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THE SEARCH FOR FOOTROT-FREE FINE-WOOL SHEEP IS GAINING CONSIDERABLE MOMENTUM - BUT THE JOB IS NOT DONE YET.

FeetFirst

Dr Mark Ferguson

TONY JOPP

We would like to acknowledge the service that the late Tony Jopp provided to the FeetFirst project through his advisory and governance role on the Animal Health Advisory Panel. Tony was dedicated to finding new ways to reduce the impact of footrot on Merino sheep and the team at NZM are very grateful for the guidance that Tony provided. He is sadly missed.

Some great progress with FeetFirst has been made in the last six months. This newsletter contains an update on what we have found so far and the next stages for the development of the genomic breeding value (gBV) for footrot resistance.

FEETFIRST PROGRESS

COMMERCIAL FLOCKS

The initial FeetFirst data set (from commercial fine-wool flocks) has been analysed by scientists at the Animal Genetics and Breeding Unit of the University of New England in Australia (AGBU).

This data set comprised genotypes from more than 3,500 DNA samples, collected from commercial fine-wool farms all over the South Island. The genotypes were from sheep that either had, or did not have, footrot at two separate inspections.

We are extremely grateful for the support we have received from the growers that agreed to sampling in their flocks, and also the veterinary teams (and the team from NZM) that worked tirelessly to collect the necessary samples.

We will finalise the last of the on-farm sample collections during the Autumn of 2015.

SIRE GENOTYPING

In addition to the FeetFirst sampling undertaken in commercial flocks, NZM has collected DNA samples from several hundred industry sires, which have also been genotyped on 50K SNP chips. These genotypes form an important reference population for the FeetFirst project.

AGBU have used this sire data set to test the concept of taking a DNA sample from a ram and determining the likelihood of its progeny getting footrot.

AGBU ANALYSIS

AGBU's analysis to date has shown that we have massive variation in footrot susceptibility in the fine-wool sheep we farm.

Furthermore, the analysis has confirmed previous estimates that the heritability of footrot in Merino sheep is approximately 20%. Put differently, 20% of the variation in footrot that you see between individuals in a mob of sheep is due to their genes, the other 80% of the variation is due to the environmental differences that the animals have been subjected to.

To put that in perspective, worm resistance and carcass fatness in Merinos have a similar heritability, and both traits have shown the ability to change dramatically when breeders put selection emphasis on them.

These results are extremely exciting and provide confidence that a genomic breeding value (gBV) for footrot resistance offers a huge opportunity to the fine-wool industry.

> The heritability of footrot resistance is approximately 20% - similar to that of both worm resistance and carcass fatness in Merino sheep.

NEXT STEPS

We are now poised to take the project to the next level, as we move into the second phase of the FeetFirst project. The next steps outlined below are subject to confirmation of further funding.

PROFESSOR RAADSMA JOINS THE ADVISORY TEAM

To ensure that the investment by all stakeholders has the greatest likelihood of success, we have secured the guidance of Professor Herman Raadsma to provide specialist technical advice around genomics and the genetics of footrot.

Herman has extensive experience in both genomics and genetics, with specialist knowledge of footrot. He has over 30 years of experience in animal health and production research, and has published 32 book chapters, 144 journal papers and over 100 industry papers. His guidance will be invaluable in the next phase of the project.

PROGENY TESTING

Based on AGBU's analysis to date and advice from Professor Raadsma, it is clear that the best direction going forward is to expand the central progeny test (CPT) – with 50 sires being progeny tested in each of 2015 and 2016 – so that by the end of the project there will be a total of 180 progeny-tested sires.

The focus of the CPT will be on building the accuracy of the footrot gBV and establishing genetic correlations between footrot and other production traits. This will require the progeny to have undergone a footrot challenge and for the feet to be scored on three separate occasions during the challenge.

This approach will require an additional property to be contracted for the CPT, and will extend the timeframe of the FeetFirst project to the end of 2017 (so that the 2016 CPT progeny can be evaluated for their performance in a footrot challenge).

In addition, we will work directly with stud breeders and, where a particular stud challenges their flock for footrot and the progeny are evaluated on the stud breeder's property, these sires will contribute to the gBV data set in a similar way to the CPT progeny, further building the accuracy of the gBV.

All of the rams that are evaluated at either the CPT or on individual stud properties will be genotyped and this information will be added to the data set from the commercial flocks.

DEDICATED SCIENTIST AT AGBU

We are in the process of employing a dedicated scientist to be based at AGBU to work with the footrot data we are generating, which will speed up the development of the gBV for footrot resistance. This person will incorporate the initial FeetFirst data set (from commercial flocks) with the footrot data collected at the CPT site and the stud properties where progeny are evaluated for footrot resistance.

COMMERCIALISATION

Commercialisation is expected to involve the use of lower density SNP chips to genotype young rams.

This will allow stud breeders to generate gBVs for footrot resistance for their young sires (even before the sires have produced any progeny). Commercial breeders will be able to access a sire's gBV for footrot resistance, along with other EBVs for that sire, when they purchase their ram team each season. This is a hugely exciting step forward for the New Zealand fine-wool industry.

In short, we are not there yet, but we are making great progress. Once again, we thank you for your support.

> A key advantage of the genomic approach is that breeding values for a whole range of performance and animal health traits, in addition to footrot resistance, will be able to be predicted for an individual sheep from a single DNA sample.

FEETFIRST UPDATES ONLINE

www.perfectsheep.co.nz/animal-health/feetfirst

CONTACT

If you have any questions about any of these projects, please feel free to contact:

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