The behaviour and health of dairy lambs reared artificially with and without early access to meal

A thesis presented in partial fulfilment of the requirements for the degree of Master of Science in Animal Science at Massey University.

BRADLEY ALLAN NIEPER

2017

Abstract

Many large-scale dairy sheep producers use lamb-rearing systems and provide lambs with milk replacer (MR) *ad libitum* and grain-based meal to accelerate rumen development to support early weaning methods. Lambs are raised inside for three weeks before being relocated to a pasture paddock and weaned off MR, followed by weaning off meal 3-4 weeks later onto a pasture-only diet. The potential to replace the early provision of meal with early access to good quality pasture before weaning has not been evaluated and may have effects on the development of feeding behaviour. Studies on feeding behaviour in lambs have focused on differences between restricted and *ad libitum* quantities of MR, with little research on differences in use of solid feed before weaning. Sixty East Friesian crossbred ewe lambs aged 3-4 days were randomly allocated to one of two treatment groups; MR *ad libitum* with access to meal (M) or MR *ad libitum* without meal (NM). Both groups had access to pasture at the beginning of week 4, and were abruptly weaned off MR at week 6 and gradually weaned off meal (M lambs only) beginning in the middle of week 8 until the end of week 10. It was hypothesised that; (1) while lambs were being reared inside, M lambs would initiate rumination earlier due to their early access to meal. (2) There would be no difference in the milk feeding behaviour between lambs on the two diets. (3) There would be no difference in the health of the lambs and lastly (4), once outside, M lambs would spend more time grazing and subsequently ruminating as a result of their earlier rumen development. All lamb behaviours were visually recorded during weeks 2, 3, 5, 7, 10 and 12 (nine hours/week). Milk feeding behaviour traits were automatically recorded hourly through the automatic MR dispenser while being reared inside for 23 days. Health scores were recorded twice daily and total days health incidences were recorded. Meal access accelerated onset of rumination, while NM lambs spent more time consuming wood shavings during week 3 ($P<0.001$). Once outside, NM lambs spent more time grazing during weeks 5 ($P<0.05$), 7 and 12 ($P<0.001$), and increased rumination time compared to M lambs by week 12 ($P<0.001$). Lambs with meal access on average had a greater number of rewarded meals (meals in which lambs consumed more than 1 ml), with a greater intake of MR per meal than lambs without meal access ($P<0.001$). There were no mortalities of lambs fed either diet. Loose faeces (mild scours), pink eye and navel infections were observed in both M and NM lambs. These findings may allow refinement of lamb-rearing practices by adjustments to the provision of meal to lambs since no adverse behavioural or health effects were observed in lambs without meal access.

Acknowledgements

First, I would like to thank Sam Peterson, Kevin Stafford and Sue McCoard for taking their time to be my supervisors and providing me with their years of knowledge and understanding of animal science for me to complete my masters. Thank you for helping to coordinate and integrate my research objectives into the lamb trial that was done at AgResearch. The skills I have developed and knowledge gathered over the past year will be useful for the rest of my life as I move forward. Thank you to Sue for providing me with an office at AgResearch and creating a friendly environment where I could go and work daily without any distractions.

Thank you to Ajmal Khan for providing his skills and time to help create with my research project and helping edit of my conference proceedings. Thank you to Siva Ganesh for his statistical knowledge and patience as my 'go-to' statistician at AgResearch and enabling me to successfully analyse my data.

I sincerely thank all the scientist and technicians from AgResearch's Animal Nutrition & Physiology Team and the Ulyatt Reid Large Animal Facility Staff for their assistance during the lamb trial as well as accepting me into the team and supporting me over the past year.

This study was funded by the Ministry of Business, Innovation & Employment (MBIE; contract C10X1305), in partnership with Kingsmeade Artisan Cheese, Maui Milk, Spring Sheep Dairy. Without this funding, this study wouldn't have been possible.

Lastly, a huge thank you to my family, partner and friends for motivating and encouraging me over the past year, without you all I don't know how I would have completed my masters or even be here in the first place.

Table of contents

Table of figures and tables