

final report

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Estimating the cost of immunity to gastro-intestinal nematodes in meat sheep differing genetically in resistance and resilience to infection

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Executive Summary

The use of chemicals (drenches) constitutes the greatest part of sheep producers' attempts to mitigate the adverse effect of nematode parasites, but is blighted by wide-spread and increasing occurrence of anthelmintic resistance in nematode populations. An additional parasite management approach is to rely on the host immune response, which has been shown to reduce worm numbers and worm egg counts. Various reports have described the benefits of selecting and breeding sheep which are resistant to parasites. But mounting of an immune response requires physiological resources which might otherwise contribute to improved production of meat, wool, milk, and offspring. It has been said that this cost of immunity makes up the bulk of the production losses caused by worms in sheep.

This project set out to compare the adverse effects of induced worm infestation in lambs known to be genetically resistant (WEC ASBV) or not, and genetically resilient (PWT ASBV) or not. The induced infestations were of Black Scour Worm (*Trichostrongylus vitrinus*) and Small Brown Stomachworm (*Teladorsagia circumcincta*), in separate experiments.

The project commenced in July 2011 and was planned to be completed in February 2015. Due to organisational restructuring and redundancies in the research organisation, the project had to be terminated prior to completion. By the time the project stopped, the work with *T circumcincta* was still in progress, but the *T vitrinus* work had been completed.

The conclusion from the fifth milestone report was that there was a significantly higher total cost of worms in the high resistance/high resilience group compared to the high resistance/low resilience or low resistance/high resilience groups, which removed the benefit of higher growth rates in the high resistance/high resilience group when uninfected, and led to no significant difference being identified in the growth rate of infected lambs across the 4 quadrants. This leads to the interpretation that the best practical breeding option is to select for high resistance and high resilience - if animals are exposed only to moderate infection there may be benefit from the overall higher growth rates expected, but if exposed to heavy infection with *T. vitrinus* they will not be penalized in growth any more than other genotypes would have been.