PARTITIONING OF NITROGEN INTO MILK BY ANGORA GOATS DEPENDS ON THEIR ENERGY STATUS

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Vadhanabhuti et al. (1993) found that supplementation with fishmeal to supply undegradable dietary protein (UDP) increased milk and fibre production of Angora goats. However, the increase in milk yield was delayed, possibly due to an energy deficit during early lactation. This experiment tested the hypothesis that the energy status of Angoras during early lactation alters their partitioning of dietary nitrogen (N) between milk and other tissues.

Four isonitrogenous diets (160 g crude protein/kg DM) comprising high and low levels of energy (HE, 11.3 and LE, 9.5 MJ ME/kg DM) and two levels of UDP (37 or 23 g/kg DM, with or without fishmeal) were fed to 20 single-bearing does at 3.3% of body weight per day during the first six weeks of lactation. Feed intake did not differ between the four groups of five does with the average being 1.1 kg DM/doe/day. The does suckled their kids during the first four weeks of lactation and their milk yield was measured once each week. During the final two weeks the does were housed without their kids in metabolism cages and were machine-milked twice daily with oxytocin injected intramuscularly to induce milk let-down. Milk samples were analysed for composition using a commercial Milk-o-Scan instrument. Nitrogen balance for each doe was determined during a 10-day period over weeks five and six. Blood was collected weekly to determine the plasma concentrations of plasma urea nitrogen (PUN) and IGF-I. Mohair production was measured from mid-side patches every two weeks.

Supplementation with fishmeal provided extra UDP to does fed either HE or LE as evidenced by the higher PUN concentrations for does fed diets without fishmeal (8.0 vs 6.7 mmol/L, $P<0.05$). The diets did not affect the concentration of fat and protein in milk (6.8% and 3.5%) but, with the high UDP, the lactose concentration increased from 5.2 to 5.4% ($P<0.05$). Mohair production and fibre diameter were similar for all does during the six weeks of lactation.

Milk yield was 20% higher with the HE diets ($P<0.05$), but N balance (metabolisable N) was greater for does supplemented with fishmeal ($P<0.05$). Supplementation of LE with fishmeal increased milk yield possibly because the extra UDP supplied additional energy. The limit on the milk yield response to fishmeal for does fed HE may have been because they had achieved a ceiling for milk production. Consequently, when milk production is below potential, it appears that the partitioning of N into milk is controlled by the energy status of the doe. IGF-I may be involved in this regulation as its concentration was higher in does fed HE than those fed LE (105 vs 66 ng/mL, $P<0.01$).

Diet	Milk yield (ml/d)	N balance (g/d)	Milk N (g/d)	Mohair N (g/d)	N retained in body tissue (g/d)
HE + fishmeal	1350 ± 57^{c}	13.7 ± 0.88^{b}	6.5 ± 0.23^{c}	0.9 ± 0.14	6.3 ± 0.69^{b}
HE - fishmeal	1195 ± 44^{bc}	10.3 ± 0.52^{a}	5.6 ± 0.34^{bc}	0.8 ± 0.08	3.9 ± 0.70^{a}
LE + fishmeal	1100 ± 33^{b}	11.4 ± 0.89^{ab}	5.5 ± 0.26^{b}	0.9 ± 0.09	4.9 ± 0.98^{ab}
LE - fishmeal	937 ± 48^{a}	10.2 ± 0.49^{a}	4.0 ± 0.36^{a}	0.7 ± 0.06	5.5 ± 0.54^{ab}

Mean (±SE) values within a column with different superscripts differ significantly at $P<0.05$.

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