EFFECT OF BREEDS OF GOATS ON FEED INTAKE AND DIGESTIBILITY OF SORGHUM HUSKS AND COWPEA HAULMS

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Abstract

A 2x2 factorial experiment involving two breeds of goats (Red Sokoto and Red Sokoto X Sahel goat which last for eight (8) days was conducted to determine the effects of breeds on feed intake and digestibility of sorghum husk and cowpea haulms. Eight goats with an average weight of 18-23kg were arranged in completely randomized design. The animals were divided into four treatments (T) groups. T1 comprises of Red Sokoto (RS) goats fed soghum husk while T2, T3 and T4 were Red Sokoto X Sahel (RSXS) goats fed sorghum husk, RS fed cowpea haulms and RSXS goats fed cowpea haulms respectively. Chemical (dry matter, crude protein, ether extract and Ash contents, Non fibre carbohydrates, Neutral detergent fibre (NDF), Acid detergent fibre (ADF) and Acid detergent lignin (ADL) Hemicellulose and Cellulose) analysis and apparent digestibility coeffeicients of the forages were determined according to appropriate procedures A.O.AC (2000) and Van Soest *et al.* (1991) respectively. The results of chemical analysis showed significant ($P<0.05$) difference in all the parameters examined, except on dry matter, acid detergent fibre (ADL) and Cellulose components of the forages. The digestibility results of the forage (Sorghum husk and Cowpea haulms) showed no significant ($P>0.05$) difference among the breeds parameters measured except on NFC, Ash, CP and Hemicellulose. The study concluded that there is no significant effect of breeds on digestibility parameters except hemicelluloses where RSXS goat recorded significantly higher values over RS goats. RS goats have better digestibility sorghum crude protein over the RSXS.

Keywords: Goats, Breed, Digestibility, Sorghum, Cowpea

Introduction

One of the challenges in the availability and utilization of forages for livestock production is their high fibrous nature and lower values of protein, energy mineral and vitamin components which results to decrease in their intake and digestibility (Bello and Tsado, 2014). The role of cowpea as a fodder in animal diets can never be over-emphasized because of their role as an available high quality legume hay in livestock diets in the whole world (Coulibaly *et al*., 2009).Cowpea residues utilization as supplemental fodder in animal production was reported by Singh et al., (2006). Sorghum husk or crop residues is the by –product left after the seeds are collected. The residues are usually burned out in the field in order to clear and clean the land from possible pest infestation hazard in the residues. (Abdalla and Yagoup,1997). The variations on the ability of different goat breeds to digest feed resources has necessitated this research with the objective of determining the effects of breed on feed intake and apparent digestibility values of Red Sokoto (RS) and Red Sokoto X Sahel (RSXS) fed Sorghum husks and Cowpea haulms.

Materials and Methods

Study area, sample collection and processing

The study was conducted at the Teaching and Research Farm and Laboratory of the Department of Animal Production, Federal University of Technology Minna. Minna is located at the Southern Guinea Savanna zone on latitude 9° 31 and 9° 42 North and Longitude 6° 29 and 6° 41 East with annual rainfall range f 1,200 – 1,300 mm and temperature range of $38^0 – 40^0$ C. the area has an altitude of 1,475m above sea level, and is characterized by two seasons, the wet season (April – October) and dry season)Novermber - March) (NSADP, 1995). The samples of Sorghum husk and Cowpea haulms were collected from the farms around University, cleaned, sundried and milled to pass 1mm sieve for chemical analysis.

Chemical analysis

Proximate composition: The dry matter, crude protein, ether extract and Ash contents of the milled grass sample were determined according to A.O.A.C. (2000). Non-fibre carbohydrate was calculated as NFC = 100 - (CP+Ash+EE+NDF)**.**

Fibre fraction analysis: Neutral detergent fibre (NDF), Acid detergent fibre (ADF) and Acid detergent lignin (ADL) of the milled grass sample were determined with the procedure of Van Soest *et al.* (1991). Cellulose content was taken as the difference between ADF and ADL while hemicellulose content was also calculated as the difference between NDF and ADF.

Experimental design

A 2x2 Factorial experiment involving two breeds of goats (RS and RSXS) and two forages (Sorghum husk and Cowpea haulms) was arranged in a Completely randomized design using A totoal number of Eight (8) goats of average weights of 18-23kg. The animals were allotted into four treatment groups. There were two goats per treatment and one goat per replicate. T1 comprises of Red Sokoto (RS) fed soghum husk while T2, T3 and T4 were Red Sokoto X Sahel (RSXS) fed sorghum husk, RS fed cowpea haulms and RSXS fed cowpea haulms respectively.

Nutrient digestibility trial

The animals were introduced into metabolism crates for an eight (8) day digestibility trial. The collection of faecal samples from each was done for five (5) days after three (3) days of adaptation period in the metabolism crates. During the collection period, the quantity of feed not consumed was subtracted from the quantity of feed given. The voided faeces were collected, weighed and well labeled recorded for each animal daily for chemical analysis. After five (5) consecutive days faecal samples from each goat were pooled and then oven dried at 105^0C for twenty four (24) hours until constant weights are obtained from the samples. Ten (10) percent of each sample were taken and store in polythene bags. The pooled samples of dried faeces were ground and screened through a 1 mm sieve and awaiting chemical analysis.

$$\text{Apparent nutrient digestibility (\%)} = \frac{\text{Nutrient in feed} - \text{Nutrient in Faeces}}{\text{Nutrient in feed}} \times 100$$

Statistical analysis

Data generated from proximate compositions was analysed using student t. test while those on apparent nutrient digestibility were subjected to analysis of variance (ANOVA) procedure of SAS (2008). Significant Means were separated using Duncan Multiple Range Test (Duncan,1995) of the same package.

Results and discussions

Table 1 revealed the proximate and fibre compositions of sorghum husk and cowpea haulms fed to RS and RSXS. The results showed significant (P<0.05) differences in all the parameters examined, except on dry matter, acid detergent fibre (ADL) and Cellulose components of the forages. Cowpea haulms had significantly (P<0.05) higher Crude protein (CP), Ether extract (EE), Ash contents than sorghum husk. Meanwhile, the non fibre carbohydrates (NFC) acid detergent fibre(ADF) and hemicelluloses contents of sorghum husk is significantly higher than cowpea haulms (table 1). The higher crude protein values of cowpea haulms emphasized the importance of cowpeas in ruminant diets as they are seen as nitrogen and mineral supplement to enhance fermentative digestion and microbial growth efficiency in the rumen of ruminants fed on poor quality forage (Leng *et al.* 1992).

Table1: Proximate and fibre compositions of sorghum husk and cowpea haulms fed to Red Sokoto (RS) and Red Sokoto X Sahel (RSXS) goats

Parameters	Sorghum husk	Cowpea haulms	SEM	LOS
Dry matter	95.17	93.00	0.72	NS
Crude protein	5.15^{b}	21.30^{a}	2.44	**
Ether extract	5.00^{b}	8.83^{a}	0.67	**
Ash	5.67^{b}	8.17^{a}	0.45	**
NFC	23.18^{a}	18.04^{b}	1.14	**
NDF	61.00^{b}	43.67^{b}	2.68	**
ADF	36.33^{a}	33.00^{b}	0.75	**
ADL	11.33	9.00	0.67	NS
Hemicellulose	24.67^{a}	10.67^{b}	2.27	**
Cellulose	25.00	24.00	0.70	NS

ab= means on the same row having different superscript differs significantly(P<0.05); SEM= standard error of means; LOS= level of significance; NS= not significantly different (P>0,05); NFC= non fibre carbohydrates; NDF= neutral detergent fibre; ADF= acid detergent fibre; ADL= acid detergent lignin

Total feed intake and digestibility of Red sokoto and Cross of Sahelian goats (Red Sokoto X Sahel goat) fed with sorghum husk and cowpea haulms is presented in table 2. The digestibility results of the forage (Sorghum husk and Cowpea haulms) showed no significant (P>0.05) difference in all of the parameters measured among the two breeds except in NFC, Ash, CP and Hemicellulose. However, RSXS was observed with significant (P<0.05) higher values of digestible NFC of sorghum over the Red Sokoto goats. Similarly, the digestibility values of hemicellulose component of cowpea showed significant higher values in the RSXS goats over the RS goats. This variation could be attributed to the effects of breeds. The CP digestibility of Sorghum had significantly higher values in RS than RSXS goats. this possibly could be due to the inherent breed differences or environmental adaptation as have earlier been reported by Tuah *et al*. (2005). The lower feed intake and digestibility values recorded in animals that were fed Sorghum husk may be attributed to the presence of an antinutritional factor. Olomu (1995) and D'Mello, (2000) reported that dhurrin is a cyanogenic glucoside located mainly in the aerial shoot of sorghum plant which on enzyme action readily yields hydrogen cyanide (HCN).

Table 2: Total feed intake and digestibility of Red sokoto (RS) and Red Sokoto X Sahel (RSXS) goats fed with sorghum husk and cowpea haulms

Parameters	T1	T2	T3	T4	SEM	LOS
Total feed intake(g/kg)	2696.42	2797.90	3493.78	3355.06	153.50	NS
Dry matter(%)	77.06^{b}	81.40^{b}	87.53^{a}	89.32^{a}	1.29	**
Crude protein(%)	80.60^{b}	64.91^{c}	93.81^{a}	92.54^{a}	2.51	**
Ether extract(%)	81.00^{b}	84.61^{b}	92.06^{a}	93.89^{a}	1.41	**
Ash(%)	39.69^{b}	71.34^{a}	66.98^{a}	72.17^{a}	3.67	**
NFC(%)	80.57^{c}	85.38^{b}	92.79^{a}	91.21^{a}	1.24	**
NDF(%)	78.82^{c}	82.28^{bc}	86.91^{ab}	89.69^{a}	1.14	**
ADF(%)	78.24^{b}	80.37^{b}	86.39^{a}	87.51^{a}	1.15	**
ADL(%)	75.14^{b}	84.68^{ab}	83.29^{ab}	86.21^{a}	1.78	NS
Hemicellulose(%)	79.52^{c}	84.96^{bc}	87.76^{b}	97.37^{a}	1.72	**
Cellulose(%)	79.26^{b}	78.15^{b}	86.95^{a}	87.74^{a}	1.15	**

abc= means on the same row having different superscript differs significantly($P<0.05$); SEM= standard error of means; LOS= level of significance; NS= not significantly different ($P>0,05$); NFC= non fibre carbohydrates; NDF= neutral detergent fibre; ADF= acid detergent fibre; ADL= acid detergent lignin; T1=Red Sokoto fed on Sorghum husk; T2=Sahelian goat cross fed on Cowpea haulms; T3=Red Sokoto fed on Cowpea haulms and T4=Sahelian goat cross fed on Cowpea haulms

Conclusion

Based on the results of this research, it can be concluded that the digestibility of the various components of cowpea haulms were significantly affected by breeds except on hemicelluloses where RSXS differes significantly over RS; RS is found with significantly better digestibility of crude protein over the RSXS.

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