Advancing sheep breeding in Ireland through genomic selection

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Fluctuations in star rating of individual rams are simply an artefact of a lack of performance information on relatives of the ram to accurately determine its genetic merit or in other words whether the ram is carrying good or bad genes. Many approaches exist to increase the accuracy statistics of an individual ram; one such approach is to look directly at the genes or DNA of a ram rather than waiting for his transmitted genes to be expressed in his progeny. Genomics is simply the study of DNA, and genomic selection is using this information to select your breeding stock. DNA remains the same for an animal across its lifetime and therefore the increase in accuracy from genomic selection can be achieved when the ram is still a lamb. Genomic selection was launched for Irish dairy cattle in 2009 and the resultant accuracy of genetic evaluations in dairy increased by 40%. In fact, 59% of dairy semen sold last year was from genomically tested bulls with no daughters milking. Expected genetic gain from genomic selection may actually be greater in Irish sheep since the current accuracy levels are lower and therefore the potential scope for improvement is greater.

OVIGEN Project

Teagasc, Sheep Ireland and UCD have recently been awarded a research grant by the Department of Agriculture, Food and the Marine with the goal of implementing genomic selection for the Irish sheep industry. As part of the OVIGEN project, funding is available to determine the DNA of up to 12,000 animals. A prerequisite for genotyping is accurate performance recording and therefore only breeds with sufficient data recorded through the Sheep Ireland system will be targeted for genotyping. To date the targeted breeds deemed to have sufficient data include Texel, Suffolk, Charollais, Vendeen and Belclare. In addition to the genotyping of the major breeds, a subset of 40 animals have been genotyped representing the minority breeds with the goal of quantifying the degree of relationship between the other breeds and the 5 main breeds currently recording in Sheep Ireland. A decision on the potential inclusion of the smaller population breeds in the genomic selection program will be taken based on these results. For hill breeders and commercial farmers, low-cost

parentage options using the genotyping technology are also being investigated to allow such flocks to start performance recording, as parentage recording is currently the biggest barrier for these groups of farmers to overcome in order to performance record their flocks.

Progress to date

DNA has been collected from 12,000 animals across the LambPlus flocks taking part in OVIGEN. A large volume of data is being collected from each of these animals including their weight, condition score, incidence of mastitis, dag scores and lameness scores. These data will be included in the genetic indexes of the individual animals and will be used to develop a new health sub-index that will be introduced in autumn 2017.

All DNA samples from these animals have been genotyped and the first reports on parentage (where a sire or dam were also genotyped) are in the process of being distributed to individual breeders. The usefulness of genomic selection will require detailed research and is expected to take longer but results will be reported to industry throughout the duration of the OVIGEN project. If the research proves this a valid method of adding information to the evaluations then the turnaround time should drop to a few weeks.