

# RSPCA Australia Scholarship for Animal Welfare Annual Report 2007-08

**Humane Animal Production Scholarship 2007: Kate Lennon, University of Adelaide**

**Project title:** A physiological, behavioural and genetic study of temperament in Merino sheep and its link to lamb survival

## Progress report 2007-08

### Introduction

Approximately 20% of all lambs born in this country die within the first three days of life (Kilgour 1992), with the major causes being starvation, exposure and mismothering (Haughey 1983). Not only does this represent a large economic loss but also an important welfare issue (Nowak 1996). In extensive systems, care should be given to ensure that the animals possess behavioural and physiological traits that allow them to survive (Goddard *et al.* 2006). This is generally not witnessed in current farming practices in Australia as fine wool Merinos are extensively farmed and have been shown to be inferior mothers when compared with Dorsets, Romneys and crossbreds, exhibiting higher lamb mortality rates (Alexander *et al.* 1990; Kuchel and Lindsay 1999).

Nowak (1996) suggested that the fear reaction in ewes, particularly that caused by the isolation from the flock during parturition and the novelty of the resulting lambs, could impair maternal behaviour, which results in increased risk of mismothering. At the University of Western Australia two flocks have been divergently selected for temperament by using willingness to approach a human in order to re-join the flock and agitation box scores with the resulting two flocks consisting of calm and nervous ewes (Gelez *et al.* 2003). Studies on these flocks have found that twin survival is increased by 10% in the calm flock when compared with that of the nervous flock (Martin and Kadokawa 2006).

The aim of the current study was to determine whether blood parameters could be used to identify differences in temperament, whether altered maternal behaviour is responsible for the increase in lamb survival witnessed in the WA flock and finally estimate the heritability of measures of temperament and correlations between these and important wool traits.

### Progress and Findings

Measure	Progress	Outcome
Identify animals of two temperaments using the IBT	Completed	Two temperament groups of ewes were identified with average agitation scores of $18.1 \pm 4.8$ ('calm') and $81.3 \pm 4.3$ ('nervous')
Quantify levels of glucose, lactate, cortisol and differential blood cell counts for resting and a stress event for both 'calm' and 'nervous' ewes	Completed	There was no effect of temperament group on blood glucose or plasma cortisol concentration, but application of a "stressor" increased both plasma glucose levels (27%) and plasma cortisol levels (70%)
Identify behavioural	Completed	The behavioural study revealed that 'calm'

differences at lambing between two groups of ewes with 'calm' and 'nervous' temperaments		ewes experienced a shorter length of parturition, $28.6 \pm 11.8$ min, when compared to 'nervous' animals ( $65.6 \text{ min} \pm 9.3 \text{ min}$ ; $P < 0.05$ ). However, it was difficult to draw conclusions from the behavioural study as all lambs survived
Estimate heritability of various measures of temperament	Completed	The heritability of ewe mothering temperament was 0.39, indicating a moderate genetic component to this behavioural trait. Agitation score, flight time and lamb survival were less heritable (0.20, 0.12 and 0.09 respectively)
Estimate correlations between measures of temperament and wool production traits	Completed	Estimated genetic correlations between these temperament traits and wool traits were low, with the exception of staple length, which was negatively correlated to agitation score ( $r_g = -0.26$ ; higher the agitation score the more agitated the ewe)

## Recommendations

Results suggest that the blood parameters measured in this study are not useful in determining temperament. In the behavioural study, it was difficult to draw meaningful conclusions as no lambs died. Genetically, the moderate heritability of ewe mothering temperament and to absence of harmful correlations with wool traits suggests that producers can select for this measure of temperament, increasing lamb survival, without negatively affecting production.

## References

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