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EFFECT OF INTERVAL OF FEEDING ROUGHAGE AND CONCENTRATE ON DIGESTIBILITY AND NUTRIENTS UTILIZATION IN SOKOTO RED BUCKLINGS

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ABSTRACT

Nine (9) Sokoto Red bucklings with average weight of 10.5 kg were allotted to three dietary treatments in a Completely Randomized Design (CRD) to evaluate the interval of feeding roughage and concentrate on digestibility and nutrient utilization at the Prof Lawal Abdul Saulawa Livestock Teaching and Research Farm, Federal University Dutsin-Ma, Katsina State. The treatments are: Treatment 1: concentrate and roughage were offered at the same time; Treatment 2: roughage and concentrate fed at two hour intervals; Treatment 3: roughage and concentrate fed at three hour intervals. Total urine and faecal outputs were collected and 10% of each day's collections were bulked and stored in a refrigerator at 5 °C. Representatives of the samples were taken to the laboratory for analysis. Apparent dry matter (DM) digestibility was higher (14.65%) in treatment1 than in treatment 3, and the digestibility of ether extracts in treatment1 was greater (21.37%) than treatment3. There was no significant (P >0.05) differences in nutrients digestibility among treatments. Nitrogen intake and retention were not significantly (P > 0.05) different among treatments means. It is concluded that feeding roughage and concentrate at different intervals has no effect on its digestibility and nutrients utilization by Sokoto Red bucklings.

Keywords: interval, concentrate, roughage, buckling, digestibility

INTRODUCTION

Goats and sheep rearing play an important role as a means of generating income and employment for the millions of resource poor rural households and contribute to their families' food and nutritional security. (Shalander and Roy, 2013). Goat production constitutes an integral part of ruminant production.
Ruminant development in the tropics is very important and essential in view of this sector's ability to provide jobs and animal products to the rural and urban teaming population. This sector's production capacity is not fully exploited (Aruwayo and Adeleke, 2019). Goats are small ruminants with excellent potentials at mitigating the shortage of human protein consumption in Nigeria and thrive on low quality feeds and crop residues with short gestation period and noted for multiple births (Aruwayo and Muhammad, 2018). Despite the attributes of goats such as low-cost of maintenance and short-term return on capital with low risk on capital investment, which make goats suitable for poorer rural folk, its production is being hindered by inadequate nutrition occasioned by the prevalence of poor quality

roughages especially during the dry season (Shellepe and Daniyel, 2017). Non-strategic utilization and combination of available feed resources and non-development of efficient production feeding system, rather than absolute quantitative and qualitative shortages, are largely responsible for feed constraints currently limiting small ruminant production and productivity in humid West Africa (Smith, 1992). In an attempt to enhance feed utilization efficiency, Adeleke (2015) investigated the effect of sequence and interval of feeding concentrate and roughage on Yankasa rams. The author reported that interval of feeding roughage and concentrate had no significant effect on nutrients digestibility and utilization at two hours interval and recommend further study to be carried out at wider intervals. Hence, this study aimed at

evaluating the effect of interval of feeding roughage and concentrate on digestibility and nutrients utilization in Sokoto Red Goats.

MATERIALS AND METHOD

Location of the study

The experiment was conducted at the Prof Lawal Abdul Saulawa Livestock Teaching and Research Farm, Federal University Dutsin-Ma, Katsina State, located in the Sudan Savanna ecological zone. The area lies between Latitude 12°27'18'N and Longitude 7°29'29'E, and 605 meters above sea level. The area receives an annual rainfall of 700 mm, which spread from May to September. The mean annual temperature ranges from 29^{o} to 31° C (Tukur et al., ***2013).***

Experimental animals and design

Twelve (12) Sokoto Red bucklings with average weight of 10.5 kg were used in a Completely Randomized Design (CRD) to evaluate the interval of feeding roughage and concentrate on digestibility and nutrient utilization. The experiment involved three treatments. Treatment 1: concentrate and roughage were offered at the same time; Treatment 2: roughage and concentrate fed at two hour intervals; Treatment 3: roughage and concentrate fed at three hour intervals. The animals were sourced from Dutsin-Ma market in Dutsin-Ma Local Government Area of Katsina state. They were quarantined for two weeks and fed the experimental diets for adaptation. They were dewormed with Albendazole and treated with Ivermectin against ecto-parasites. At the end of the adaptation period, the animals were tagged and weighed to get the initial weights and randomly allocated to experimental treatments after balancing them for weight.

Experimental diets and management of animals

The experimental diets comprised Groundnut haulms and concentrates mixture compounded to contain 15% CP. The concentrate mixture composed of maize offal, cottonseed cake, bone meal and common salt (Table 1). The animals were weighed at the beginning and at the end of the study. The animals were housed in individual metabolism crates for digestibility, and nitrogen utilization and balance studies and offered the experimental diets. A total of 3% of the body weight was fed to each animal daily in proportion of hay and concentrate at a ratio 70% to 30% respectively. The diets were offered to the animals in the morning and leftovers were weighed the next day in the morning. Water was offered *ad libitum* and changed every morning.

The animals were allowed fourteen (14) days adjustment period to the new environment before collection of faecal and urine outputs for seven consecutive days. The urine output from each of the experimental animals was collected over the seven (7) day period in a plastic container containing 50 ml of 0.1N H_2SO_4 to prevent ammonia loss from the urine. Ten per cent of it was stored in a deep freezer for analysis for nitrogen content. Total faecal output from each animal was collected and weighed fresh. Ten percent of each day's collection was collected and bulked, oven-dried for 48 h at 70^{0}C, milled and stored in plastic containers for proximate analysis. Data collected were subjected to analysis of variance using the General Linear Model procedure of SAS (SAS, 2001). The treatments means were compared using Duncan Multiple Range Test.

Table 1: Ingredient Composition of Concentrate and Roughage (%)

Concentrate Ingredient	Composition	Roughage
Maize offal	67.85	
Cottonseed cake	30.15	Groundnut haulms
Bone meal	1.50	
Common salt	0.50	

Total	100.00

Results and discussion

Proximate composition of the experimental diets

The proximate composition of the roughage and concentrate used in this study is shown in Table 2.

Table 2: Chemical Composition of the Experimental Diets (%).

PARAMETERS	CONCENTRATE	ROUGHAGE
Dry matter	87.18	87.81
Crude protein	15.06	9.5
Crude fiber	5.74	24.84
Ash	7.18	6.97
Nitrogen free extract	52.69	68.92
Ether extract	17.45	9.87
Neutral detergent fibre	14.28	37.47
Acid detergent fibre	11.21	26.07

Nutrient digestibility of concentrate and roughage fed to Red Sokoto Bucklings at different intervals

The nutrient digestibility of the experimental diets is shown in Table 3. The digestibility of the DM, CP, CF, NFE and EE were not significantly (P>0.05) affected by the interval of feeding the roughage and concentrate as shown in Table 2. The DM digestibility ranges from 64.08% to 73.47% in treatments 3 and 1, CP digestibility ranges from 64.08% to 73.47%. CF digestibility ranges from 80.96% to 86.29%. NFE digestibility ranges from 50.02% to 62.41%. EE digestibility ranges from 78.49% to 96.56%. The similarity of all the digestibility parameters in this study implies that interval of feeding roughages and concentrates did not influence nutrient digestibility. This agrees with the findings of Adeleke (2015) and Carro et al. (1994)

who reported that there was no effect on nutrients digestibility of Yankasa weaner rams fed concentrate and roughages at different intervals.

Table 3: Nutrient Digestibility of Sokoto Red Buckling fed concentrate and roughage at different intervals (%).

Treatments

PARAMETERS	1	2	3	SEM
Dry matter digestibility	73.47	66.05	64.08	3.03^{NS}
Crude protein digestibility	86.15	71.80	72.50	3.54^{NS}
Crude fiber digestibility	86.29	86.29	80.96	1.32^{NS}
NFE digestibility	62.41	51.20	50.02	4.44^{NS}
Ether extract digestibility	96.56	78.49	79.56	4.07^{NS}

Nitrogen Utilization of Sokoto Red Bucklings fed concentrate and roughage at different intervals

Table 3 shows the Nitrogen utilization of Sokoto Red bucklings fed concentrate and roughage at different intervals. All the parameters measured were not significantly (P>0.05) affected by the different intervals. Nitrogen intake ranges from 9.18 g/day to 10.14 g/day. Faecal nitrogen output ranged from 1.76 g/day to 2.69 g/day. Urinary nitrogen ranges from 0.46 g/day to 0.83 g/day. The Nitrogen absorbed ranged from 7.29 g/day to 7.59 g/day. Nitrogen balance ranged from 6.47 g/day to 7.14 g/day while nitrogen retention ranges from 64.39 g/day to 74.57 g/day. These results are similar to the findings of Adeleke (2015) who reported no significant effect on nitrogen utilization of Yankasa weaner rams fed concentrate and roughages at different intervals. The similarity may be due to the similar physiology of sheep and goats.

Table 3: Nitrogen Utilization of Sokoto Red Bucklings fed concentrate and roughage at different intervals

	TREATMENTS			
PARAMETERS	1	2	3	SEM
N intake g/day	9.18	9.98	10.14	0.51^{NS}
FEN g/day	1.76	2.69	2.55	0.21^{NS}
URN g/day	0.53	0.83	0.46	0.13^{NS}
NAB g/day	7.41	7.29	7.59	0.50^{NS}
NBL g/day	6.88	6.47	7.14	0.49^{NS}
NRT g/day	74.57	64.39	69.89	2.84^{NS}

FEN: faecal Nitrogen, URN: urinary Nitrogen, NAB: nitrogen absorbed, NBL nitrogen balance, NRT: Nitrogen retention.

Conclusion

Based on the data obtained from this study, it is concluded that feeding roughage and concentrate at different intervals has no effect on digestibility and nutrients utilization by Sokoto Red bucklings. Therefore, ruminant animal farmers can offer both concentrate and roughage at the same time.

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