INTAKE AND DIGESTIBILITY OF THREE VARIETIES OF SORGHUM STOVER BY SHEEP IN THE SUB-SAHELIAN ZONE OF NIGERIA

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Abstract

A study was carried out using twelve Balami sheep with average bodyweight of 22.50kg to determine the intake and digestibility of three varieties of sorghum stover. Animals were randomly divided into three groups of four animals per group based on similar liveweight. Three varieties of sorghum stover: ICSV 1002, KSV4 and "Warware Bashi" (local) were designated as treatment Tl, T2 and T3 respectively, with T3 serving as the control. The experiment lasted 84 days. All treatment diets were supplemented with 250g/day wheat offals throughout the experiment. Dry matter and organic matter intakes as percent of metabolic weight (W0.75kg) were best in Tl ICSV 1002 variety 8.12 and 7.57 respectively. Similarly, the digestibilies of dry matter and organic matter as percent of metabolic weight (W0.75kg) were best in Tl ICSV 1002 variety 4.03 and 3.76. However, the apparent percent digestibilites of other nutrients had a different pattern with crude protein, crude fibre and nitrogen free extract being best (P< 0.05) in T3 (control) 68.09, 89.95 and 58.86% respectively. Liveweight change was best in T2 KSV4 variety 56.67g/day. Varieties (ICSV 1002) and (KSV4) if supplemented with a cheap source of protein could improve ruminant animal production in the region.

Key words: Intake, Digestibility, Sorghum Stover and Sub-Sahelian,

■ Introduction

In Nigeria, the search for high yielding, high quality and all season pasture to maintain year round animal production continues especially with the low productivity and nutritive value of the natural pastures. In the sub-sahelian region of Nigeria, residues of crop residues such as sorghum, millet and maize are the most available feeds for ruminants in the dry season (de Haan, 1991). These residues are known to be of low quality; thus, their proper utilization can only be enhanced through supplementation with feeds that could provide sufficient fermentable nitrogen, carbohydrates and micronutrients needed by the ruminants (Saadullah, 1990; Devendra, 1990). Similarly, the utilization of low quality forages with emphasis on crop residues is being intensified by ruminant nutritionists in Nigeria (Adu *et **al,*** 1993; Tchinda *et al*, 1994). The aim of this study was therefore, to determine the nutrient intake, utilization and digestibility of three varieties of sorghum stover fed to sheep in the sub-sahelian zone of Nigeria.

Methods

Twelve Balami sheep averaging 22.50kg in bodyweight aged 11/2-2 years were used from the sheep flock of Teaching and Research Farm of the University of Maiduguri.The animals were divided into three(3) groups and each group randomly allotted to one of the treatments in a latin square design. The sorghum stover used for the study was sourced from the Crop Science Farm and the three varieties were designated Tl (ICSV 1002), T2 (KSV$) and T3 (local variety) control. All animals received 250g/head/day wheat offals. Sorghum stover intake was measured daily and liveweight of animals was measured weekly. Salt lick and water were provided ad libitum. The study lasted for twelve weeks comprising of 4 weeks each. Voluntary intake, digestibility and liveweight were recorded. Feaces were collected during the last 7 days of each period.

Chemical and Statistical Analysis

Feeds and feacal samples collected, during the feeding trial were analysed for dry matter, crude protein, crude fibre, and ash using AOAC (1980), methods. Acid detergent fibre and neutral detergent fibre were determined using the metods of Goering and Van Soest (1970). Data collected were subjected to analysis of variance (Steel and Torrie, 1960). Means were separated using multiple range test (Duncan, 1955).

Results and Discussion

The dry matter content of the experimental diets were 94.40, 91.60 and 88.20% for Tl, T2 and T3 respectively. The high dry matter content could be attributed to high intensity of sunlight and temperature accompanied with high evaporation in the region of study which increases rate of photosynthesis and thus, increasing the dry matter production. This is in line with what was reported (McDowell, 1972) for cereal crops. The crude protein content of the experimental diets were 6.60, 7.00 and 7.40% for Tl, T2 and T3 respectively. The low crude protein contents were similar to observations made by (Adu *et al.,* 1993, who worked on maize stover. The crude fibre content varied from 25.00% in T2 to 45.00% in T1. These results were in agreement with the findings of Gihad *et* a/1985) who reported that sorghum stover are exceptionally high in lignin (fibre) content. The ether extract content of the experimental diets were 5.00%, 4.00% and 4.00% for Tl, T2 and T3 respectively. The low values recorded could have resulted from losses via leaching during the rainy season (Pearce *et al.,* 1988). The ash levels in the experimental diets varied from 7.00% in Tl and T3 to 8.00% in T2. The nitrogen free extract content of the experimental diets were 36.40%, 56.00% and 52.10% for Tl, T2 and T3 respectively. The nitrogen free extract content of the treatment diets obtained in this study were comparable to values recorded for sorghum by (Aregheore, 1994).

The mean dry matter intake values were 0.67kg/day, 0.65kg/day and 0.68kg/day for animals on treatments Tl, T2 and T3 respectively. The levels of dry matter intake recorded Tl (0.67), T2 (0.65) and T3 (0.68) in this experiment were similar to what was reported by Adu *et al.* (1993), who used maize stover and attributed the low dry matter intake to low levels of digestible crude protein and organic matter content of cereal stovers. The dry matter intake expressed as a percent of bodyweight were 4.02, 2.89 and 2.96 for treatments T1, T2 and T3 respectively. The values were not different ($P > 0.05$). However, Tl had the highest value. Dry matter intake recorded for the three treatments were close to the 3.4% value recommended by Arigbede *et al.* (2000) for sheep. The dry matter intake expressed as a percent metabolic weight also followed a similar pattern as that of the bodyweight being higher ($P < 0.05$) in Tl than T2 and T3 which were similar ($P > 0.05$). The dry matter digestibility values were 40.80%, 41.50% and 39.83% for animals on treatments Tl, T2 and T3 respectively. The value recorded for T2 was highest. The low digestibility values obtained in this study were similar to the findings of Zemmelink *et al.* (1985) and Ademosun (1970) who attributed this to bulkness and fibrous nature of tropical roughages and pastures and hence less digestible. The organic matter intake ranged from 0.60kg/day in T2 group to 0.64kg/day in T3 group. The organic matter intake expressed as a percentage of bodyweight varied from 2.65% in T2 group to 3.76% in the T3 group respectively. Tl group, recorded the highest organic matter intake as percent bodyweight. The organic matter intake expressed as a percent of metabolic weight ranged from 5.79% in T2 group to 7.57% in Tl group. Similarly, Tl group, recorded the highest value of organic matter intake as percent metabolic weight.

The organic matter digestibility values were 66.13%, 55.50% and 68.13% for Tl, T2 and T3 respectively. T3 group recorded the highest value of organic matter digestibility and the three values were different ($P < 0.05$). The digestible organic matter intake ranged from 0.33kg/day in T2 group to 0.44kg/day in T3 group. The value recorded for T3 was the highest and all the three values were similar ($P > 0.05$). The crude protein digestibility ranged from 33.33% in T2 to 68.09% in T3. The results were in line with observations of Alhassan *et al.* (1986) who attributed the low crude protein digestibility to low nitrogen content in crop residues and some agro-industrial products.

The crude fibre digestibility values varied from 21.15% in Tl group to 89.95% in T3 group. The lower value of 21.15% recorded in Tl was in accordance with what was reported for maize stover fed.to sheep and attributed it to the low nitrogen level available to rumen microbes (Adu et al., 1993). The apparent digestibility values for ether extract were 98.71% in T1, 54.17% in T2 and 96.92% in T3 respectively. Preston and Leng (1985), attributed low level of apparent digestibility of ether extract in ruminants to inefficient microbial utilization of dietry lipids. The low level recorded in T2 under this study. The nitrogen free extract apparent digestibility values ranged between 42.73% in Tl to 58.86% in T3 (control). Devendra (1990), attributed a low nitrogen free extract digestibility values in ruminants to lack of fermentable soluble carbohydrates in tropical forages and pastures. The mean liveweight changes were 42.14, 56.67, and 48.33 g/day for animals on treatments Tl, T2 and T3 respectively. The lower rates of gain recorded for T3 treatment, could be due to bulkness and fibrous

nature of tropical forages and roughages Ademosun (1970); Zemmelink *et* a/.(1985) and McGregor (1985), who attributed lower gains and weight losses in ruminants to poor value of tropical pastures.

Conclusion

Crop residues will continue to be feed resources in developing countries and increased ruminant production can be accomplished through improved utilization of crop residues from sorghum. Thus, results from this study indicated that ruminants such as sheep be sustained using poor quality roughages of sorghum stover varieties ICSV 1002 and KSV4 supplemented with a cheap source of protein especially, agro-industrial by-product may yield better performance. Further research is recommended on the efficient utilization of these two varieties using other ruminants like goats and cattle.

Table 1. Chemical Composition of Experimental Diets(%)

Components	**Treatments**			
	Tl (ICSV)	T2 (KSV4)	T3 (local Variety)	Supplement Wheat Offal
Dry matter	94.40	91.60	88.20	86.70
Crude protein	6.60	7.00	7.40	12.12
Crude fibre	45.00	25.00	29.50	9.68
Ether extract	5.00	4.00	4.00	4.08
Ash	7.00	8.00	7.00	5.65
Nitrogen free extract	36.40	56.00	52.10	68.47

Table 2. Mean Dry Matter Intake, Nutrient Digestibility and Liveweight Change

Component	Tl	T2	T3(control)	SEM
Dry matter intake(kg/day)	0.67	0.65	0.69	___
Dry matter intake,% body weight	4.03	2.89	2.90	1.21
Dry matter intake (%) metabolic Weight (Wkg^{075})	8.12	6.29	6.49	2.10
Organic matter intake (kg/day)	0.62	0.60	0.64	___
Organic matter intake,% body weight	3.76	2.65	2.77	0.64
Dry matter digestibility (%)	40.80	41.50	39.83	0.01
Organaic matter digestibility %	66.13^{b}	55.5^{c}	68.13^{a}	8.24
Digestibility organic matter intake (Kg/day)	0.41	0.33	0.44	___
Crude protein digestibility (%)	51.22^{b}	33.33^{c}	68.09^{a}	18.62
Crude fibre digestibility (%)	21.15^{b}	86.73^{a}	89.95^{a}	32.40
Ether extract digestibility (%)	98.71^{a}	54.17^{c}	76.92^{b}	20.41
Nitrogen free extract digestibility(%)	42.73^{c}	47.62^{b}	58.86^{a}	3.41
Average Daily gain(g/day)	42.14^{c}	56.67^{a}	48.33^{b}	4_97

a,b,c = Means with the same row bearing different superscript differ ($P<0.05$).

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