Welfare and performance of newborn and young dairy calves

A THESIS IN PRESENTED IN PARTIAL FULFILMENT

OF THE REQUIREMENTS FOR THE DEGREE

OF

MASTER OF SCIENCE

IN

PHYSIOLOGY

AT MASSEY UNIVERSITY, PALMERSTON NORTH, NEW ZEALAND.

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2002

Widmung

Ich widme diese Thesis den beiden wichtigsten Menschen in meinem Leben – meinen Eltern. Eure Liebe, Euer Vertrauen in mich und Eure Unterstuetzung haben mir geholfen einen Traum zu erfuellen. Ich hab' Euch ganz doll lieb.

I dedicate this thesis to the two most important people in my life – my parents. Your love, trust and support helped me fulfil one of my dreams. I love you so very much.

Acknowledgements

Foremost, I would like to thank my supervisors Professor David Mellor and Associate Professor Kevin Stafford for their continual support and guidance throughout my Masterate. Our meetings motivated me to go on and do my best. I am very grateful for all the time you invested in me. It has been a great experience. Thank you for having me as your student.

Special thanks to my parents without whose financial and moral support and love this endeavour would not have been possible. Thanks for the long phone calls and emails, the photos you send me of the whole family and the parcels filled with chocolates, which continually cheered me up when I got homesick. Also, thanks to the rest of my family for their love and to all my friends all over the world for supporting me.

Special thanks also to my best friend Nicole Tubach and my partner Cedric Priest. You were there when I needed someone to talk to, when I needed someone to let my frustration out at, and when I needed cheering up. Thanks for being there for me and believing in me.

I would also like to thank my fellow students Ngaio Beausoleil, Philippa Mello, Kate Littin and Shauna Sylvester. Thanks for your help in the field (especially for being out there during those cold and rainy nights), but also for your support and friendship during the last two years. Thanks also to Rene Corner for her help with formatting this thesis, for giving me the opportunity to relax with some more calf work and for her friendship.

I would also like to acknowledge Neil Ward for technical assistance, Aimee Charteris for her help with setting up the experiments, Phil Pearce and Marie Russel for the analysis of plasma samples, Colin Holmes for recording the cow body condition scores, Debbie Twiss for her help taking cow blood samples, for her advice and for providing me with information on the veterinary records for the calves of Dairy Farm No. 4, Chris Hunt from AgResearch Palmerston North for supplying me with weather data for the period of August 2001 and Anne Ridler and her veterinary students for helping blood sampling the cows.

I appreciate the invaluable help and support given by Dairy Farm No. 4 manager Michael-John Burry, by farm supervisor Gareth Evans and the farm staff, which was given generously whenever needed.

Special thanks also to Dean Burnham and Geoff Purchas whose experience in field trial work kept me from being discouraged several times.

Advice and assistance regarding statistical analysis was kindly supplied by Duncan Hedderley. Without your help I would have been lost trying to come to grips with statistical theory ☺!

Lauren Elgie, Glenn Thomas, Hadley Charteris, Jeremy Darby, Ema Tocker, Cheryl McMeekan, Andrew Shepherd, Lauren Weaver, Jo Wrigley, Ximena Tolosa and Gabrielle Stanley provided invaluable assistance sampling newborn calves, sometimes in cold and wet weather and during cold and dark nights. Thank you!

I gratefully acknowledge the financial support for this research project by the Ministry of Agriculture and Forestry (MAF policy), and the scholarship and financial support by the Livestock Improvement Corporation (LIC).

Thanks also to all those calves, which -involuntarily-, participated in the experiments described in this thesis and without which this research would not have been possible.

Approval from the Massey University Animal Ethics Committee has been obtained for the experiments described in this thesis.

Abstract

Physiological evaluation of newborn lambs at birth revealed four main causes of hypothermia and death: placental insufficiency, intrapartum hypoxaemia, inadequate heat production and starvation. No similar evidence seems to be available for calves and thus the present study measures parameters used in previous lamb studies to evaluate the physiological status of calves and the incidence of the four factors in newborn dairy calves.

The study was carried out in the Manawatu region during spring 2001. Multiparous and primiparous cows about to calve were observed continuously. All dystocias were assisted. Within 30 minutes of birth the rectal temperature of each calf and a jugular blood sample were taken. Time to stand on all four feet and birth weight were also measured. The packed cell volume and plasma concentrations of glucose, fructose and lactate were analysed as indices of prenatal and intrapartum status. A subset of calves was then followed up after pick-up to 4 days of age taking rectal temperature twice daily and a jugular blood sample at approximately 24, 48, 72 and 96 hours after birth. Plasma was analysed for glucose, beta-hydroxybutyrate, urea and gamma-glutamyl transferase concentrations to determine energy status of the calves for the first four days after birth and to determine whether calves had sufficient colostrum intake indicative of passive immunity.

The physiological status of calves at birth was fairly uniform. Calves born after dystocia had significantly higher plasma lactate concentrations, took significantly longer to stand and had significantly lower packed cell volumes than normally born calves. The higher plasma lactate concentrations and longer time to stand in these calves indicate hypoxia at birth and reduced vigour. As packed cell volume was not significantly elevated in calves with significantly elevated plasma lactate concentrations it is suggested that placental insufficiency was not a major problem. The majority of calves had relatively high rectal temperatures suggesting that thermogenesis was not impeded.

The majority of calves followed up to 4 days of age were in good energy balance. Starvation and hypothermia were not major issues as judged by relatively high plasma urea and beta-hydroxybutyrate concentrations and rectal temperatures. The majority of

calves had adequate gamma-glutamyl transferase concentrations suggesting effective passive uptake of immunoglobulins. However, all calves that died (n=8) had significantly lower concentrations than calves that became sick and subsequently recovered and those calves that remained healthy.

Overall, the physiological status of the calves of the present study between birth and 4 days of age was adequate. However, immune status plays an important role for the health and welfare of the newborn calves as judged by the fact that all calves that died failed to take in colostrum before pick-up.

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