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Lamb Rearing Performance in Highly Fecund Sheep



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The Massey University Animal Ethics Committee has approved the studies involving animal manipulations

I have prepared this thesis and it is a record of my own work.

I took the photos of the sheep, unless otherwise specified.

Abstract

This thesis investigates ewe and lamb behaviour, genetics and environmental effects to determine whether lamb rearing performance can be improved in highly fecund sheep. The studies were carried out under commercial pastoral farming conditions. High performing sheep farmers were surveyed to identify management and performance practices that differentiate farms with high and low lamb rearing success. Farmers agreed that mothering ability was the most important factor affecting lamb survival and considered lamb survival to be the most important trait affecting farm profit. The survey identified the Coopworth breed as the predominant breed of high lambing percentage flocks.

Heritability estimates were derived for lamb survival ($h^2 = 0.16$), ewe maternal behaviour score ($h^2 = 0.05$) and litter survival ($h^2 = 0.00$) in a Coopworth flock that had been selected for improved maternal ability for nearly 30 years. Maternal genetic variation in the Coopworth flock was low for lamb and maternal traits and suggests that farmers must consider the environment and management techniques to improve lamb survival. A greater proportion of the variation in triplet survival was attributed to environmental effects than it was for twins, therefore triplets require more care.

Management and environmental factors investigated in this study affected ewe and lamb attachment behaviours in larger litters. A relationship was found between pregnant ewe physiology and maternal behaviour. Ewes that maintain body condition in late pregnancy and have lower plasma β -hydroxybutyrate levels were more receptive to the demands of their litter as these ewes had higher MBS. The effect of maternal nutrition in late pregnancy and at lambing was explored further. Feeding levels did not affect the majority of maternal behaviours investigated. However triplet lamb behaviour was affected by maternal nutrition in late pregnancy and lambs born to poorly fed ewes were less likely to stand, locate their dam's udder and follow their moving dam after separation at tagging. Triplet lamb survival was similar to twin lamb survival when pasture allowance was not restricted in late pregnancy.

Ewe behaviour was affected by breed, selection line and litter size. Ewes that high bleated less and showed less flocking behaviour, in the arena test and at tagging had

greater lamb rearing performance at weaning. Ewes that were quick to contact their lambs after separation at tagging weaned greater lamb weights (weight weaned increased 10kg per ewe from MBS3 to MBS4). Lamb behaviour was not affected by breed and was not explained by birthweight. Lambs that stood and sucked from their dam within ten minutes from tagging had an improved chance of survival to weaning (survival increased 5-fold and 3-fold respectively). Lamb behaviour has a significant role in ewe-lamb attachment in large litters. In particular lamb bleating represents need and attracts the dam when separated. The lamb bleats more if its dam has a lower MBS and it will bleat more if it stands quickly. The dam will high bleat when she has lower MBS and cannot locate her lamb or litter.

Lamb rearing success for ewes with larger litters is determined by lamb behaviour and the lamb's interaction with its dam. Triplet lambs can achieve survival rates similar to twins, providing the maternal environment and lamb genetics support appropriate ewe-lamb attachment behaviours.

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