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Supplementation of straw diets for growing lambs

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Introduction

In many tropical countries the main food resources available to ruminants in the dry season are high in fibre and low in dietary energy and nitrogen. Young ruminants in particular have problems surviving on diets of poor quality forages and crop residues. There are numerous references in the literature concluding that inadequate dietary protein during the dry season is the primary factor limiting animal productivity.

However in developing countries, where high protein supplements often are either too expensive or unavailable, it is less certain whether a high energy, low protein supplement (such as cassava) would be a worthwhile intermediate alternative for immature animals. A feeding trial was designed to compare straw intake and digestibility with different ratios of supplemental energy and protein.

Material and methods

Four supplements were offered containing either low energy, low protein (LELP); low energy, high protein (LEHP); high energy, low protein (HELP); or high energy, high protein (HEHP). Soya bean was used as the protein source, cassava for energy. The ratios of cassava : soya bean for the four supplements were:

2 : 5 for LELP
1 : 3 for LEHP
5 : 2 for HELP
2 : 6 for HEHP

The supplements were offered to the lambs according to live weights as shown in Table 1.

Table 1 *Estimated metabolizable energy (MJ/day per kg live weight) and crude protein (g/day per kg live weight) provided by supplement*

	LELP	LEHP	HELP	HEHP
Energy (MJ/day)	3	3	6	6
Protein (g/day)	0·65	1·3	0·65	1·3

In addition to the supplements, chopped barley straw (crude protein = 55 g/kg) was offered *ad libitum*. It was estimated that on the LELP diet, a straw intake of 12 g/kg live weight would provide a metabolizable energy intake close to maintenance. Sixteen Romney lambs (mean weight 23 kg (s.d. 1·5 kg) aged approximately 4 months were randomly allocated to the four treatments. A two-period crossover design was adopted altering the level of protein offered but not energy. A 2-week period for adaptation was followed by a 2-week data collection period with digestibility measured over 10 days.

Results

Straw intake from day to day was variable but the degree of variability was similar for all treatments. Straw intake with all 16 animals exceeded the amount required to satisfy maintenance.

With the low energy supplements, there was a significant increase in dry matter intake of straw ($P < 0·5$) and total intake ($P < 0·001$) with an increase in protein supplementation. In a comparison between all four treatments, high energy supplements significantly reduced straw intake ($P < 0·05$) although total intake results indicated that this was a food substitution effect. Digestible dry matter intake was significantly higher with both the high protein supplements. Crude protein digestibility was significantly higher with the high protein supplements. Table 2 summarizes the results.

Table 2 *Summary of results of intake and digestibility*

	Dry matter (DM) straw intake (g/kg LW)	Total DM intake (g/kg LW)	Digestible DM intake (g/kg LW)	Crude protein digestibility
LELP	19·4	23·5	12·6	0·50
LEHP	20·8*	26·0***	14·5***	0·57***
s.e.d.	0·45	0·45	0·41	0·02
HELP	17·3	24·4	13·7	0·53
HEHP	17·7	25·9	14·9*	0·61*
s.e.d.	0·66	0·66	0·47	0·024

Discussion

As expected, increasing the level of protein supplementation stimulated straw intake on low energy diets. The results demonstrated the substitution effect of feeding high levels of concentrate on overall dry matter intake.

In terms of optimizing straw utilization with growing lambs: (a) high energy supplements might not be beneficial because of the reduction in forage intake; (b) a low energy : high protein supplement appeared to be more appropriate than a high energy : high protein supplement.

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