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Welfare and performance of newborn and young dairy calves

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Tamara Johanna Diesch
2002
Widmung


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.
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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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