A NOTE ON GENETIC VARIATION IN IMMUNE RESPONSE TO *CLOSTRIDIUM CHAUVOEI* VACCINE IN LAMBS

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Clostridial infections represent the most important bacterial diseases in sheep. Commercial use of multivalent clostridial vaccines containing antigens against *Clostridium tetani* (tetanus), *Clostridium chauvoei* (blackleg), *Clostridium perfringens* (enterotoxemia), *Clostridium botulinum* (botulism) and *Clostridium novyi* (gas gangrene) is now common practice in most sheep-producing countries (Sterne *et al.* 1962).

In contrast to most production traits in sheep, few studies have investigated environmental (including management) and genetic aspects of response to commercial vaccines in sheep. This note reports on the findings of a preliminary investigation which examined the relative magnitude of certain environmental and genetic effects on antibody responses to vaccination with *C. chauvoei* antigens to protect sheep from blackleg, a potentially lethal disease which can be controlled through vaccination.

Mixed-sex weaners ($n=436$), representing the progeny of 24 sires from 6 flocks of the Merino genetic resource flock at the University of Sydney, Camden, were sampled following vaccination with a commercial multivalent Clostridial vaccine (CSL 5 in 1). All lambs were born over a 6 week period in September/October, and were grouped according to age, in 3 management groups for marking, when they received their first vaccination (October 13, 21, November 5 for the 3 groups respectively). All weaners received a booster vaccination on January 4th, and blood samples for antibody assays were taken two weeks later. An enzyme-linked immunosorbent assay (ELISA) was used to measure antibody response to *C. chauvoei* whole cell antigens as described by Crichton *et al.* (1990). Following square root transformation, least squares analysis of antibody titre data was performed using Harvey (1975). The mixed model included fixed effects of flock, sex, birth/rearing type, age of dam and ELISA plate number. Day of birth and birth weight were also included as covariates. A term for sires nested within flock was included as a random effect.

Sex, type of birth, age of dam, date of birth and birth weight were unimportant sources of variation in antibody titre. Significant differences were observed between sire-groups within flocks, and resulted in a preliminary sire half-sib heritability estimate of 0.55 ± 0.19 for vaccine response to *C. chauvoei*. Differences between flocks were non-significant when tested against the mean square for sires within flocks. ELISA plate number had a major effect ($P < 0.001$) on variation in antibody titre and therefore was included in all analysis; there was a high correlation (0.999) between titres for duplicate samples within plates. Plate effects may thus reflect random differences between groups of animals which happened to be measured on the same plate, or specific effects unique to each ELISA plate. It was decided, and recommended for future analyses, to adjust all data for differences between ELISA plates, by including this term in all analyses.

The results presented here suggest that response to vaccination with *C. chauvoei* antigens is unlikely to be influenced by major environmental/fixed effects examined in this study. This is in contrast to other production traits such as fleece and body weights which are generally strongly influenced by such effects. Although more data are required, preliminary results reported here suggest that response to *C. chauvoei* vaccination is under considerable genetic control. This has not been reported previously.

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