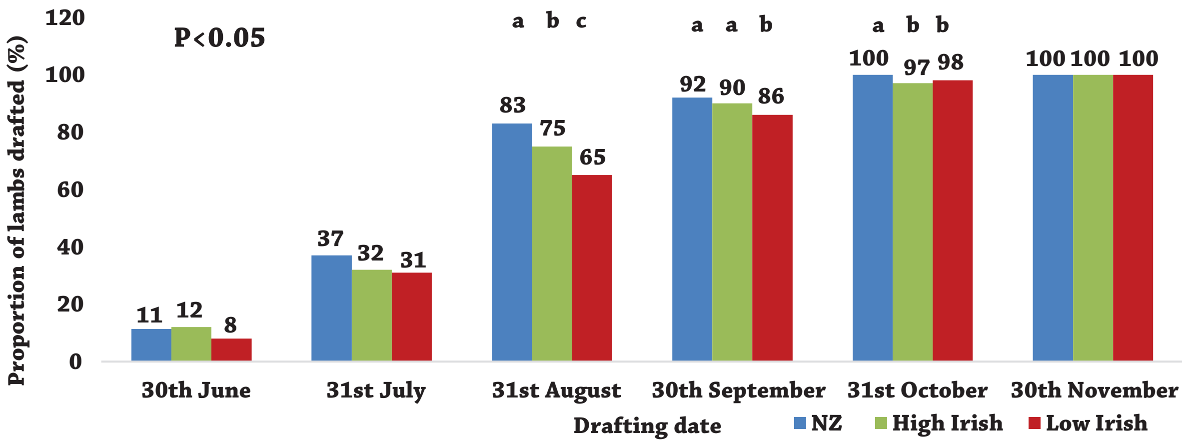

Figure 1. The effect of ewe maternal genetic merit (High New Zealand (NZ), High Irish, Low Irish) on the proportion of lambs drafted by the end of each month

Productivity performance

The total number of lambs born and reared per ewe over the four year period of the study was calculated. New Zealand and High Irish ewes gave birth to more lambs per ewe compared to the Low Irish group (Figure 2). NZ and High Irish ewes also reared a greater total number of lambs over the four year study (3.41 and 3.33 lambs per ewe, respectively), compared to the Low Irish ewes (2.98 lambs per ewe; Figure 2).

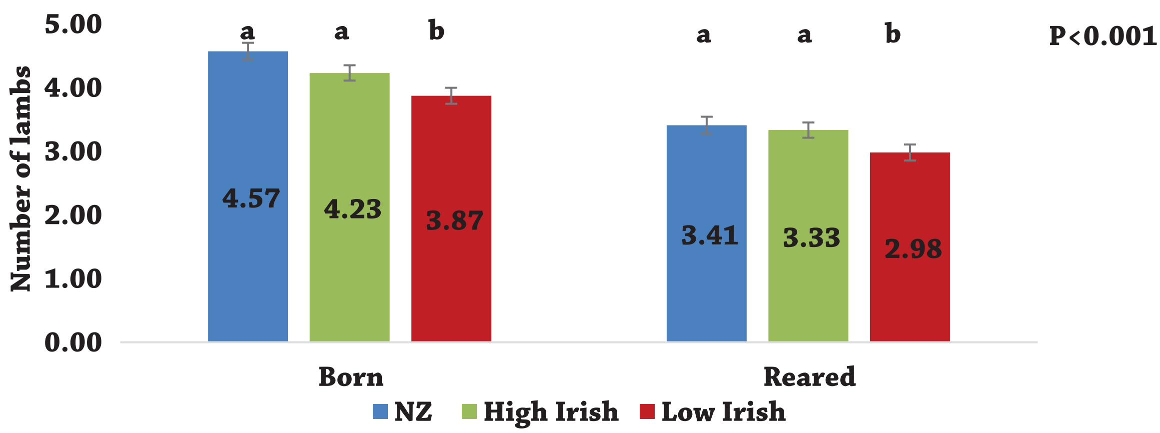

Figure 2. The effect of ewe maternal genetic merit (High New Zealand (NZ), High Irish, Low Irish) on the number of lambs born and reared per ewe over the period of the study

Ewe live-weight (83.6 kg) and body condition score (3.10) were similar across the three groups at 40 days post-lambing. When the live-weight of both the ewe and the lamb at 40 days were compared to one another, NZ and High Irish ewes were capable of producing a greater amount of lamb live-weight per kg of their own live-weight (0.260kg lamb live-weight per kg ewe live-weight) compared to Low Irish ewes (0.213kg lamb live-weight per kg ewe live-weight, Figure 3).

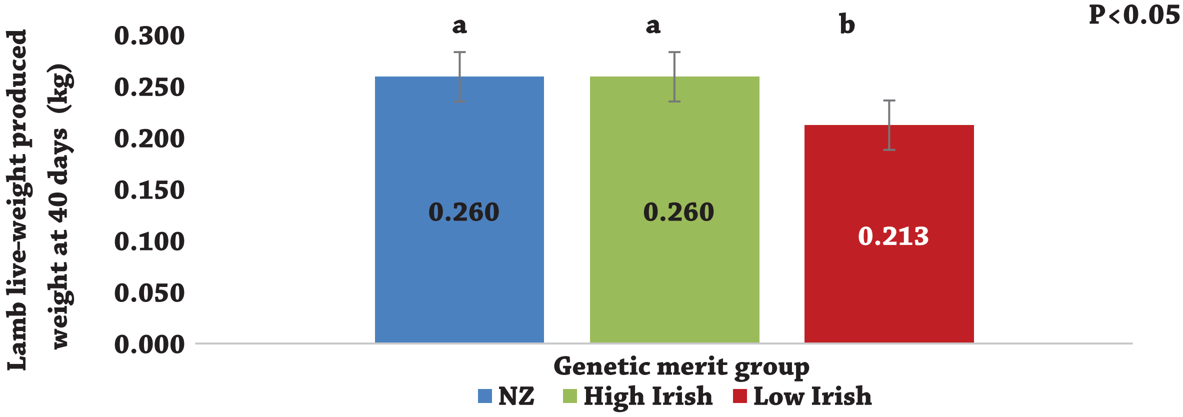

Figure 3. The effect of ewe maternal genetic merit (High New Zealand (NZ), High Irish, Low Irish) on lamb live-weight produced per kg ewe live-weight at 40 days post-lambing

Dry matter intake of ewes at 40 days post-lambing was similar across the three groups, ranging between 2.2 and 2.4 kg DM per day. However, when the ability of the ewe to convert that feed intake into lamb live-weight at 40 days was examined, NZ ewes produced a greater amount of lamb live-weight when consuming the same amount of feed as the High Irish and Low Irish ewes who demonstrated similar results to one another, (0.244 kg, 0.206 kg and 0.181 kg lamb live-weight per kg DM intake for NZ, High Irish and Low Irish ewes, respectively, ($P<0.01$)).

Conclusion

Results from the INZAC flock demonstrate the suitability of New Zealand genetics within an Irish production system and show NZ ewes to be at least similar, if not superior to their High Irish counterparts for many traits including reproduction, lambing and lamb growth traits. Differences between the High Irish and Low Irish ewes were evident across some traits including weaning rate, total number of lambs born and reared over four years, lamb growth post-weaning, days to drafting and lamb live-weight produced per kg ewe live-weight at 40 days post-lambing, however no differences were detected across other traits indicating that further investigation of the indexes is warranted. Results show that selecting ewes of high genetic merit, irrespective of country of origin demonstrated the potential for both farmers and the national sheep industry as a whole to increase output via the number of lambs produced and traded throughout the ewe's productive life in a more efficient and productive manner.

New Zealand feeding guidelines for growing lambs to target live weights on herbage

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Take home messages

- High performance will only be achieved with a high-quality sward (ideally ME in the range of 11 to 12 MJ/kg DM) and when feed intake is not limited.
- Performance is greater when the legume content within a sward is higher and the animal has the ability to choose what it consumes.
- For all classes of sheep in New Zealand herbage intake is not limited when ryegrass white clover swards are maintained between 4 and 8 cm. Within this sward height range, herbage quality, especially if a high white clover content can be achieved, will be optimal.
- Maximising lamb growth and total weight of lamb sold is not just about feeding the weaned lamb well it's also about ensuring ewes are fed well and are in good body condition.
- There is often not enough herbage on farm to meet the optimal requirements for all classes of sheep, at any given time point. Therefore, for each period of the year, farmers need to identify and prioritise which sheep class needs to be fed the best.
- Alternative herbages can be effective tools to improve lamb growth. However, to maximise lamb growth think about managing the sward for the benefit of the plant and lamb performance will take care of itself.
- Many of the permanent alternative species require rotational grazing and therefore to be effective, enough land area needs to be planted to allow for this management style.

Introduction

The New Zealand sheep flock has reduced significantly from approximately 45 million in 1990 to less than 28 million in 2020. However, during that time the average lambing percentage (number of lambs reared per ewe presented for breeding) has increased from approximately 100% to 135% and average carcass weights have increased from approximately 15 kg to 19 kg. The net effect being total industry lamb carcass production has only decreased by roughly 8%. During this period the income from sheep sales, predominantly lamb for slaughter, has become the greatest component of total income sourced on the average sheep and beef farm, as the importance of wool has declined dramatically. Therefore, finishing heavier lambs, as early as possible is now a significant driver for profitability on New Zealand sheep and beef farms. Sheep production in New Zealand is outdoors only, herbage based and relies on a low-cost minimal input system. New Zealand farmers receive no subsidies. The most efficient sheep system is a system where each ewe successfully rears multiple lambs that are slaughtered at weaning, or soon after. This requires high levels of quality herbage.

Permanent pasture species in New Zealand are predominantly based on grass with a low percentage of white clover, generally less than 10%. Ryegrass is the most common sown grass species, although on hill country, especially on the steeper terrain less productive and native grass species can dominate. Increasingly, farmers are utilising short- and longer-term alternative herbage species to ensure higher performance in their flocks. Alternative herbages used in New Zealand are predominantly either pure swards of brassica species (e.g. turnip, swede, kale, rape), pure legume swards (e.g. lucerne or red clover) or herb swards (e.g. plantain, chicory), with the later generally in a white and/or red clover mix.

A main use of the alternative herbages is to grow lambs faster to allow for earlier slaughter dates or heavier slaughter weights. They can also be utilised to improve growth rates in replacement ewe lambs and offered to mature ewes at strategic times of the year, for example in mid pregnancy and lactation, to indirectly improve lamb performance. The purpose of this paper is to focus on the current feeding guidelines to maximise sheep performance in New Zealand with a focus on ryegrass white clover-based guidelines for lamb finishing. However, this paper will also briefly cover the use of alternative herbages, namely herb mixes including plantain, chicory and red- and white clover. It is also important to acknowledge that to ensure heavy lambs at weaning the ewe must be in good condition and fed appropriately in pregnancy and lactation.

Basic principles for ryegrass white clover grazing management under New Zealand conditions

A considerable amount of research has shown that the intake of sheep (adult or young stock) is not limited if the ryegrass white clover sward height does not go below 4 cm (or 1200 kg DM/ha; in New Zealand pasture mass is measured to ground level). Depending on sward conditions, maintenance only feeding levels occur when the sward height is grazed down to approximately 2 cm (or 600 to 800 kg DM/ha). While individual intakes do not increase at sward heights above 4cm, when sward height gets above approximately 10 to 12 cm (2000 to 2400 kg DM /ha), especially over the summer/autumn period, pasture quality declines. Good quality ryegrass white clover pasture should have a ME in the range of 10.5 to 12.0 MJ/kg DM. Mature, rank and reproductive ryegrass-based swards can have ME values below 10 MJ/kg DM. Ensuring the clover content is as high as possible is also an important mechanism to ensure a quality ryegrass white clover sward. Therefore, to maximise energy intakes and performance the ideal ryegrass white clover sward should be maintained in the 4 to 8 cm (1200 to 1800 kg DM /ha) range. Due to seasonal influences on pasture production and animal demand, keeping all swards within the optimal range for all sheep on a farm is impossible. Therefore, farmers must identify and target those classes of sheep which would benefit the most from being offered ryegrass white clover swards within this optimal range, in each period of the year.

Basic principles for herb clover mixed sward grazing management under New Zealand conditions

The golden rule for managing herb clover mixes is to manage for the benefit of the plants, and sheep performance will take care of itself. However, if farmers manage these mixed swards to maximise herbage utilisation, animal performance will decline and the productivity and longevity of the herbages will be disappointing. Clear guidelines have been developed for New Zealand conditions. These include never grazing below 8 cm and waiting to re-graze until the sward is at least 16 cm and has been rested from grazing for at least 3 to 4 weeks. There should be no grazing of the herb clover mix for up to two months in the mid-late winter period. The sward requires rotational grazing and therefore farmers must plant enough area to allow for this. Failure to do this will likely result in over grazing and reduced herbage persistency. Following the correct guidelines should allow the sward to be productive for 4 to 7 years depending on the soil type. Adjusting sheep to these mixes can occur over a 5 to 7 day period, without a drop in performance, by starting with a 2 hour adaption period the first day and increasing this by 2 hour intervals each day. The high performance on these mixes is likely driven by higher intake as the animal is able to select what it wishes to consume and for each period of the year there is at least one species within the mix that's productive, from a herbage mass perspective producing a high feed value sward. On farms with alternative herbages on average less than 10% of the farm is planted with these, due to their limited herbage productivity in winter.

Managing the ewe to maximise lamb growth

Maximising the number and weight of lambs to be weaned in the following year starts at the weaning of this year's lamb crop. At weaning farmers are advised to condition score their ewes and mange a split flock rotation over the summer period, with the poorest condition ewes offered a level of herbage to gain body condition. While the better condition ewes, which is hopefully greater than 80% of the flock, are managed to maintain live weight and clean up rank poor quality grass based pasture to allow for higher quality pasture to grow and be grazed by this year's lambs. To ensure ewes are gaining live weight/body condition, post grazing ryegrass white clover sward heights should not fall below 3 cm, (approximately 900 - 1000 kg DM/ha) and the herbage should ideally have a minimum ME of 10 MJ/kg DM.

During pregnancy, farmers are advised to combine pregnancy scanning data (i.e. number of foetuses carried) with predicted time of lambing (i.e. first or second cycle based on either crayon mating rump marks or estimated foetal ageing via ultrasound) and ewe body condition to determine ewe feeding requirements. It is unlikely that there would be enough herbage on farm to meet the theoretical demands for all ewes, therefore farmers must prioritise based on nutritional need from at least the mid-pregnancy period. The early lambing, multiple bearing ewes, especially those in poor body condition, have the greatest nutritional need and these ewes from mid-pregnancy should not be forced to graze a ryegrass white clover sward below 3 cm. Singleton bearing ewes and those lambing late in the lambing period can be grazed down to sward heights of 2cm. Based on feed availability, predicted pasture growth, number of multiples and ewe body condition the number of ewes in each of those two grazing mobs can be adjusted. Ideally from day 130 of pregnancy, all ewes should be offered minimum post grazing ryegrass white clover sward heights and pasture masses of 4cm and 1200 kg DM/ha respectively. If this cannot be achieved farmers must prioritise based on nutritional requirements. Early- and mid-pregnancy are periods where brassicas are often offered to ewes for grazing in pure swards to rest the ryegrass white clover sward and allow it to accumulate for later stages of pregnancy and in early lactation.

Lambing occurs outdoors with ewes set stocked (spread out) across the majority of paddocks on the farm. The number of ewes (stocking rate) within each paddock is based on the paddocks current pasture mass, predicted pasture growth rate and the feed demand of the ewes, the latter is driven by the number of lambs to be reared by each ewe. Set stocking generally occurs within two weeks of the start of the lambing period although, later lambing ewes can be maintained in a rotation. Multiple bearing/rearing ewes and singletons are set stocked in different paddocks at differing stocking rates. The aim is to ensure ryegrass white clover pasture covers are maintained during late pregnancy (final 2 to 3 weeks) and lactation period, in the range of 4 to 8 cm (or 1200 to 1800 kg DM/ha) to maximise lamb survival and growth. If this cannot be achieved, which is often the case, singleton ewes and later lambing ewes may be set stocked at a level that results in slightly lower grazing sward heights. It is important that breeding is timed so that ryegrass white clover growth is increasing as ewes enter the very late stages of pregnancy. If ryegrass white clover sward heights drop below 3 cm in the late lactation period, it can be beneficial to wean early onto a legume dominate sward. This can be a good quality ryegrass white clover sward or an alternative legume dominate herbage. Under low ryegrass white clover sward heights ewes and their lambs can be competitive for the feed available. For early weaning to be successful lambs need to be at least 50 days of age and weighing a minimum of 18 kg, and herbage availability so intake is not being limited. Early weaning also reduces overall flock feed demand.

Lucerne swards and herb clover mixes can be utilised in lactation to increase lamb growth and survival. If ewes lamb on these sward types, they are set stocked at a level to ensure herbage height does not go below 8 cm. Post tailing, which generally occurs at 3 to 5 weeks of age, the ewes and their lambs are placed onto a rotation for the benefit of the plant. It is important to ensure the correct number of ewes and their lambs are on these herbages as there can be negative health consequences of removing ewes in peak lactation from these and the requirement to adjust them back to a ryegrass white clover sward. In that respect ewes must be slowly adjusted onto these herbages prior to lambing over at least a 5 to 7 day period, which can be difficult in late pregnancy. In many farming environments these species are not growing or can be damaged by grazing in late winter, which can coincide with the late pregnancy period. Therefore, post tailing, often farmers slowly introduce ewes and lambs onto these alternative herbages over a 5 to 7 day period and increased lamb growth to weaning, by 20 to 40% can be observed. More recently, these alternative herbages are being used as a tool to allow for early weaning while ensuring lambs continue to grow at a high rate, of greater than 250 g/d. This targeted use of the herb clover mix reduces overall farm sheep feed demand, by returning weaned ewes to maintenance feeding levels on ryegrass white clover swards.

Weaned lamb management to maximise growth

As indicated earlier the most efficient lamb finishing system is one in which lambs achieve slaughter live weights as soon as possible after weaning. This will reduce lifetime food intake to reach slaughter, allowing feed to become available to other classes of stock, and reduces animal health and labour costs. For example, if a lamb is fed to allow it to grow at only 100 g/d from 28 kg to a slaughter weight of 40 kg on a ryegrass white clover sward, it will take 120 days and it will consume 149 kg DM for its maintenance and growth. If that same lamb was fed to grow at 250 g/d, it will only require 48 days and consuming just 77 kg DM to achieve its slaughter weight and requires less labour and animal health costs. Carcass weights targets depend on breed and environment and can range from 17 to 20 kg.

On ryegrass white clover-based swards the pre- and post-grazing height ranges should be the same as those for ewes in late pregnancy and lactation (i.e. the 4 to 8 cm range), if weaned lamb growth is to be maximised. However, it is important that pasture quality does not decline below an ME of approximately 10.5 MJ/kg DM (ideally ME of 11 MJ/kg DM). If it goes below this level lamb performance will be poor and total feed consumed to reach the target slaughter weight will be increased. Under optimal ryegrass white clover conditions, lambs post weaning should be able to grow at 150 to 250 g/d. Therefore, if lamb growth is to be maximised, other classes of livestock must be utilised to ensure the ryegrass white clover sward is maintained within the optimal sward height and quality range. A rotational grazing system is utilised. Ideally the ryegrass white clover sward would have a high clover content.

On herb clover sward mixes, containing species such as plantain, chicory and red- and white clover, post grazing heights should not be below 8cm and the lambs should also be on a rotational grazing system. Numerous studies have shown that on these mixes lamb growth rates in excess of 300 g/d can be achieved and carcass dressing out percentages (carcass weight as a percentage of live weight) can be improved. These mixes have been found to have the greatest effect on lamb performance during the summer and autumn periods, when it can be difficult to maintain grass quality. Even taking into account that these herb clover mixes should not be utilised for a period of up to two months in the mid- to late-winter period, annual total lamb carcass production has been shown to be greater than a ryegrass white clover sward finishing lambs all year round.

The management of lucerne swards is similar to that of the herb clover mix and it needs to be rotationally grazed. Lambs also need to be adjusted on. The lucerne should not be grazed too low (i.e. below 8 cm), lambs should not be forced to consume the stem and it should not be grazed in winter. Over the summer period the plant needs to be rested to allow it to replenish is root reserves. This is a good example of managing the sward for the benefit of the plant, not the animal, if the farmer wishes to maximise herbage productively and longevity and therefore total animal performance.

There are numerous shorter-term herbage options (i.e. annuals that are utilised for a few months only) for finishing lambs in New Zealand, with many of these being brassicas which are generally managed as monocultures. These are often targeted for use in winter, when ryegrass white clover herbage productivity can be poor or in the summer-autumn period, when ryegrass white clover quality can be limiting. Care needs to be taken with some of these, as depending on their stage of growth and environmental conditions, adverse animal health consequences can occur. Each species has its own optimal guidelines. However, there can be no doubt that lamb growth on these species, once the lambs have been adjusted, can be very high. The limitations with these are firstly their cost in relation to their short-term use and secondly, farmers trying to maximise utilisation of the herbage, which can limit lamb performance by forcing the lamb to consume poor quality parts of the plant and reduce intake. Once lambs are forced to consume the stems, blubs or mature parts of these plants lamb growth rates will be limited. Under these conditions, consideration could be given to utilising other classes of stock to consume the last parts of these plants.

Reducing labour at lambing: improving lamb vigour and ewe mothering ability through breeding

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Take home messages

- Lambing accounts for over 25% of the annual labour requirement on a sheep farm
- Improved ewe mothering ability and lamb vigour immediately after birth could reduce the labour requirement
- The existence of heritable genetic variability indicate that both ewe mothering ability and lamb vigour can be improved through breeding

Introduction

Genetics, the study of genes and genetic variation, is a powerful tool at the disposal of farmers to identify the genetically elite animals to be the parents of the next generation. All improvements achieved through breeding are permanent and cumulative, meaning their consequences will be seen in the flock for many years to come. While environmental or management factors can change throughout the lifetime of an animal, the genes of the animal remains unchanged and are fundamental to the performance of the animal. The national sheep breeding indexes enable farmers to make more informed selection and breeding decisions. The aim of the national replacement breeding index is to identify ewes with good maternal characteristics that also produce good quality carcass conformation lambs suitable for slaughter at an early age. The aim of the national terminal breeding index is to produce fast growing, healthy terminal progeny that can be finished efficiently with minimal issues. The national breeding indexes are:

1) *Replacement index* – ranks animals based on their ability to produce daughters excelling in maternal performance including traits such as milk yield, lamb survival, and lambing difficulty. The replacement index also includes some terminal traits such as growth and carcass characteristics (i.e., carcass conformation and carcass fat) to account for the ability of these daughters to produce progeny that can be efficiently finished. Health traits are also included in the replacement index.
2) *Terminal index* – ranks animals based on their ability to produce fast growing terminal progeny born with minimal lambing difficulty. The terminal index takes into account the progeny's growth rate, carcass characteristics (i.e., carcass conformation and carcass fat), lambing, and health data.

Novel traits

Research is ongoing to investigate the possibility of including other traits in the indexes that are important to Irish sheep farmers. When considering a trait for inclusion in the national breeding indexes it must fulfil three key criteria including:

1) the trait must exhibit genetic variation
2) the trait must be of social or economic importance
3) the trait must be (easily) measurable on a large scale or strongly correlated with a trait that is

Once a new trait is identified as being of importance to Irish sheep farmers, the next step involves establishing the extent to which the trait is under genetic control. This process involves the estimation of genetic parameters such as heritability. The heritability of a trait reflects the extent to which the trait of interest is under genetic control and can be referred to as the resemblance between relatives. In order to accurately estimate the heritability of a trait such as ewe mothering ability or lamb vigour, a large number of records must first be collected. Ewe mothering ability and lamb vigour records were collected from both flock-book recorded animals and crossbred animals through the four Central Progeny Test (CPT) flocks.

Lambing traits

Lambing on sheep farms accounts for over 25% of the annual labour requirement (Figure 1) representing more than double the labour requirement at other key time points such as weaning, mating, or housing. Therefore, measures that could potentially reduce the labour requirement or time spent per ewe must be investigated. Two such traits currently under investigation by Teagasc are ewe mothering ability and lamb vigour. Ideally a ewe will lamb unassisted, produce sufficient colostrum and milk, as well as being attentive towards her lambs that stand quickly and suckle after birth. Ewes that do not achieve these milestones on their own require intervention from the farmer which incurs a cost (i.e., labour requirement) including the stress on farmers at the busiest time of the year.

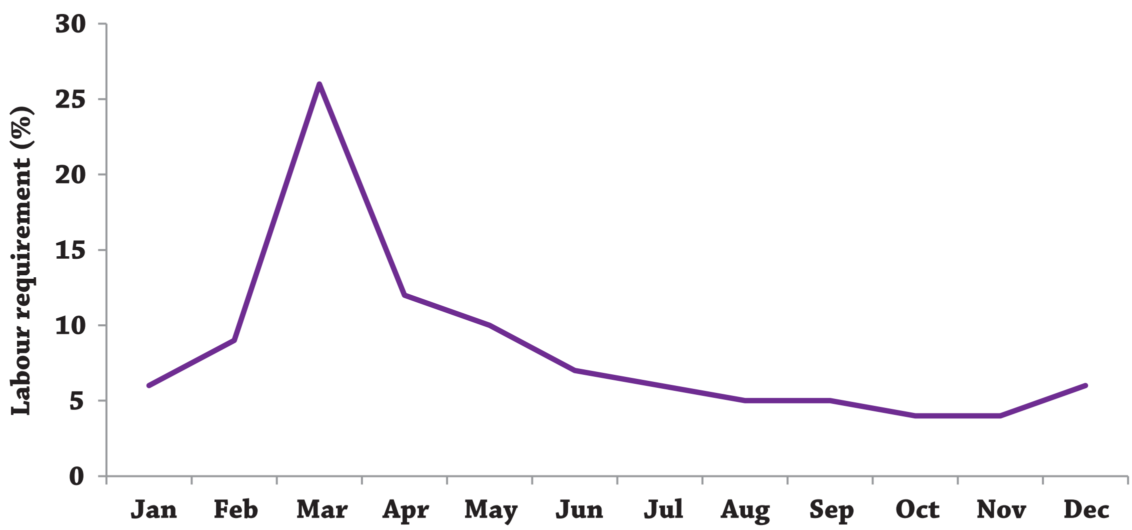

Figure 1. The distribution of the labour required throughout the year on a mid-season lambing farm (Bohan et al 2016)

Ewe mothering ability

Ewe mothering ability is measured on a five-point scale based on the attentive behaviour demonstrated by the ewe towards her lambs (Table 1). Analysis was undertaken on over 25,000 flock-book recorded and commercial crossbred ewes that were scored for ewe mothering ability. The overall frequency of poor ewe mothering ability (i.e., score 1, 2, and 3) was 16.1%, while 38.4% and 45.5% of ewes were scored as displaying good (score 4) and very good (score 5) ewe mothering ability, respectively.

Table 1. Description of ewe mothering ability and lamb vigour scores

		Trait description	
Score	**Category**	**Ewe mothering ability**	**Lamb vigour**
1	Very poor	No interest in lambs	Standing after 60 minutes
2	Poor	Slow to lick lamb(s) & stands well away	Standing within 60 minutes
3	Average	Licks and follows lamb(s)	Standing within 30 minutes
4	Good	Licks lamb(s), is protective & follows closely	Standing within 10 minutes
5	Very good	Licks lambs immediately, very protective, follows very closely, & bleats	Standing within 5 minutes

In order to estimate the differences in prevalence of poor ewe mothering ability (i.e., score 1, 2, and 3) in the daughters of sires, the sires are required to have a large number of daughters that lambed and were scored for ewe mothering ability in more than one flock. A total of 150 sires had at least 30 daughters that lambed and were scored for ewe mothering ability in at least two different flocks. The sires included represented many different breeds. The prevalence of poor ewe mothering ability (i.e., score 1, 2, or 3) in the progeny of sires is presented in Figure 2. Figure 2 shows that the daughters of two different sires did not demonstrate poor ewe mothering ability score (i.e., all daughters had a ewe mothering ability score of 4 or 5); conversely, 60% of the daughters of one sire had a poor ewe mothering ability score. As management practices and environment were expected to be the same for all ewes in the same flocks, the presence of variability among sires indicates that genetic differences account for a large proportion of the differences in ewe mothering ability. In fact, the heritability estimate for ewe mothering ability was 6% meaning that 6% of the differences in ewe mothering ability are due to her genetics. In comparison, the (direct) heritability of (multi-litter) lambing difficulty and lamb mortality in the national breeding indexes is 7% and 2%, respectively. Ewe mothering ability improved with parity meaning that ewes that had more litters had better ewe mothering ability which may be explained by the ewe's previous experience. There was no difference in ewe mothering ability among ewes that lambed for the first time at one year of age versus those that lambed for the first time at two years of age.

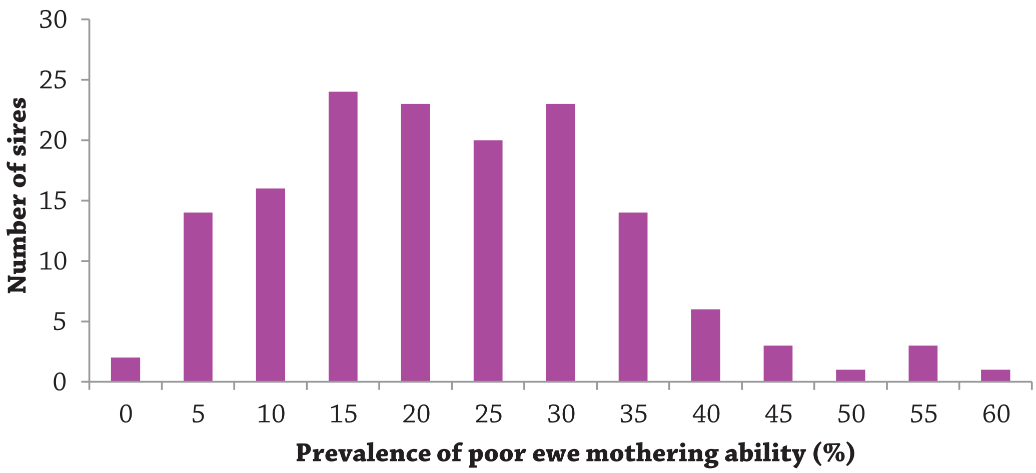

Figure 2. The distribution of sire prevalence of poor ewe mothering ability. Poor ewe mothering ability is classified as ewes that had a score of 1, 2, or 3. Each bar within the graph represents the number of sires (on the left axis) that had daughters with a prevalence of poor ewe mothering ability indicated on the bottom axis

Lamb vigour

Similar to ewe mothering ability, lamb vigour is measured on a five-point scale (Table 1) based on the time taken for a lamb to stand immediately after birth. A lamb with a score of 5 (i.e., very good) is standing and seeking to suckle within only 5 minutes after birth while a lamb with a score of 1 (i.e., very poor lamb vigour) takes at least an hour after birth to stand. The prevalence of poor lamb vigour (i.e., score 1, 2, and 3) was 19.9%. Similar to ewe mothering ability, differences in the prevalence of poor lamb vigour in the progeny of sires was estimated (Figure 3). Sires included in Figure 3 had to have a large number of offspring recorded for lamb vigour with these offspring being recorded in more than one flock. A total of 309 sires had at least 30 progeny that were born and scored for lamb vigour in at least two different flocks. Many breeds as well as sires used in both flock-book recorded and commercial crossbred flocks were represented in the 309 sires included in Figure 3. Considerable differences among sires exist in the prevalence of poor lamb vigour (i.e., score 1, 2, and 3; a lamb that took at least 30 minutes to stand) of their progeny (Figure 3). Figure 3 demonstrates that the offspring of fourteen sires did not have a poor lamb vigour score (i.e., all progeny were standing within 30 minutes post birth) while conversely, 90% of the progeny of one sire took at least 30 minutes to stand after birth. Similar to ewe mothering ability, as management practices and environment were expected to be the same for progeny of sires in the same flocks, the presence of variability among sires indicates that a large proportion of the differences in lamb vigour are due to genetic differences. The (direct) heritability of lamb vigour in Irish lambs is 40% which is similar to ultrasound muscle depth (heritability=28%) within the national breeding indexes. Therefore the genetics of the lamb is responsible for 40% of the differences observed in lamb vigour among individuals. In many early life traits such as lamb vigour, the genetics of the dam may also have an effect. This is termed as the maternal heritability estimate which is the extent to which the performance of the animal is determined by the genetics of the dam. The maternal heritability estimate for lamb vigour is 5%. An analogy here is lambing difficulty, the genetics of the lamb (e.g., its size) influences if a difficult birth will be experienced but also the genetics of the dam (e.g., pelvic width) influences the birthing process. The direct heritability for (multi-litter) lambing difficulty is 7% while the maternal heritability is 3%.

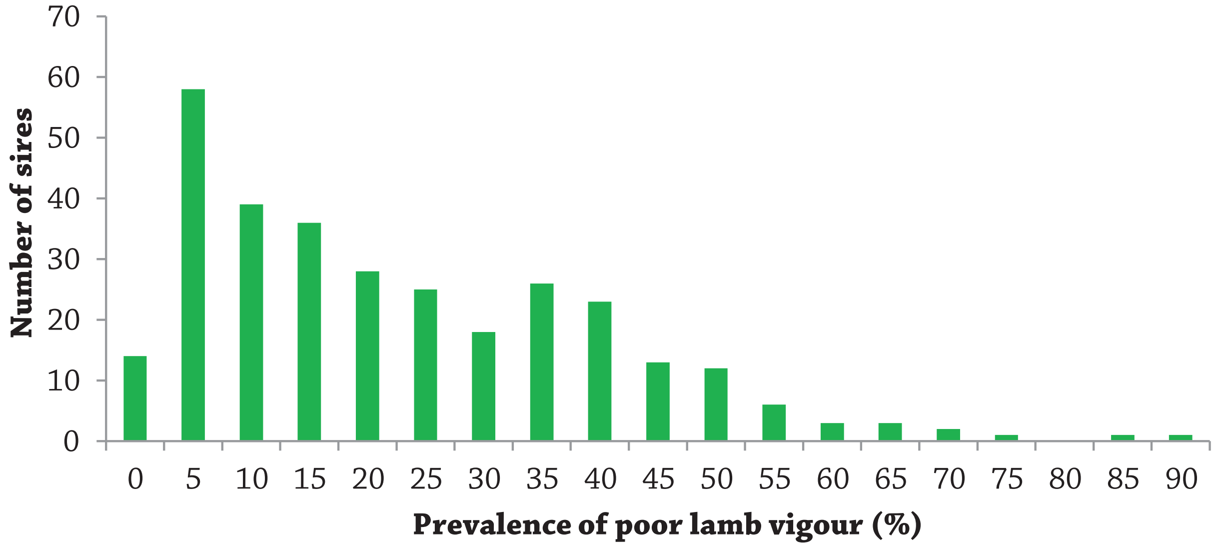

Figure 3. The sire prevalence of poor lamb vigour (i.e., score 1, 2, and 3; the lamb took at least 30 minutes to stand after birth). Each bar within the graph represents the number of sires (on the left axis) that had progeny with a prevalence of poor lamb vigour indicated on the bottom axis

Conclusion

The prevalence of poor ewe mothering ability and poor lamb vigour varied between the progeny of sires. In fact, 6% and 40% of the variability in ewe mothering ability and lamb vigour, respectively were due to genetic differences which are exploitable in breeding programs. This supports that in the future, where both traits are included in a breeding index, the selection of sires with a superior breeding value for ewe mothering ability and lamb vigour would improve both traits. Such a strategy could, overtime, reduce the labour requirement at lambing.

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Laryngeal Chondritis of Texel and Beltex sheep: Incidence, pathogenesis and suggestions for further work

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Take home messages

- Laryngeal chondritis (LC) accounts for significant mortality in Texel and Beltex sheep and their crosses. Rams are most commonly affected, but LC is also seen in ewes and lambs
- It is likely that the conformation of these breeds and the anatomy of their larynges predisposes them to LC but the exact pathogenesis is not known with certainty
- Further genetic work is required in order to select sheep at lower risk of developing the condition, although there is unlikely to be a single gene responsible
- Imaging (ultrasonography and endoscopy), and measuring phenotypic traits in breeding sheep may also have a place in reducing the impact of the disease

Introduction

Laryngeal chondritis (LC) is a condition seen in sheep mainly in the Texel and Beltex breeds (it is known as 'Texel throat'). It involves opportunistic bacterial infection and consequent inflammation of the arytenoid region of the larynx, probably as a result of traumatic damage to the laryngeal epithelium. There is a spectrum of pathology from subclinical to fatal; for clinical cases the prognosis is often poor; death occurs as a result of asphyxia. The disease accounts for a significant proportion of mortality in these breeds but detailed research in the condition is lacking. This paper aims to describe the results of a detailed anatomical study on the Texel larynx and another case series on a possibly related syndrome in Texel & Beltex sheep: diaphragmatic rupture and major haemorrhage. It then attempts to show how these reports contribute to our understanding of the pathogenesis of LC.

Background

As part of a carcass-based diagnostic service based in Co. Durham (North–East England) at a fallen stock collection centre, laryngeal chondritis was identified as a significant cause of death in Texel rams. Gross laryngeal lesions are shown in Figures 1 and 2. Laryngeal chondritis was the commonest diagnosis made overall on post mortem examination of 170 rams from 2014-2019 (Figure 3), accounting for 17% of deaths (30/170). Although the Texel is a very popular terminal sire breed in the region (and elsewhere), this was considered a significant finding likely to impact Texel ram longevity, and worthy of further investigation. Laryngeal chondritis also accounts for a significant proportion of mortality in Texel and Beltex ewes, and their crosses, as well as lambs (Ben Strugnell, personal observations).

Figures 1 and 2. Laryngeal Chondritis. In Figure 1 (left), there is granulation tissue and marked necrotic chondritis of the vocal processes of the arytenoid cartilages (blue arrow). In Figure 2 (right) there is marked purulent infection of the crico-arytenoid joints (green arrow)

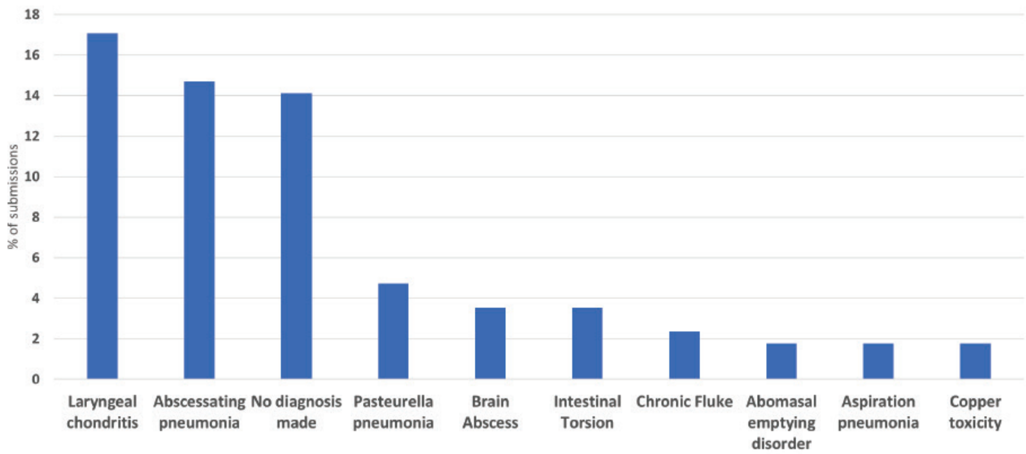

Figure 3. Causes of death in 170 Rams of all breeds necropsied at FPM Ltd. 2014-2019

Two studies undertaken

Study 1

Twenty-three larynges from Texel rams and 20 larynges from Bluefaced Leicester (BFL) rams were collected at random from a fallen stock collection centre in North East England. It has been hypothesised that the conformation of Texel and Beltex sheep may predispose to LC, thus the study aimed to determine exactly what anatomical risk factors might be responsible for this apparent increased risk. The BFL breed was chosen because it is common in North East England and its conformation is very different from the Texel, making it likely to act as a useful pathology-free control. Various carcass, airway and laryngeal measurements were taken from each of the 43 larynges. Imaging using Computed Tomography (CT) and Magnetic Resonance Imaging (MRI) was also performed on a sub-set of larynges.

Study 2

This was a case series based on the observations from various post mortem laboratories in England, describing a syndrome of diaphragmatic rupture, often accompanied by major haemorrhage and sometimes additionally with local clostridial myositis and arterial aneurysm seen in Texel and Beltex sheep with increasing frequency. This descriptive case series aimed simply to collate these observations, suggest a case definition and hypothesise about the pathogenesis of the syndrome.

Results

Study 1

There were no statistically significant differences in the age of the rams chosen (at random), although eight of the Texel rams were shearlings, compared to two BFL rams. It has been suggested that LC may become clinical around puberty, or as a result of increased vocalisation around tupping, and incidence in older tups (which survive their first season) may be lower (Ben Strugnell, personal observations). The cross-sectional area of the Texel rams was significantly lower than in the BFL rams (Figure 4), which (together with the funnel-shaped Texel larynx) could lead to more turbulent airflow over the laryngeal epithelium. There was a significantly greater tendency of the vocal folds to touch in the Texel rams. In common with other studies (Kennedy et al 2020), subclinical laryngeal pathology (vocal fold mucosal erosion, ulceration, oedema, hyperplasia) was common. At least two Texel rams probably died of LC.

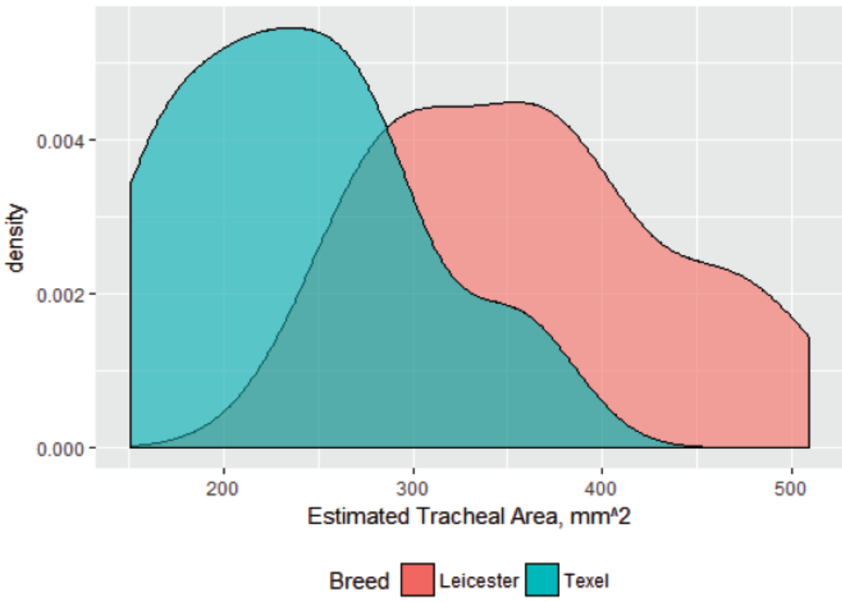

Figure 4. A density distribution for the tracheal areas for BFL and Texels measured at the 2nd-4th tracheal ring (mm^2) (Waine et al 2019a)

Study 2

The main finding from this study was that the diaphragmatic ruptures in these cases were unlikely to be congenital, or traumatic; there was clear histological evidence of historic muscle fibre tearing and repairing prior to final rupture. The reasons for this are unknown but are discussed below. In one case there was also a reduction in thickness of the fibroelastic arterial connective tissue confirming a spontaneous aortic rupture. Laryngeal chondritis was variably present in these cases.

Discussion

On the basis of the information presented in this paper, the following hypothesis on the pathogenesis of LC in Texel and Beltex sheep are suggested:

1. Vocal folds in the Texel/Beltex breeds are close together or touch, owing to the anatomy of the larynx.
2. During vocalisation, and possibly during normal ventilation in these breeds, vocal folds clash together and the epithelial surface is damaged/traumatised. Puberty may trigger changes which increase the risk of this event.
3. This allows bacterial infection by local opportunistic commensal bacteria (Staphylococci, and *Fusobacterium necrophorum*).
4. The attendant inflammation can cause marked swelling/oedema and occlude the airway, leading to asphyxia
5. Sub clinical laryngeal chondritis and mild laryngeal pathology are probably common, especially proliferating granulation tissue on the vocal process of the arytenoid cartilage. The factors which trigger the progression of these lesions to fatal laryngeal chondritis are unknown.
6. Purulent infection of the crico-arytenoid joints is a common feature of LC, usually although not always occurring together with some pathology of the vocal processes arytenoid cartilages (see Figures 1 and 2). It may be that purulent infection originating at the vocal folds of the arytenoid cartilages tracks up within the sub-epithelial tissues leading to infection of these joints. These joints govern arytenoid movement, which is probably reduced if they are infected. This is likely to exacerbate the condition.
7. Texel and Beltex Sheep probably have narrow tracheas (for their size/weight) (Figure 4), which probably increases the turbulence of airflow through the larynx and increases the risk of trauma to the laryngeal/arytenoid epithelium.
8. Purulent arytenoid lesions may be bilateral or unilateral, but there is no evidence for damage to the recurrent laryngeal nerve and atrophy or the *crico-arytenoideus dorsali*s muscle, which is the pathogenesis of laryngeal paralysis in horses.
9. A distinct but possibly related syndrome of diaphragmatic rupture, sometimes with arterial aneurysm and major haemorrhage and sometimes with clostridial myositis of adjacent muscles, has also been described in the Texel and Beltex breeds (Waine at al 2019b). The pathogenesis of this syndrome could be:
    a. An underlying connective disuse disorder. In histologically there is evidence of repeated chronic healing and repairing of the diaphragmatic muscle fibres. There is sometimes also some disorganisation of the intimal connective tissue of the arteries which might lead to the aneurysm. This could raise the possibility of a connective tissue disorder (similar to Marfans Syndrome in humans, where aneurysms and diaphragmatic hernias are also seen; Kothari et al 2017). It could then be postulated that the same connective tissue disorder could influence the connective tissue in the laryngeal cartilages, especially when combined with the local anatomy and airflow forces applied there.
    b. The diaphragmatic rupture could be the result of large intra-thoracic forces applied in these breeds, as a result of the combination of (subclinical) LC, a narrow trachea, a barrel-chest and an obstructed upper airway. If this is the case, then there may be similarities with Brachycephalic Upper Airway Syndrome in dogs like pugs and French Bulldogs. Interestingly, diaphragmatic (hiatal) hernias are also reported in these breeds.

Conclusion

Further work is required on this condition, which is probably commoner than suggested by conventional surveillance methods, and may (like many possible genetic conditions) be under-reported by breeders worried about economic losses. There is general agreement that the conformation/anatomy of the Texel and Beltex Breeds predisposes to LC, so a genetic component is plausible. Priorities for further work should be characterising any possible genes associated with the condition, and identifying phenotypic traits in animals being selected for breeding, which may reduce the risk of disease in them or their offspring.

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Speaker Profiles

Nicola Fetherstone

From a sheep and suckler farm in Co. Roscommon, Nicola went on to pursue a career in agriculture through enrolling in an animal science degree in UCD in 2013.

On graduating in 2017, Nicola joined the Teagasc Walsh Scholar team through enrolling in a PhD titled "INZAC: An Irish and New Zealand animal comparison" under the supervision of Dr Noirin McHugh and Dr Fiona McGovern of Teagasc and Associate Professor Tommy Boland of UCD.

Nicola's studies involved not only the collection and analysis of a vast amount of data on the INZAC flock including reproductive, lambing, ewe and lamb growth, performance and productivity, but also allowed her to travel to New Zealand for a three month period to link up with agri-consultancy firm AbacusBio and increase her knowledge in the area of New Zealand production systems. As her PhD draws to a close, Nicola will present her findings to date.

Professor Paul Kenyon

Paul Kenyon is the Professor of Sheep Husbandry at Massey University, New Zealand and the head of the School of Agriculture and Environment. He grew up on a sheep and beef farm and has more than 20 years of experience in sheep research in New Zealand and internationally.

Specific research programs include; maximizing ewe lamb (hogget) breeding performance, the management of twin and triplet bearing ewes and their offspring in pregnancy and lactation, developing ewe body condition score guidelines, effects of body size on efficiency of production in sheep, alternative feed types to improve sheep performance, maximising ewe milk production and farmer learning.

These research projects are undertaken at both the basic biological science level and at the farm systems/applied level. He works collaboratively with farmers, industry and veterinarians throughout New Zealand and is a regular presenter at industry and farmer events.

Speaker Profiles

Áine O'Brien

Áine O'Brien is a Post-doctoral Researcher on Sheep Genetics and Genomics, Teagasc. She qualified with a BAgrSc Agricultural Science (Animal Science) from University College Dublin, in 2015.

She completed her PhD on 'Genetics and genomics for performance in a multi-breed Irish sheep population', with University of Limerick in 2019. The topic Áine will cover for the conference is 'Reducing labour at lambing: improving lamb vigour and ewe mothering ability through breeding'.

Ben Strugnell BVM&S Cert PM MRCVS

Ben Strugnell qualified from the Royal (Dick) School of Veterinary Studies, Edinburgh in 2002 and spent 6 years in rural mixed practice in North Yorkshire. He then joined the Veterinary Laboratories Agency VI Centre/ diagnostic laboratory in Thirsk, where he worked as a Veterinary Investigation Officer for 6 years.

In 2010 he obtained the RCVS Certificate in Pig medicine. In 2014 he undertook a pilot project with the Beef and lamb Levy Board in England (EBLEX), which established a carcase-based post mortem diagnostic service for farmers and their vets at a large fallen stock collection centre in North East England. The pilot was a success and he has remained at the same centre, performing post mortem examinations on various classes of livestock, in what is now a sustainable enterprise.

Since 2014 over 8000 carcasses have been examined, and accumulated data on causes of death has been of use to the industry and government. He has also been a visiting lecturer at the University of Nottingham and undertakes regular teaching of veterinary undergraduates and post-graduates, farmers and allied professionals.

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