

USE OF THE LACTATING EWE AS A MODEL FOR STUDYING  
EFFECTS OF NUTRITION ON LACTATION IN THE COW

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The difficulties of maintenance of lactating dairy cows for intensive studies on the physiology of lactation or the effects of nutrition on lactation make it attractive to seek a suitable experimental model for studies of this nature. Extensive use has been made of the lactating goat and a number of important studies have been performed using the goat (see Linzell and Peaker 1971). The present experiments were conducted with the object of examining whether the lactating ewe might serve as a model for studying the effects of nutrition on lactation in the cow. In particular, we examined whether it was possible to induce the "low fat" and "low solids-not-fat" syndromes in lactating ewes.

Two separate experiments were conducted using ewes which had been lactating for 4-5 weeks. Ewes had been maintained in metabolism cages since the day of lambing, and had been milked by hand twice each day since that time. They were fed a pelleted ration containing lucerne chaff and rolled barley (10 MJ/kg d.m.) in sufficient quantity to meet their calculated requirements for maintenance plus milk production (MAFF 1975). Each ewe was fitted with a cannula in each jugular vein to facilitate collection of blood, and when necessary, infusion of glucose.

In one experiment 3 ewes were given intravenous infusions of D-glucose at rates which were 25%, then subsequently 50% of the calculated irreversible loss of glucose. In response to the lower rate of glucose, milk production increased and infusion of the higher rate decreased milk production. Levels of total solids and lactose in milk remained essentially constant whereas levels of solids-not-fat increased and fat decreased. Plasma glucose and insulin levels increased whereas no changes were recorded for plasma growth hormone following glucose infusions. In another group of 5 ewes feed intake was reduced by 30% then subsequently 40%. Milk production and contents of solids-not-fat and lactose in milk progressively decreased whereas the fat content of milk remained essentially stable. No substantial changes were recorded for plasma glucose, insulin nor growth hormone.

The results show that the lactating ewe responds to altered nutritional status in the same manner as the lactating cow. In response to inadequate energy in the diet, milk production and levels of solids-not-fat decrease. On the other hand, when plasma glucose levels are increased milk output increases together with the content of solids-not-fat but the fat content of milk decreases.

LINZELL, J.L. and PEAKER, M. (1971). *Physiol. Rev.* 51: 564.  
MAFF (1975). "Technical Bulletin 33. Energy Allowances and Feeding Systems for Ruminants", (HMSO: London).

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