PROGRESS IN THE DEVELOPMENT OF BREEDING SCHEMES FOR THE IRISH SHEEP INDUSTRY: THE MATERNAL LAMB PRODUCER GROUPS

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SUMMARY

The Irish sheep industry is undergoing major changes in the area of genetic improvement to ensure sheep farming remains competitive with alternative land uses. While the industry faces many challenges economically, environmentally, and socially (farm management), novel and innovative approaches have been developed in the area of sheep breeding to try and change the way ram breeding and purchasing occurs. The Maternal Lamb Producer (MALP) group scheme has been designed to assess different breeds of rams for performance in a range of traits, in a commercial farm situation. This will not only provide valuable data for wider ram genetic evaluations, through a Central Progeny Test (CPT), and demonstrate the use of electronic and DNA technology in sheep breeding, but also provide a relevant transparent demonstration to commercial farmers on the difference in the profitability arising from different rams. It is this demonstration, along with acceptance and uptake by commercial farmers that will drive ongoing investment in genetic improvement in the Irish sheep industry.

INTRODUCTION

The major challenges facing the Irish sheep industry include the part time nature of sheep farming, lack of scale, increasing compliance costs associated with environmental sustainability, high labour input costs, high capital costs associated with management systems, and increasing competition in markets. These factors have contributed to poor profitability in sheep farming operations. The poor profitability has resulted in a steady decline in the number of breeding ewes over the last 10 years, with 2.6 million ewes in 2008, down from 4.3 million in 1999 (Bord Bia 2008).

Sheep Ireland (www.sheep.ie) is the trading name of Sheep Database Limited, a company established by the Irish Sheep Industry. ICBF (the Irish Cattle Breeding Federations Society Ltd - www.icbf.com) provides management and technical expertise for Sheep Ireland and is in the process of implementing a genetic improvement program to help re-establish a highly profitable sheep industry as an important rural industry in the Irish economy. The development of a genetic improvement program provides a starting point for industry-wide efforts to rebuild numbers of breeding ewes and profitability throughout the industry.

Future developments are targeted towards a genetic improvement program that will facilitate sustainable profitability for all sectors of the Irish sheep industry. Ensuring that each component of the supply chain, from the producer to the processor to the market, is viable in the context of the overall sheep industry is critical. Sustainable profitability requires the sheep industry to be competitive with other enterprises. Genetic improvement coupled with advances in management

which increase returns to producers are very important pre-requisites to maintaining or growing the national flock (Conington *et. al.* 2001).

In genetic improvement programs, well-organised breeding schemes are important tools for selection of elite animals and for benchmarking breeding values between breeds and in different environments (McLean *et.al.* 2006). These require creation of good genetic linkages across groups that would not otherwise utilise the same rams.

Breeding schemes such as Central Progeny Tests (CPT), where a selection of rams that are genetically well-linked within the various breeding groups are used as sires, provide a basis for assessing a large number of rams across breeds and for many traits, and linking this information to an even wider number of animals throughout the linked pedigree system (McLean *et. al.* 2006).

This paper outlines the current industry structure, previous genetic evaluation services, previous and existing breeding schemes, and describes the structure and operation of a novel Maternal Lamb Producer (MALP) group scheme.

BREEDING INDUSTRY STRUCTURE

A notable and likely very influential aspect of the Irish sheep industry is the predominance of part-time sheep farmers. Over recent decades, part-time sheep farmers have been able to make significant income off-farm. It is likely that a portion of the recent reduction in sheep numbers can be attributed to a change in the business focus of sheep farmers.

The Irish ram breeding tier is made up of breeders that traditionally use visual appraisal to select for terminal traits within their breeds, with a small proportion of breeders using performance recording for a limited range of growth and carcase traits. Very little recording is carried out on maternal traits. These breeders sell rams to a commercial tier of approximately 35,000 farmers, with increasing competition in a shrinking market. This, combined with falling profitability in commercial sheep farms, has resulted in a difficult trading environment for breeders. This is exacerbated for breeders using performance recording, who have to bear additional costs associated with genetic evaluations, without recognition and financial reward in the market place for these efforts. With many commercial farmers purchasing lower priced rams, a large portion of the revenue received by the majority of pure-bred breeders comes from sales of rams to other breeders at shows and sales.

Natural service is the most common form of mating, and there is only limited use of artificial insemination.

Breeders tend to maintain their individual "pure" breeds with cross or composite breeding rare, and hence breed societies play an important role in ancestry recording, breed promotion and marketing, as well as trait selection.

GENETIC EVALUATIONS

In the past genetic evaluations for rams were based on breeding values of animals within breed, within flock, and within year. Genetic evaluation services via the Pedigree Sheep Breed Improvement Program (PSBIP) (Crosby *et. al.*1998) have been offered by the Irish Department of Agriculture for those breeders collecting performance data; incorporating growth rate, muscle depth and back fat depth to generate breeding values using multiple trait animal model Best Linear Unbiased Prediction (BLUP) methods. These breeding values were weighted and combined into a Lean Meat Index (LMI). Unfortunately participation in the scheme was limited to only a few terminal sire breeds and with the exception of the Texel breed, participation only reached around 10%-15% of the breed society members. A new across breed genetic evaluation system that integrates commercial and pedigree breeder data is under development by ICBF. Across breed genetic evaluations utilising commercial and pedigree breeder data have been very successful in the Irish beef sector (Amer *et. al.* 2001).

NEW APPROACHES AND A NOVEL BREEDING SCHEME

Ireland has lacked a breeding scheme that would provide an accurate assessment of rams across breeds and across multiple traits and that can be linked to the entire pedigree system. There has however been a number of small sire referencing schemes operating, including a sire referencing group (LMI-SR) comprising PSBIP Texel and Charollais breeders. This group was started in 1997, with the aim of improving the accuracy of the LMI and increasing genetic gain for participating breeders.

However these have been within breed rather than across breed evaluations and have been largely unsuccessful in delivering tangible benefits to commercial Irish sheep farmers. A lack of commercial producer uptake is recognised as a major contributing factor (William Hutchinson, pedigree breeders and commercial farmer – personal communication). A consequence of this is that breeders have considered that genetic improvement schemes represent a cost, rather than a benefit to their business.

The focus of the proposed breeding schemes in the Sheep Ireland genetic improvement program is to increase recording by breeders to include more economically relevant traits such as lambing difficulty, and combine this with a novel MALP group scheme beginning in 2008.

The rationale behind the MALP group scheme is to, not only provide valuable data which will be linked to a proposed CPT, but also provide a convincing demonstration of the range in genetic merit among a group of rams. The focus is on the financial and management impacts of using rams with the appropriate traits to improve income and decrease costs. To improve commercial ewe performance, the emphasis must be on maternal traits that will lead to lower cost and easy care sheep (Cottle 1999), and this is therefore the long-term focus of the MALP scheme. However in the short term, the immediate value will come from showing the variation in lambs that are slaughtered.

The objective is to help commercial farmers and processors to appreciate the value of improved genetics, and to help the processors understand the extent of variation among progeny of the same sire. This scheme also presents a great opportunity for breed societies to make significant contributions to the sheep industry through improvement and dissemination of elite breeding animals, and encouragement of performance recording by members.

The scheme involves some 23 commercial farms of sizes ranging from 80 to 1020 breeding ewes, assembled into five groups, involving a total of 224 rams and 8000 ewes. These commercial farms are spread over geographically diverse locations running a range of breeds, to provide regional interest and relevance to a variety of land types and production systems. The farmers involved are supported financially for the additional work undertaken.

Within each of the groups rams have been swapped during the mating season to provide genetic links between farms and therefore enable a comparison of rams across the group. A minimum of 2 rams have been used as links between participating farms to ensure adequate genetic linkage is obtained. Hence of the 224 rams, 70 will provide genetic linkage between flocks and between groups. Rams will also be used to link between years. It is envisaged that in the following years, with the development of a CPT, that data collected in the MALP group scheme will contribute, with the use of link rams, to the evaluation of rams across breed throughout the wider breeding industry.

A very important aspect of this system is that the MALP scheme aims to assess the commercial producers' own rams. This ensures transparency in terms of the results. All of these rams are from pedigree flocks (i.e. they have a pedigree identity). In addition, rams from each of the major recorded breeds (Suffolk, Texel, Charollais, Belclare and Vendeen) have been selected from existing performance-recorded flocks for inclusion in order to facilitate links between the MALP and CPT.

The use of adjunct technologies. The MALP scheme also provides an opportunity to demonstrate the use of electronic identification and DNA technology in sheep breeding (Lewis and Simm 2002).

In order to maintain individual animal identification in a commercial farm environment, all ewes and their progeny are to be electronically-tagged using low frequency electronic identification. This will simplify data collection for all traits and also simplify animal management (drafting, feeding management, record keeping). The real value proposition lies in the use of the data collected via electronic identification in the generation of information that can be applied on-farm to increase efficiency (e.g. culling of poor performers), and reduce costs on farm (cull for persistent lameness).

DNA parentage allows the producer to not only minimise the disturbance of lambing ewes and accurately identify each lamb to a dam, but also provides the opportunity to store blood samples that may be potentially valuable in the future. DNA parentage will be used to allow commercial multi-sire mating, ensure accuracy of parentage recording, and reduce the work load required at lambing. This will mean that all ewes, rams, and lambs will be DNA sampled.

CONCLUSION

A new genetic improvement strategy has been developed for Ireland encompassing a novel breeding scheme aimed at increasing uptake of performance recording by breeders and the use of improved rams by commercial farmers. Underpinning these new breeding initiatives are major developments in national breeding objectives for maternal and terminal sires, and an across breed genetic evaluation system integrating data from both pedigree breeders and commercial farmers. The scheme is built around commercial farms and is focused on practical and producer-driven recording. The MALP group scheme uses leading technology in identification and DNA to increase the accuracy and efficiency of data capture and recording. It is hoped that this scheme will accelerate adoption of genetic improvement technologies by breeders and drive commercial famers to provide accurate purchasing signals when purchasing rams.

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