

IMPROVING RESILIENCE IN MERINOS

CSIRO researchers Dr Brad Hine and Dr Jen Smith are investigating whether the resilience of Merino sheep can be improved through targeted breeding. The project is using wether progeny of the Merino Lifetime Productivity (MLP) project over five years at the New England MLP site.

Resilience is defined as the ability to cope with challenges and return quickly to being productive. Livestock face a variety of environmental challenges in their production environment from pathogens (disease challenge), climatic extremes, social mixing and management induced stress. Animals respond to these challenges with a variety of immune, physiological and behavioural responses which are highly integrated.

A newly funded collaborative project between AWI and CSIRO will test several hypotheses around resilience and the ability of animals to cope with challenges posed by their production environment.

The focus of the project will be two drops of F1 MLP wethers, the sons of 28 industry sires, half of which will be used to answer the following four research questions:

1: Are immune competence (ability to mount an immune response), stress responsiveness and temperament favourably correlated in Merino sheep?

Immune competence, ability to cope with management induced stress and temperament are important traits which contribute to an animal's resilience. We have observed favourable genetic correlations between these resilience traits in beef cattle. Based on these results, researchers will investigate whether similar favourable correlations exist between these resilience traits in Merino sheep.

2: Do Merino sheep with enhanced immune competence have reduced incidence of disease, reduced health-related mortalities and improved productivity in the face of disease challenge resulting in significant benefits in terms of health, welfare and productivity of animals?

Work in beef cattle has demonstrated that animals identified as being 'immune competent' have significantly less disease related mortalities and incur significantly lower health-related costs for producers. Researchers will

investigate whether similar benefits, in terms of improved health and welfare, and reduced production costs will be associated with 'immune competent' Merino sheep.

The initial MLP site (Balmoral) now has ewes that are rising 3 and 4 year old ewes, and the Pingelly and MerinoLink sites have rising 2 and 3 year old ewes. The progeny of different sires are showing increasing variation in mortality rate which is having a significant economic impact.

3: Do Merino sheep with enhanced immune competence respond more strongly to routine vaccinations used by the sheep industry than their low responder counterparts, allowing producers selecting for immune competence to improve their ability to protect their flocks against disease?

Vaccination is routinely used in the Merino industry to protect animals against common diseases of significant economic importance. For most vaccines, there is always a proportion of 'non- or low-responders' who do not respond sufficiently well to the vaccination to achieve protection and which remain susceptible to disease. These animals significantly reduce the efficacy of vaccination on-farm and the ability of producers to protect their flocks against disease.

Researchers will investigate whether they can improve lifetime productivity and the number of low- or non-responders to vaccination programs through selection for improved resilience in Merino sheep.

4: Are immune competence and carcass traits that predict eating quality, favourably correlated in Merino sheep (as has been demonstrated in meat breed sheep) suggesting selection for immune competence may also have benefits for carcass retail values and eating quality?

Researchers have observed favourable genetic correlations between immune competence traits and carcass traits related



Tim Lawrence (scanner) and Annika Alexander (student) fat and muscle scanning 2017 drop New England MLP wethers.

to tenderness (shear force), intra-muscular fat (IMF) and fat cover in meat breed sheep. Results from carcass data were supported by live animal ultrasound scanning data which suggested that fat cover was also favourably genetically correlated with immune competence in terminal lambs. These findings suggest selection for immune competence may also have benefits for carcass retail values and lamb eating quality in Merino sheep. A proportion of 'resilience tested' lambs will be feedlot finished and slaughtered at a commercial abattoir to obtain detailed feedlot performance and MLA-funded carcass data.

The final report from this project is due in December 2021.

MORE INFORMATION
Dr Brad Hine, CSIRO:
brad.hine@csiro.au or (02) 6776 1377