

Feeding sorghum stover to Ethiopian sheep and cattle: effect of chopping and amount offered on intake and selection

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Introduction

Offering *ad libitum* quantities of cereal crop residues which allow animals to select the more nutritious leaf and sheath components and reject the poorer stem has been shown to improve intake in sheep and goats (Wahed, Owen, Naate and Hosking, 1990). The effects of the physical form of sorghum stover offered on intake, have not been explored. There are likely to be differences between sheep and cattle in their selective eating of sorghum stover due to anatomical differences in mouth parts.

Two experiments were conducted to study the intake and selectivity of sheep and cattle offered sorghum stover in varying quantities and form (either chopped or unchopped).

Material and methods

In experiment 1, 48 Menz highland rams were used over 56 days in a 2 × 2 factorial design with four replicate pens each containing three sheep. Factors were amount offered (25 or 50 g/kg live weight per day) and physical form of stover (chopped or

unchopped). Dinkamash (non-bird-resistant) variety was given. Each pen was offered 339 g dry matter (DM) per day of cottonseed cake supplement. Water and mineral lick were provided. Daily food offered and refusals, per pen, were recorded and samples taken for morphological separation.

Experiment 2 involved 32 individually fed crossbred bulls (zebu × Friesian) in a 2 × 2 factorial design and eight replicates per treatment. Stover variety offered, and treatments, were as in experiment 1 except that cottonseed cake was offered at 790 g DM per animal per day and duration of the experiment was 49 days.

Results

Table 1 shows the results of experiment 1. Intake of stover was significantly increased by both chopping the stover ($P < 0.05$) and offering more ($P < 0.001$). There was no significant ($P > 0.05$) interaction between form and amount of stover offered. Rams selected for leaf and leaf sheath, and against stem (Table 1). The contents (g/kg) of leaf, leaf sheath and stem respectively in offered stover were: chopped,

Table 1 Results of experiment 1 with rams (per group of three animals)

Amount offered (A) (g/kg live weight per day)	Form of stover (F)				s.e.	Significance		
	Chopped		Unchopped			F	A	F × A
	25	50	25	50				
Live-weight gain (g/day)	45.8	70.5	30.5	55.9	0.10	***	***	***
Stover offered (kg DM per day)	1.23	2.60	1.25	2.56	0.11	*	**	***
Stover intake (kg DM per day)	1.08	1.60	0.98	1.24	0.08			***
Leaf intake (kg DM per day)	0.03	0.06	0.03	0.07	0.003			***
Sheath intake (kg DM per day)	0.35	0.72	0.26	0.52	0.03	**		***
Stem intake (kg DM per day)	0.71	0.82	0.69	0.65	0.06			***
Proportion of stover refusal	0.115	0.383	0.215	0.518	0.0310	**		***

Table 2 Results of experiment 2 with bulls (per animal)

Amount offered (A) (g/kg live weight per day)	Form of stover (F)					Significance		
	Chopped		Unchopped			F	A	F × A
			25	50				
Stover offered (kg DM per day)	5.19	9.95	4.93	9.38	0.20	*	***	
Stover intake (kg DM per day)	3.59	3.94	3.74	4.85	0.15	**	***	*
Leaf intake (kg DM per day)	0.46	0.61	0.46	0.76	0.01	***	***	***
Sheath intake (kg DM per day)	0.94	1.34	0.87	1.19	0.03	***		
Stem intake (kg DM per day)	2.20	2.00	2.42	2.90	0.12	***		
Proportion of stover refusal	0.287	0.597	0.240	0.486	0.016	***		

24, 284, 693; unchopped, 26, 212, 763. Ram growth rate was significantly increased by both chopping the stover ($P < 0.001$) and offering more ($P < 0.001$).

Table 2 shows the results of experiment 2. For stover intake, there was a form × amount interaction ($P < 0.05$), indicating that the response to increasing the amount offered was higher with unchopped compared with chopped stover. The cause of the interaction seemed to be the differences in stem intake depending on amount of stover offered (Table 2). The bulls, like the rams, appeared to be selecting for leaf and leaf sheath. The contents (g/kg) of leaf, leaf sheath and stem respectively in offered stover were: chopped, 108, 207, 685; unchopped, 101, 200, 699.

Discussion

In sheep, there was an intake-response to both doubling the offer-rate of stover and chopping. There was a greater response to offer-rate than chopping; offer-rate and form did not interact.

In contrast, intake in cattle decreased when stover was chopped and there was a significant form × offer-rate interaction, with the response to increasing the offer-rate being larger with unchopped compared with chopped stover. Both sheep and cattle selected for leaf and sheath fractions.

The experiments indicate that intake of sorghum stover by both sheep and cattle is increased if animals are offered large excesses to facilitate selective feeding. Chopping stover (as in this study) improves intake in sheep, but is detrimental to intake in cattle.

Reference

Wahed, R. A., Owen, E., Naate, M. and Hosking, B. J. 1990. Feeding straw to small ruminants: effect of amount offered on intake and selection of barley straw by goats and sheep. *Animal Production* 51: 283-289.

200. Feeding chopped sorghum stover to Ethiopian sheep: effects of sorghum variety and amount offered on intake, digestibility and live-weight change

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Forty-eight rams, aged *ca* 15 months and live weight (M) 20 kg, were individually fed over 42 days to measure the effects of a 2 × 2 arrangement of treatments involving chopped (Alvan Blanch 'Maxi' Chaff Cutter) sorghum stover. Rams were arranged in 12 blocks according to M, and within block, randomly allocated to treatment (sorghum variety: bird-resistant [BR] or non bird-resistant [NBR]; amount of stover offered: 25 [25] or 50 [50] g dry matter (DM) per kg M per day. Water and minerals were provided. Faeces from rams in blocks 1, 4, 8 and 12 were collected to measure digestibility. Offered stovers differed in leaf-plus-sheath:stem (BR, 1.25; NBR, 0.82). Intake of leaf-plus-sheath was affected ($P < 0.001$) by variety and amount offered; stem intakes were affected by variety ($P < 0.001$) but not by amount offered. For BR25, BR50, NBR25, NBR50 respectively, intakes of leaf-plus-sheath and stem were: 287, 187; 464, 165; 244, 234; 394, 239 (s.e. 8.5, 8.9) g DM per day. Rates of stover refusal were 123 and 378 g/kg offered respectively when 25 and 50 g DM per kg M per day of stover were offered. Stover DM digestibility was lower ($P < 0.05$) for BR than NBR (504, 540 (s.e. 11.6) g/kg but was not affected ($P > 0.05$) by amount offered. Ram M was not affected ($P > 0.05$) by variety; rams offered 50 g DM per kg M per day maintained M whereas those offered 25 g DM per kg M per day lost M. The results demonstrate variety to be less important than amount offered in affecting intake and live-weight change of rams maintained on mineral-supplemented sorghum stover. From this experiment, offering chopped sorghum stover at 50 g DM per kg M per day, and allowing animals to reject 378 g/kg of stover offered, would appear to provide a maintenance-feeding strategy for Ethiopian Menz rams.