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PERFORMANCE OF GOATS FED BOVINE RUMEN CONTENT AND WHEAT OFFAL AS SUPPLEMENT TO GROUNDNUT HAULMS.

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ABSTRACT: *The experiment was conducted out to determine the performance of goats fed bovine rumen content-wheat offal as supplement to groundnut haulms. Four (4) goats with average weight of 16.63kg were used for the study. The animals were weighed and randomly assigned to four (4) dietary treatments in a 4*4 Latin square design (LSD) with 4 periods. . The experimental diets were A= 100% rumen content (control), B=75% rumen content + 25%wheat offal, C= 50% rumen content + 50% wheat offal and D=25% rumen content + 75% wheat offal. Groundnut haulms were fed ad-libitum as the basal diet. Results showed variation (P<0.05) in the dry matter intake and Feacal output (g/day) among all the treatments. The digestibility of Crude Protein (CP) and Organic matter (OM) were not influenced (P>0.05) by supplementation with rumen content-wheat offal. There were significant (P<0.05) differences in Dry matter, Ether extract, Crude Fibre and dry matter digestibility between the treatments. Urinary nitrogen was higher for treatment B, there were no variations (P>0.05) between and there was a significant (P<0.05) difference Nitrogen intake, feacal nitrogen and nitrogen retained among the treatment groups. In conclusion, for better performance in the live weight gain of goats, treatment D=25% rumen content and 75% wheat offal with groundnut haulms diet should be taken into cognisance.*

KEYWORDS: Goat, Rumen content mixture, Performance, Goats

INTRODUCTION

Livestock production is an important tool in the economy of developing countries. Goats particularly play an important role in the livelihood of small scale farmers as a major component of livestock mixed farming systems, which produce meat, milk, skin, fiber, and manure to large number of low income earners (Acharya *et al.*, 2011).

The complex factor that affects livestock production is nutrition, as feed resources are limited in quantity and quality (Nsahlai *et al.,* 1998).The systems of goat production in Nigeria are usually characterized by limitations posed by non-availability of year-round feed resources due to prolonged dry season of northern Nigeria (Aina *et al.*, 2002).

In Nigeria goats are raised extensively on natural grasses and crop residues. Studies have shown that grasses alone cannot provide adequate nutrients for optimum production of goats (Mc Donald, 1995). Crop residues are the most abundant and readily available feed resources for livestock production (Belete, 2006; Ajeigbe *et al.,* 2011). Groundnut haulms is aleguminous crop residue, it can be fed solely to the animal or supplemented with other forages as basal diet. Savadogo *et al.* (2000) reported that groundnut haulms had high crude protein. Recent trends in animal nutrition in Nigeria based on the principle of minimum input indicate focus on the utilization of non conventional feed resources (Fasae *et al.,* 2007). The

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recycling of slaughter house wastes, as feed for various categories of livestock has been a continuous subject of investigation and consideration (Akram, 1990). Rumen content available in abattoirs could be good sources of protein in livestock diets if properly harnessed (Dairo, 2005). It is usually available throughout the year (Igwebuike *et al.*, 2006). Dey *et al.* (1992) reported increase in digestibility of dry matter and crude fibre in goats fed with the rumen content. The present study was therefore designed to assess the performance of goats fed bovine rumen content-wheat offal as supplement to groundnut haulms.

MATERIALS AND METHODS

Experimental Site

The study was conducted at the Ruminant Unit of the University of Maiduguri Livestock Teaching and Research Farm, Maiduguri, Borno State. Maiduguri is located between latitude 11.15 and 11.45^{o} N, longitude 30.05 and 30.35^{o} E and on altitude of 364 m above sea level in the North east of Nigeria. The dry season lasts for about 9 months with the hottest period occurring between the months of March and June where the normal ambient temperature reaches 40^{o}C or more (Ugherughe and Ekedolum, 1986). The mean relative humidity ranges from 30 - 50 % with maximum of about 90 % in August. The annual rainfall ranges from 500 mm – 600 mm (Ugherughe and Ekedolum, 1986).

Experimental Animals, Feeding and Management

Four (4) non-descript goats, with average body weight of 16.63kg were used for the study. The animals were obtained from the Teaching and Research Farm; University of Maiduguri. Prior to the commencement of the experiment the animals were given prophylactic treatments against internal and external parasites. The animals were weighed and allotted to the four dietary treatments in a 4*4 Latin square design (LSD) with 4 periods. Each period lasted for 14 days. Thereafter the animals were housed in pens which have wide windows for the adequate ventilation. Animals were fed for seven (7) days as adaptation period, followed by7 days of data collection. Experimental diets were fed to animals at 1 % body weight once daily at 08.00am. The animals were given water and mineral salt lick *ad libitum*.

Experimental diets

Rumen content was collected from the abattoir in Maiduguri. Wheat offal and groundnut haulms were obtained from the Teaching and Research Farm, University of Maiduguri. The experimental diets were A= 100% rumen content (control), B=75% rumen content + 25%wheat offal, C= 50% rumen content + 50% wheat offal and D=25% rumen content + 75% wheat offal. The experimental diets were fed as supplement to a basal diet of groundnut haulms.

Chemical and Statistical Analyses

Samples of the experimental diets and feacal samples were analyzed for proximate composition using the procedures of AOAC (2002). Data generated were subjected to analysis of variance (ANOVA). Means were separated using Least Significant Difference (LSD) (SAS, 2003).

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RESULTS AND DISCUSSION

Proximate Composition

The proximate composition of the experiment diets are shown in table 2. The Dry Matter content of treatments A, B, C and D were 88.30, 89.30, 4.83, 90.50 and 91.00 % respectively Highest DM content was observed in D and the lowest in A. The DM content obtained agrees in this study for bovine RC with the values 88.o % reported by Gohl. (1981). The DM content was lower when compared with the values of 96.50 and 93.00 % reported in their studies (Mandung, 1994; Mohammed *et al.,* 2008). The crude protein content of experimental diets ranged from 12 to 15.58%. The CP content decreased with increasing level of wheat offal in the diets. The Crude protein value of bovine rumen content obtained in this study fell within the range of 13.3 to 16.4 reported by Abouheif *et al.* (1999). The crude protein content of bovine rumen content was lower than 16.53 % (Mohammed *et al.,* 2008). The crude fibre bovine rumen content is not in conformity with Mandung (1994) who reported ranged of 19.5 to 34.33 %. The ether extract content of bovine rumen content obtained was comparable with the values of 1.5 % reported by Mandung (1994). The variations in proximate and may be due to differences in feed consumed and the amount of constituent mixture. The nitrogen free extract content of bovine rumen content obtained in this study was comparable with the value of 42.60 % (Gohl, 1981). The ash value in this study was lower than the ash value reported for bovine rumen content (Gohl, 1981).The proximate composition of rumen contents could also be influenced by the pre-slaughter feeding regimen and the length the holding period between feeding and slaughter (Abouheif *et al.* 1999).

Growth Performance

The results of growth performance are presented in Table 2. There were no significant (P<0.05) differences among the treatments in Final live weight, Daily Live weight gain and feed conversion ratio, while there were significant (P<0.05) differences among the treatments in Dry matter intake and Feacal output. Final live weight ranged from 17.38 to 18.53 kg. The Daily Live weight gain ranged from 55.50 to 115.25 g. The Dry matter intake ranged from 449.75 to 662.52 g/day. Total Dry matter intake increased with the decreasing level of inclusion of rumen content-wheat offal. The Feacal output ranged from 115.00 to 179.04 g/day.

Goats fed on diets supplemented with rumen content with wheat offal mixture had higher DMI than the control. This shows that these diets were more palatable to goats. The higher mean daily feed intake on treatment D may probably be attributed due to low inclusion of rumen content. Goats on the control diet had the lowest DMI which is contrast to McDonald *et al.* (1995) and Schneider *et al.,* (1995) who reported that increase in level of crude protein in the diet would increase intake. This observation is in agreement with Jovanovic *et al.* (1977), who reported that rumen content containing total mixed ration had high feed intake as compare to the control diet. Similarly Esonu *et al.* (2006) also reported high intake on diets containing rumen content than the control. Adeniji (2008) reported that rumen content containing diets had higher feed intake than the control. The results of this study is not in conformity with the report of Abouheif *et al.* (1999), who observed a decrease in DM intake for rumen contents based diets. Adeniji, (2008) reported an increase in feed intake in early weaned piglets fed 20% (RCMM) rumen contents-maggot meal mixture.

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Under certain conditions such as high ambient temperature and high fibre content, feed intake may be depressed (Preston and Leng, 1987). Fajemisin *et al.* (2010) stated that low dietary fibre fractions and adequate protein content in livestock diets enhanced nutrients intake. Khattab *et al.* (1996) clearly indicated that the inclusion of rumen content in the rations of ruminants produced no palatability problem. The highest mean daily live weight gain recorded in goats fed on treatment D could be attributed to the high DMI and better FCR. This result is similar to the report of Khattab *et al.* (1996) who found that DM intake and daily weight gain in lambs fed on (25 and 50 %) rumen content-supplemented diets were higher than those on control diet. The final live weight of goats fed diet D was highest and could probably be due to the presence of high ME in the diet

Nutrient Digestibility and Nitrogen Utilization

The nutrient digestibility of goats fed bovine rumen content and wheat offal as supplement to groundnut haulms are shown in Table 3. There were no significant (P>0.05) differences in crude protein and organic matter digestibility among treatments, while Dry matter, Crude fibre, Ether extract and Dry matter digestibility differed significantly ($P < 0.05$) between the treatments. The Dry matter digestibility ranged from 72.04 to 76.68 %. The Ether extract ranged from 71.83 to 76.39 %. The Crude fibre ranged from 59.02 to 84.28 %. The Dry matter digestibility ranged from 72.04 to 76.68 %.

The Nitrogen utilization of goats fed bovine rumen content plus wheat offal as supplement to groundnut haulms are shown in Table 3. There were no significant (P>0.05) differences Urinary nitrogen excretion (g/day) between treatment groups. The Nitrogen intake ranged from 10.87 to 13.85 g/day. There were differences among treatments ($P < 0.05$). The Feacal nitrogen ranged from 3.23 to 5.59 g/day. There were differences among treatments ($P < 0.05$). The Nitrogen retained ranged from 7.45 to 10.70 g/day. There were differences among treatments ($P < 0.05$). All the goats were in positive nitrogen balance.

Abouheif *et al*. (1999) reported that lambs fed rumen content mixed with barley only, showed depression in DM digestibility compared to those fed basal diets. Furthermore, improved fermentation also has a direct effect on DMI by goats (Huhtanen *et al.,* 2002).Though an adaptation period based on the literature (Putrino *et al.,* 2007) was used in this study, rumen content mixture was more readily consumed by the goats at the end of the experiment period than at the beginning of the trial However, the highest value of crude protein digestibility recorded in treatment D and lowest in treatment A. The result is in agreement with the finding of Khattab *et al*. (1996) who reported that 25 and 50 % rumen content supplemented diets showed higher CP digestibility than 100 %. They speculated that the noticeable improvement in the digestibility of the rations containing rumen content may probably be related to considerable amount of semi-digested material and unknown factors that enhanced rumen microorganism. The result of the present study is in contrast with the finding of Abouheif *et al.* (1999) who stated that there was a trend for insignificant decrease in digestibility as the level of rumen content increased. The treatment A had the lowest nitrogen intake which might be attributed to low dry matter intake and treatment D had the lowest urinary nitrogen this could be attributed to high efficiency in the utilization of nitrogen.

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CONCLUSION

The utilization of the rumen content and wheat offal as supplement had no deleterious effects on the growth performance of goats. It is recommended for use by goat producers during the dry season. In conclusion it use the 25 % level of inclusion of rumen content diet had the best and it is recommend to used by farmers in dry season as feeding regime.

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APPENDIX

Table 1: Proximate Composition of feed ingredients.

Parameters (%)	Groundnut haulms	Wheat offal	Bovine rumen content
Dry matter (DM)	83.20	99.60	88.30
Crude Protein (CP)	11.29	13.39	15.58
Ether extract	1.00	1.00	1.00
Crude Fibre (CF)	33.00	11.00	40.00
Ash	6.00	5.00	7.00
Nitrogen free extract (NFE)	31.91	69.21	24.72
Metabolisable energy(kcal/kg)	1631.54	3033.39	1535.02

Table 2: Proximate Composition of dietary supplements.

Parameters (%)	A	B	C	D
Dry matter (DM)	88.30	89.30	90.50	91.00
Crude Protein (CP)	15.58	14.18	13.83	12.60
Ether extract	1.00	1.00	1.00	1.00
Crude Fibre (CF)	40.00	24.00	14.00	16.00
Ash	1.00	8.00	8.00	1.00
Nitrogen free extract (NFE)	24.72	42.12	53.67	54.40
Metabolisable energy(kcal/kg)	1535.02	2100.92	2498.00	2478.80

Table 3: The growth performance of goats fed bovine rumen content and wheat offal as supplement to groundnut haulms.

Parameteurs	Treatments				
	A	B	C	D	SEM
Initial live weight (kg)]	16.98	16.83	17.33	17.70	-
Final live weight (kg)	17.38	17.43	17.93	18.53	0.68^{NS}
Daily Live weight gain (g)	55.50	82.50	84.25	115.25	27.73^{NS}
Dry matter intake (g/day)	499.75^{b}	580.02^{ab}	641^{a}	662.52^{a}	46.09*
Feacal output (g/day)	115.00^{b}	148.64^{ab}	169.78^{a}	179.04^{a}	18.98*
Feed conversion ratio (feed/g)	9.65	9.08	9.85	6.28	2.47^{NS}

SEM = Standard error of mean.
NS = Not significant (P>0.05).
* = Significant (P<0.05).
ab = Means on the same row with different superscripts differ significantly (P<0.05).

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Table 4: Nutrient digestibility and nitrogen utilization of goats fed bovine rumen content plus wheat offal as supplement to groundnut haulms.

Treatments					
Nutrients digestibility %	A	B	C	D	SEM
Dry matter (DM)	72.04^{b}	74.10^{ab}	74.70^{ab}	76.68^{a}	1.75*
Crude Protein (CP)	79.17	81.61	84.64	88.10	7.78^{NS}
Ether extract	71.83 ^{b}	74.02 ^{ab}	74.70 ^{ab}	76.39^{a}	1.80*
Crude Fibre (CF)	59.02 ^{b}	62.82^{b}	74.80^{ab}	84.28 ^{a}	6.72*
Organic matter (OM)	82.56	86.85	86.94	87.82	3.64 ^{NS}
Dry matter digestibility (%)	76.68^{a}	74.70^{a}	72.04^{b}	74.10^{ab}	1.75*
Nitrogen utilization					
Nitrogen intake (g/day)	10.87^{ab}	10.99^{b}	12.85^{ab}	13.85^{a}	0.96*
Feacal nitrogen (g/day)	3.23^{c}	3.61b^{c}	4.81^{ab}	5.59	0.49*
Urinary nitrogen (g/day)	3.04	3.86	3.29	1.70	1.28 ^{NS}
Nitrogen retained (g/day)	7.45^{b}	8.54^{b}	10.18^{a}	10.70^{a}	0.65*

SEM = Standard error of mean.

NS = Not significant (P>0.05).

* = Significant (P<0.05).

abc = Means on the same row with different superscripts differ significantly (P<0.05).

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