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Improving Triplet Lamb Survival in New Zealand



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ABSTRACT

This thesis sets out to identify physical and physiological differences between lambs of different birth ranks at birth, and to use this information to identify practical on-farm management strategies which could improve triplet-born lamb survival.

Triplet-born lambs, especially the lightest-triplet-born lambs, not only had a greater capacity to lose heat but also had a reduced capacity to produce heat when compared to twin-born lambs. Due to their lighter birth weights, triplet-born lambs had lower plasma thyroxine (T_4) concentrations within the first 24 hours of life than twin-born lambs, and within twin- and triplet-born litters, the lightest- and medium-triplet-born lambs had greater plasma lactate concentrations than all twin-born lambs and the heaviest-triplet-born lambs. Independent of lamb birth weight, triplet-born lambs had lower plasma tri-iodothyronine (T_3) concentrations within five minutes of birth, and within twin- and triplet-born litters, the lightest- and medium-triplet-born lambs had lower plasma T_4 and T_3 concentrations within five minutes of birth than all twin-born lambs and the heaviest-triplet-born lambs. It was hypothesised that because triplet-born lambs had a lighter birth weight and lower plasma thyroid hormone concentrations, they would have inadequate thermoregulatory capabilities when compared to twin-born lambs. The lower rectal temperatures of triplet-born lambs within the first hour of life and the lower heat production on a per lamb basis at 24 to 36 hours of age, and the lack of difference in maximum heat production on a per kg of birth weight basis at 24 to 36 hours of age support this hypothesis.

Two practical on-farm management strategies trialled in this thesis to improve triplet-born lamb thermoregulation were offering concentrate supplement during late pregnancy to improve lamb birth weights, and maternal iodine supplementation to improve lamb plasma thyroid hormone concentrations. While offering concentrate showed positive effects such as increasing lamb birth weights, colostrum uptake and triplet-born lamb heat production on a per kg of birth weight basis, the results were either inconsistent across experiments or between birth ranks suggesting additional work is required to determine the repeatability and cost effectiveness of these findings. Maternal iodine supplementation offered no

benefits in terms of lamb birth weights, plasma thyroid hormone concentrations or lamb heat production. Further investigations identified that lamb birth weights, thyroid hormone concentrations, glucose and NEFA concentrations are positively associated with maximum heat production at 24 to 36 hours of age. Practical on-farm management strategies which could target these physical and physiological factors may improve triplet-born lamb heat production, and therefore the survival rates of triplet-born lambs.

This thesis is dedicated to Geoff and Jill Kerlake

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