Sheep breed improvement in Ireland

Introduction

A sheep breed improvement is in operation in Ireland and is operated by Sheep Ireland since 2009. Sheep Ireland is a non-profit organisation funded by both the Irish Department of Agriculture and Irish sheep farmers in the form of a slaughter levy. Sheep Ireland provides genetic indexes on breeding rams to help Irish sheep farmers to source the most profitable genetics available to the industry.

Genetic Improvement

Genetic improvement in the Irish sheep industry is not where it should be. Growth traits have been improved somewhat over the years through the use of continental breeds and selecting breeding rams based on size and visual condition. Maternal traits across the Irish national flock have regressed due to an over reliance on growth genetics and using these growth genetics to breed the next generation of replacement females (There is a direct negative correlation between growth rates and maternal traits, the more growth potential an animal has, the higher the likelihood it would make a poor breeding ewe). The majority of breeding ewes in Ireland are bred by Terminal sires (breeds which focus on growth rates). While there are maternal breeds available in Ireland, adoption of these breeds has been slow. One of the key drivers of profit on sheep farms is the number of lambs slaughtered per breeding ewe. In Ireland this key figure has remained static at ~1.3 lambs/ewe for the past 30 or so years.

The Sheep Ireland genetic improvement programme

This programme has grown annually from its beginning in 2009. The structure of the programme is twofold in that data from both pedigree ram breeders and commercial sheep farms are incorporated into a single genetic evaluation system.

Annual ram demand in Ireland

The latest sheep census from the Irish Department of Agriculture stated that there are just over 80,000 rams being used to service 2.5 million ewes annually. The average ram breeding lifespan is approximately 3 to 4 years, which means Ireland requires 20,000 to 26,000 replacement rams annually. In 2016 Sheep Ireland performance recorded just over 10,000 rams which illustrates that the there is still considerable growth in performance recording required before the annual industry ram demand is being serviced. It should also be kept in mind that of these 10,000 rams performance recorded in 2016, a proportion will need to be culled for physical incorrectness, low genetic indexes etc, which further reduces availability.

Potential for growth and challenges

There is major potential to grow the rate of genetic gain being made in the Irish sheep industry for the benefit of all sheep farmers. Genetic gain will only be maximised by continued growth in the level of sheep performance recording taking place and by greater adoption of genetic indexes at farm level.
At present ram breeders that are engaged in performance recording are those that are active participants in formal breed societies. Being part of a breed society means that animal ancestry is being maintained annually which is critical when providing genetic indexes. Indexes are produced by evaluating entire bloodlines and not just individual animals, so access to ancestry information is the key foundation stone. At this point in time the percentage of breeding rams being purchased from ram breeders actively participating in breed societies where parentage is recorded annually could be as low as 50%. Sheep Ireland estimates that approximately 25% of rams purchased annually have genetic indexes. This means that a huge proportion of farmers are purchasing rams from sources which are recording no information on the rams that they are presenting for sale annually. As a result, improving the genetics of these rams is extremely difficult.

Adoption of genetic indexes at farm level is another major challenge facing Irish sheep genetic improvement. Due to the fact that sheep farmers generally do not keep very detailed individual animal performance records, it is difficult for farmers to notice the benefits of using a high index ram. Generally farmers will use a team of rams across their ewes so the effect or benefit being delivered by one or two is difficult to identify. Farmer payments delivered in the form of on-farm schemes have recently helped to significant raise the profile and awareness of sheep genetic improvement, but these types of measures need to be sustained over relatively long period of time to have a long term effect on changing sheep farmers approach to ram purchase and breeding decisions. A large proportion of Sheep farmers in Ireland are also taking part in the BDGP (Beef Data Genomics Program) scheme, which is creating huge awareness of the EuroStars, how to interrupt them and most importantly the benefits of using genetic indexes when making breeding decisions. This will undoubtedly help to also increase the awareness of sheep genetic evaluations as both the beef and sheep genetic indexes are displayed in a similar format.

**EuroStars showing good results**

At the last Irish National Sheep Conference Dr. Noirin McHugh (Teagasc) presented the latest validation results as part of her presentation on “Accelerating sheep genetic improvement in Ireland”. The data used in this validation was from 2013 – 2015 and based on 7,644 performance recorded commercial farm lambs. It is important to point out that the star ratings used in this validation were taken at mating time, therefore all the differences seen in table one were predicted by the indexes before rams were released with ewes. These differences are at an individual trait level. The 1 Star data represents when 1 Star rams were mated with 1 Star ewes for that trait. The 5 Star data represents where 5 Star rams were mated with 5 Star ewes.

Table 1. Mean on-farm performance of offspring of differing in star ratings for key performance traits.

<table>
<thead>
<tr>
<th>Index</th>
<th>Trait</th>
<th>1 star</th>
<th>5 star</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Replacement Index</strong></td>
<td><strong>Lamb Mortality (%)</strong></td>
<td>16.64%</td>
<td>9.60%</td>
</tr>
<tr>
<td></td>
<td>Number of lambs born</td>
<td>1.68</td>
<td>1.81</td>
</tr>
<tr>
<td></td>
<td>Ewe mature weight (kg)</td>
<td>73.40</td>
<td>69.22</td>
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<tr>
<td><strong>Terminal Index</strong></td>
<td><strong>Lambing Difficulty (%)</strong></td>
<td>34.4%</td>
<td>21.36%</td>
</tr>
<tr>
<td></td>
<td>40 day weight (kg)</td>
<td>18.98</td>
<td>19.52</td>
</tr>
<tr>
<td></td>
<td>Weaning weight (kg)</td>
<td>31.94</td>
<td>33.02</td>
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</tbody>
</table>
Lambs from five star parents had 7% less lamb mortality and required less assistance at birth greatly increasing the welfare of the animal. Animals with a 5 star rating for the replacement index were on average 4.18 kg lighter (lighter ewes are easier to feed and maintain) but had a greater number of lambs born (+0.13 lambs) compared to the one star ewes. Progeny from five star parents were also heavier at 40 day weighing and also at weaning compared to progeny from 1 star animals. While each of the difference across the traits displayed below may seem minor, when they are all combined you have ewes that have more lambs, with less lambing difficulty, with heavier lambs at weaning, and all this from a slightly smaller ewe, all of which leads to a more sustainable sheep industry.

**Future Plans**

**Genomics**

Sheep Ireland is planning or releasing genomic evaluations in the spring of 2017. Genomic evaluations will greatly increase the accuracy of the current evaluations meaning the differences found between 1 vs 5 star animals is likely to increase, therefore giving farmers more confidence about buying into the technology of genetic evaluations. The current downside to this technology is that it is still cost prohibitive for pedigree farmers to carry out on a full flock basis without some financial support. One of the best ways to drive down the price of this technology is to increase the number of sheep being genotyped each year. Forming a link/consortium with other European countries offers significant benefits from a cost saving and data sharing point of view.

**Health**

Sheep Ireland has collected an extensive amount of data on health traits over the past number of years, concentrating on lameness, dagginess, body condition score and mastitis. These are the areas of health we believe we can have the most impact on currently. Based on the analysis to date we can now predict which animals are most likely to be lame, daggy (increased risk of fly strike) or to develop mastitis, to varying degrees of certainty. By using genetic indexes to select high health index bloodlines the welfare of our national sheep flock will improve.

**Sheep Ireland suggested proposals for the committee**

Sheep Ireland recommends the provision of funding for an annual European forum involving all member states to discuss and advance sheep genetic improvement. Setting up such a European sheep breeding group, would facilitate many advances in the area of sheep breeding including;

- Standardise the sharing of sheep performance data and genetic evaluations between countries. The current ‘Interbeef’ group facilitates a similar process in beef.
- Sheep genomics will form a large part of sheep breed improvement going forward and a European wide approach in this area would deliver significant benefits to all member states, especially in the area of purchasing new genomic chips, where price is directly linked to quantities being purchased.
- More research to be done on animal welfare/health traits such as lambing difficulty, lameness, mastitis and worn resistance.
Ireland is challenged with reducing its greenhouse gas emissions by 30% by 2030 with livestock being a major contributor to emissions in this country. By breeding more efficient sheep this will help to reduce emissions from the national flock. The Irish Cattle Breeding Federation have demonstrated a 9% difference in the carbon emissions for every kilo of beef produced from the top 10% of beef herds versus the bottom 10% on the Irish beef breeding index, which is a significant difference in favour of high index beef animals. The Irish sheep genetic indexes are demonstrating significant differences in efficiencies between high and low index animals across key performance traits.

For this reason Sheep Ireland recommends the following:

- A financial support mechanism for Irish and perhaps European sheep farmers to use high genetic merit animals which will lead to greater profitability on sheep farmers and a positive impact on animal welfare and the environment.