HIGH VERSUS LOW CONCENTERATE DIET IN LAMB NUTRITION

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SUMMARY

Experiments were conducted to measure lamb performance, nutrient digestibility and nitrogen balance associated with feeding a high concentrate (A) or a low concentrate (B) diet. No significant difierence (P> _0.05) was observed between the two diets regarding daily gain, feed intake and feed cfficiency. The daily gain (g) , dry matter intake (kg) and feed conversion were, 122.0, 1.26, 11,9 and 145.7' 1.32, 9.8 for diets A and B, respectively, Also, no significant difilwences (P >0.05) were found between the two diets regarding digestion coefficients of dry matter, organic matter, crude protein and nitrogen - free extract. However, digestion conelficients of ether extract differed (P < 0.05) between the two diets. The values for this parameter were 77.5 and 42.4 for diets A and B, respectiv- ely . Nitrogen intake , excretion and retention were not statistically ditferent (P>0.05) between the two diets.

INTRODUCTION

Recently, the cost of energy and protein concentrates has become drastically expensive in the Sudan. This emphasizes the importance of adjusting the pro-portions of these concentrates to that of roughage in animal diets if maximum returns are to be obtained.- Therefore, the availability of information on the influence of diflerent combination of concentrate - to - roughage on the rate and economy of gain would be of great benefit to animal producers. The objective of this study was to examine the influence of varying concentrate to roughage proportions on performance and nurrient utilization by Sudan desert lambs.

MATERIAL AND METHODS

Experimental Design :

The experiment involved l2 lambs (19 - 39 kg) of Sudan desert type. The lambs were paired according to body weight and one lamb from each pair was allocated at random tothe experimental diets.

Feeds and Feeding :

The experiment involved two diets i.e a high concentrate diet (A) and a low concentrate diet (B). Ingredients of the two diets and their proximate analysis are given in table 1. The animals were placed on their respective dietary treatments for I4 days adjustment period followed by 56 days experimental feeding period during which they were individually fed. The daily allowance was offered ad libitum in one morning and one evening meal . Clean water and salt licks were freely available.

Table 1. Ingredients and proximate analysis of experimental diets.

Item	Diet A	Diet B
	%	%
Ingredient (ab)		
Alfalfa hay	25	50
Cottonseed cake	37.5	25
Sorghum grains (Dura)	37.5	25
Chemical Composition(c)		
Crude protein	18.8	18.3
Crude fibre	13.3	21.1
Ether extract	7.9	4.5
Ash	6.5	8.2
Nitrogen - free extract	53.5	47.9

(a) As- fed basis

(b) Salt licks were available through the entire experimental period. They were guaranteed to provide not less than 0.5%Zn, 0.4%Mn, 0.25%Fe, 0.05%Cu, 0.01% I and 0.01% Co.

(c) Dry matter basis.

Feed refused was weighed every day morning and feed consumed was recorded. Changes in live weight were obtained by difierence between initial and final weight. Evaluation of the‘ Experimental Diet: : The experimental diets were evaluated for energy concentration and digestible

ether extract and ash by methods described in A.O.A.C. (1975). Nitrogen retention was determined by difference. ‘Digestion coeflicients, digestible nutrient values and nirtogen balances were calculated. These data were subjected to analysis by paired t- test (Steel and Torrie, 1960).

RESULT

Performance data for lambs fed the two dietary treatments are presented in table 2. Daily gain, feed intake and feed efficiency were not signficantly different ($P>0.05$) between the experimental lamb groups. Lambs fed diet B gained more weight and showed better feed deficiency than those fed diet A. Total digestible nutrients (TDN) consumed (kg) were significantly greater ($P <0.05$) for lambs given diet A than those given diet B.Digestible crude protein (DCP) consumption (kg) was similar ($P > 0.05$) between lambs fed the two diets. The ratio of TDN to DCP was significantly greater ($P < 0.05$) for lambs fed died A than for those fed diet B. Data in table 3 give the digestibility icoefiicients and digestible values of the diets. Ether extract digestion coefficient was significantly greater ($P < 0.05$) for diet A than for diet B. Digestibility of other organic nutrients and values (%) of TDN and DCP were not significantly different ($P>0.05$) between the two diets.

Table 2. Performance of the experimental animals(a)

Item	Diet A	Diet B
Number of Animals	6	6
Feedlot period, days	56	56
Initial weight, kg	25.8 ± 1.5	26.3 ± 1.7
Final weight, kg	32.6 ± 1.5	34.5 ± 1.5
Daily gain, g/day	122.0 ± 23.3	145.7 ± 21.7
DM intake. kg/day	1.26 ± 0.10	1.32. ± 0.10
DM intake, % L.WT.	4.2 ± 0.10	4.2 ± 0.10
DM intake/gain	11.9 ± 1.8	9.8 ± 1.1
TDN consumed, kg/day	0.85 ± 0.07	0.67 ± 0.04
DCP consumed, kg/day	0.17 ± 0.01	0.16 ± 0.01
Kg TDN/kg DCP	5.2 ± 0.03 (b)	4.2 ± 0.12 (c)

(a) Mean values standard errors.
(b,c) Values in the same row with different superscripts differ ($P < 0.05$).

Nitrogen metabolism data are shown in table 4. Nitrogen intake excretion and retention did not differ ($P > 0.05$) significantly between lamb fed the two dietary treatments. ‘

Table 3. Mean digestibility coefficients and nutritive values of the experimental diets (*a*)

Item	Diet A	Diet B
	%	%
Dry matter	56.2 ± 6.3	54.1 ± 6.8
Organic matter	67.1 ± 5.9	55.8 ± 6.5
Crude protein	69.5 ± 5.5	65.9 ± 5.0
Crude fibre	25.0 ± 1.5	35.9 ± 9.5
Ether extract	77.5 ± 4.1 (b)	42.4 ± 8.5 (c)
Nitrogen - free extract	76.0 ± 4.3	62.6 ± 5.5
TDN	67.4 ± 5.7	50.8 ± 6.0
DCP	13.1 ± 1.0	12.1 ± 0.9

(a) Mean values standard errors.

(b, c) Values in the same row with different superscripts differ ($P < 0.05$)

However, faecal and urinary excretions (g/day) of nitrogen tended to be greater for lambs fed diet B; whereas, nitrogen retained (g/day or % N intake) tended to be greater for lambs offered diet A.

Table 4. Nitrogen metabolism of the experimental diets (*a*) .

Item	Diet A	Diet B
N balance, g/day		
Intake	25.5 ± 4.1	25.2 ± 0.8
Faeces	8.0 ± 2.3	8.5 ± 1.0
Urine	4.8 ± 2.5	5.4 ± 1.9
Retained	12.7 ± 0.2	11.3 ± 2.5
N retained % N intake	49.7 ± 9.2	44.8 ± 9.5

(a) Means values ± standard errors.

Discussion

The dry matter intake of the lambs from the two diets was similar to that reported by NRC (1975). Average gain was 122.0 and l45.7g for lambs fed diets A and B, respectively . The most likely explanation of this observed slightly better performance may be related to certain intrinsic characteristic of the mixed diet and rumen fermentation patterns and their effects on body comp- osition (Church, 1976) Also, it may be argued that lambs on diet A put more fat, an energy demanding process, than lambs on diet B. The avergae daily gains were considerably lower than those report d by Suliman and El Amin (1980) for Sudan desert sheep fed similar types of diets. However, the lambs in their experiment, compared with those in the present study, were fattened early in life. The feed conversion efiiciency measured as dry matter intake per unit of gain was higher than those reported by Suliman and El Amin (1980). This may be attributed to the faster growth rate observed in their study compared with that _noted in our work. However, feed conversion eificiency values obsrved in this experiment agree with those reported by Osman et al. (I968). Animals given diet A consumed significantly higher ($P<0.05$) amount of TDN than those given diet B. Lambs fed the latter diet ate lower amount of TDN than that recommended by NRC (1975). Lambs on both diets ate appr- oximately the same amounts of DCP (170 vs 160 g/day for lambs on diet A and B, respectively). The daily consumption of this nutrient for both groups of lambs was considerably higher than that recommended by NRC (I975). With the exception of crude fibre fraction, digestibility of all other nutrients appeared to be consistently greater for diet A than for diet B. This agrees with Stinocher et al. (I979) who observed reductions in digestion coefficients of energy and protein when the hay (alfalfa) fraction constituted more than 50% of the diet. Nitrogen retention was slightly better for lambs offered diet A than for those olfered diet B. This is in agreement with a previous study(Lofgreen et al., 1981) which showed that lambs fed high energy diets retained more nitrogen than those fed low energy diets. * Generally the lambs on both diets performed similarly ; however, because diet A contained more cereal grains (an expensive ingredient required by man and poultry), diet B seems to be more appropriate for lamb fattening under the prevailing conditions.

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