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Energy utilization of diets with different hay proportions in lactating goats

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Even in intensive farming conditions, dairy goats are commonly fed rations with high forage proportions and little concentrate. For high yielding animals, this results in a lack of energy which limits milk production. Literature on energy metabolism of lactating goats fed diets with high energy and protein contents is scarce.

Six Saanen goats (48 kg BW and 116 days of lactation, on average) were paired and fed *ad libitum* three hay/concentrate diets with 70 (diet 70), 50 (diet 50) and 30 (diet 30) percent of permanent pasture hay (17 % CP on DM) in a Latin Square design. The concentrate included 29 % cereals, 17 % soybean meal, 12.5 % brewers grain, 10 % beet pulp, maize germ expeller, maize gluten meal, sunflower meal, minerals and vitamins. Protein contents were 18.8, 19.3 and 19.8 % on DM for diets 70, 50 and 30, respectively. Individual apparent digestibilities were determined on the actual ingested diets (8 collection days for each period), while respiratory exchanges were recorded by indirect calorimetry for the three pairs of goats (4 days for each pair) during digestibility.

The data obtained (see table) indicate that the concentrate proportion in the diet positively influences dry matter intake and milk yield ($P<0.001$) but not milk fat and protein. Energetically, for most of the parameters considered there were significant differences between diet 70 and the others, but not between diet 50 and diet 30. Particularly, diet 70 had higher energy losses both as faeces ($P<0.001$), as urine and methane (NS) and as heat production ($P<0.01$). As a consequence, RE and the nutritive value (expressed as ME, NE_l or UFL) was minimum for diet 70 ($P<0.05$). On the other hand, diets 50 and 30 had similar nutritive values.

The data obtained suggest that, at the conditions of the experiment (stage of lactation and level of production), there was a substantial improvement in increasing the concentrate proportion from 0.3 to 0.5 in the diet. Concentrate proportions higher than 0.5 showed better milk yield performance, but no significant advantage in the efficiency of energy utilization.

	% hay			SE	Significance		
	70	50	30		70 vs 50	70 vs 30	50 vs 30
DMI (g/d)	2091	2318	2535	20	***	***	***
Milk yield (g/d)	2868	3248	3508	46	***	***	***
Milk fat (%)	2.55	2.66	2.62	0.04	NS	NS	NS
Milk protein (%)	2.80	2.81	2.90	0.07	NS	NS	NS
DM digestib. (%)	65.9	67.4	68.1	0.3	**	**	NS
DE (% GE)	65.3	67.9	69.3	0.3	***	***	*
UE (% GE)	3.8	2.9	3.0	0.3	NS	NS	NS
CH_4-E (% GE)	7.0	6.6	5.6	0.2	NS	NS	NS
ME (% GE)	54.5	58.4	60.7	0.4	*	**	*
Heat (% GE)	35.8	33.7	33.4	0.1	**	**	NS
Milk E (% GE)	17.1	17.8	18.0	0.2	NS	NS	NS
RE (% GE)	1.7	7.0	9.4	0.3	**	**	*
ME (MJ/kg DM)	9.77	10.46	10.84	0.07	*	**	NS
NE_l (MJ/kg DM)	5.62	6.74	7.02	0.14	*	*	NS
UFL/kg DM	0.79	0.95	0.99	0.02	*	*	NS

* $P<0.05$; ** $P<0.01$; *** $P<0.001$