# NUTRIENT UTILISATION, GROWTH AND CHEMICAL BODY COMPOSITION OF PRE-WEANED LAMBS REARED ARTIFICIALLY

## Effects of feeding milk replacer and pellets

A thesis presented in partial fulfilment of the requirements for the degree of

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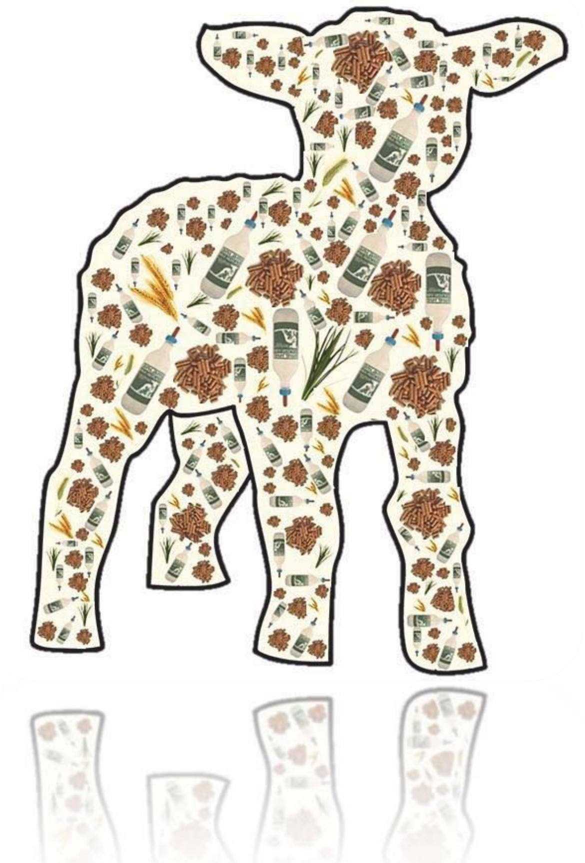

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*"Dietary inputs are of value only as long as they increase kilograms of lamb weaned, improve fibre quality or quantity, or positively impact lifetime production"*

(Hatfield *et al*, 1995)

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# ABSTRACT

Understanding how nutrient supply controls lamb growth is important in improving the efficiency of nutrient utilisation. Estimation of metabolisable energy (ME) requirements for lamb maintenance and growth pre-weaning has been limited to milk-only fed lambs. This is due, at least in part, to the difficulty of measuring pasture intake in pre-weaned lambs, which restricts the determination of nutrient balances and nutrient use efficiencies. The aims of this thesis were to: 1) evaluate the effect of various milk and pellets combinations on lamb growth, organ development, body composition and utilisation of energy for maintenance and growth, 2) derive equations for predicting feed intake, and 3) develop a growth simulation model for use as a tool to develop feeding strategies for lambs. Lambs were offered various diet combinations from age one day until slaughter at 18 kg live weight (LW). Addition of solid feed to the milk diet of pre-weaned lambs improved their growth rates, efficiency of gain and enhanced rumen development. Increasing daily ME intake from 1.5 times maintenance to *ad libitum* at a constant protein to energy ratio did not alter the total chemical body composition of the lambs fed to a fixed LW. Increasing the crude protein content of milk replacer, and therefore the corresponding protein to energy ratio, increased average daily gain and efficiency of gain in lambs. Further, the protein content in the empty bodies of lambs increased whilst fat content decreased. Growth and body composition of lambs were unaffected by altered pellet protein content. The study also showed that lambs fed in excess of their protein and energy requirements reached maximum potential protein deposition rates. Based on a model developed, overestimating the maintenance energy requirements of milk-only fed lambs underestimated their daily fat deposition rates and underestimating the maintenance requirements of lamb offered milk and *ad libitum* access to pellets over estimated their daily fat deposition. A greater percentage increase in fat deposited in gain increased the energy requirements for gain in the lambs. This study has contributed to the knowledge on rearing lambs artificially with various combinations of milk and pellets. The findings will provide a useful platform for future studies aiming to develop feeding strategies to improve pre-weaning lamb growth.

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