AN INVESTIGATION OF IMMUNOGENETIC TESTS FOR INTERNAL PARASITE RESISTANCE IN SHEEP AND THEIR ASSOCIATION WITH PRODUCTION CHARACTERS

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Recent studies have shown that the genetic resistance of sheep can be exploited to provide alternative methods of control based on the way immunity influences resistance to infection by nematode parasites. However, selection for resistance against nematode parasites will only have practical relevance if important production parameters such as liveweight gain and wool growth are unaffected, if not improved (Albers *et al.* 1984).

The aim of the present study was to examine ovine lymphocyte antigen (OLA) type, eosinophil count and antibody titres as indicators of resistance to internal parasites with special reference to the effect of resistance to nematode parasites in sheep on production.

This study involved 3 experiments conducted over 3 years at Gatton College. There were 203 and 211 ewes of mixed age used in Experiments 1 (1990) and 2 (1991) respectively; while 302 weaners were used in Experiment 3 (1992). All sheep were exposed to natural infection with internal parasites, primarily *Trichostrongylus colubriformis* and *Haemonchus contortus.* The animals were monitored, over 4 consecutive months between May and October each year for faecal egg count (FEC), peripheral blood eosinophil count and, in Experiment 3, antibody titres determined by an enzyme-linked immunosorbent assay (ELISA). The OLA type of each sheep was also determined using a microcytotoxicity test on lymphocytes from blood samples collected during the same period. All production parameters including liveweight at weaning or at joining, fleece weight and ewe fecundity were recorded in the months prior to the commencement of sampling.

Analysis of the data revealed that while "OLA type-SY1a" sheep groups had lower mean FEC and higher mean eosinophil counts than "other OLA type" groups, the results were mostly not significant. However, in 15 from 28 observations across all 3 experiments, it became apparent that where a particular sheep group possessed a significantly higher eosinophil count ($P < 0.05$), the same group also had a significantly lower FEC ($P < 0.01$). There was also an inverse relationship between eosinophil count and FEC (20 instances from 33 observations), with all 6 significant results ($P < 0.05$) being associated with negative correlations ($r = -0.16$ to -0.32). Sheep groups in Experiment 3 that possessed significantly higher mean antibody titres to *T. colubriformis* and *H. contortus* ($P < 0.05$) had significantly lower mean FEC ($P < 0.01$) in 24 of 32 observations. In addition, antibody titres were mostly negatively correlated (28 of 32 observations; $r = <-0.53$) with FEC; but only 2 significant associations were found. While there were no relationships revealed between OLA type and antibody titres, antibody titres and eosinophil count tended to be positively (18 of 32 observations), but only in 4 instances, significantly correlated ($P < 0.05$; $r = 0.52$ to 0.81).

There was a lack of consistently significant associations between any of the immunogenetic markers and any production parameter examined including weaning weight, joining weight, fleece weight or ewe fecundity; and any correlations were mostly low and/or negative.

In conclusion, all 3 immunogenetic markers have potential. for identifying gastrointestinal parasite resistant sheep particularly as the presence of these markers does not appear to adversely affect the productive potential of the animals. Possibly these markers could be included in a sheep selection index; however, this suggestion warrants further investigation.

ALBERS, G.A.A., BURGESS, S.E., ADAMS, D.B., BARKER, J.S.F., LE JAMBRE, L.F. and PIPER, L.R. (1984). *In* "Immunogenetic Approaches to the Control of Endoparasites", (Eds J.K. Dineen and P.M. Outteridge) pp. 41-51 (CSIRO: Melbourne).