Behavioural and physiological responses of domestic sheep (*Ovis aries*) to the presence of humans and dogs

A thesis presented in partial fulfillment of the requirements for the degree of

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Abstract

Both humans and dogs are integral in sheep production systems; however, which is more aversive to sheep, or indeed, whether either causes significant stress, has not been shown experimentally. The aim of this thesis was to examine some behavioural and physiological responses of domestic sheep to the presence of humans or dogs. An arena test was used to measure the relative aversion of sheep to the presence of a human or dog, as well as to elucidate differences in the responses of flocks at the University of Western Australia (UWA) which were putatively selected for differences in fearfulness. A Y maze preference test was used to 'ask' sheep whether they preferred a human shaking a rattle or a barking dog. In both tests, adrenocortical responses were measured concurrently to support the interpretation of behaviour.

The presence of a human or dog in the arena elicited significantly more avoidance and vigilance behaviour and less exploration than did the presence of a control object. However, the dog elicited significantly more of this fear-related behaviour, and significantly larger adrenocortical responses than did the human. Sheep also expressed a clear preference for a human shaking a rattle over a barking dog in the Y maze test and exhibited larger adrenocortical responses to the dog than to the human in the Y maze facility.

The UWA flocks differed in their expression of locomotor and vocal activity; MA sheep were more active/vocal than the other flocks, not only in the presence of the human but also with the box or dog. MA sheep expressed less avoidance and vigilance and more exploration than the other flocks in the presence of the human and exhibited significantly lower plasma cortisol concentrations than LA sheep after exposure to the human (10-min sample). However, there were no inter-flock differences in fear-related behaviour or adrenocortical responses when the flocks were presented with the box or dog. The results do not support the notion that the UWA flocks have been selected for differences in a consistent predisposition to react fearfully.

The adrenocortical responses measured in these studies were only moderate in magnitude and duration, with peak plasma cortisol concentrations 2-3 times higher than pre-treatment values, and all concentrations returning to pre-treatment levels within one hour of the start of treatment. If these observations are confirmed in practical situations, the presence of humans and dogs during routine handling should cause little concern on the basis of animal welfare. However, limiting the presence of dogs in certain situations (e.g. before slaughter) may reduce stress in domestic sheep.

Significant methodological developments in this research include the use of multivariate statistical techniques to analyze arena behaviour, the concurrent measurement of adrenocortical and behavioural responses in the arena and Y maze tests, and the explicit testing of the effects of individual lateral biases on choice behaviour in a Y maze test. Future studies should measure sheep stress responses to the presence of humans and dogs in practical situations.

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Declaration

This is to certify that I have pursued this study in accordance with the requirements of Massey University's regulations including:

i. The research carried out for my Doctoral thesis has been used in whole or in part for this qualification only.

ii. The research is my original work, except as indicated by appropriate attribution in the text and/or acknowledgements. I claim full responsibility for the primary role in developing the original scientific ideas and experimental designs, collecting and interpreting the data, and writing all scientific documents associated with the research outlined in this thesis, with guidance from my academic supervisors.

iii. The text, excluding appendices and bibliography does not exceed 100,000 words.

iv. All ethical requirements relating to the research have been met as required by Massey University, and/or other organizations and committees, and under the relevant legislation.

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Beausoleil, N.J., Stafford, K.J., Mellor, D.J. Does direct human eye contact function as a warning cue for domestic sheep, *Ovis aries*? *Journal of Comparative Psychology, 120 (3): 269-279* (**Appendix 2**).

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Other publications completed in parallel with thesis research

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