

UTILIZATION OF CATTLE FORE-STOMACH DIGESTA ENSILED WITH AFRICAN LOCUST BEAN PULP AND NON PROTEIN NITROGEN SOURCES BY GROWING UDA RAMS

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ABSTRACT

Sixteen growing Uda rams weighing between 20 and 25kg were used to determine the utilization of cattle fore-stomach digesta ensiled with African locust bean pulp (ALBP) and non-protein nitrogen (NPN) sources. The study was conducted in Katagum, Zaki Local Government Area, Bauchi State. The animals were randomly allocated to four dietary treatment groups in a completely randomized design (CRD). The research lasted for eighty four (84) days of feeding and seven (7) days digestibility trials. Data were taken on feed intake and body weight changes. Blood samples were also collected and analyzed for haematological indices. The results showed that feed intake and dry matter intake (%body weight) were significantly ($p < 0.001$) different. The weight gain, ADWG, total feed intake, feed conversion ratio, haemoglobin, packed cell volume, red blood cell, white blood cell, mean corpuscular volume, mean corpuscular haemoglobin, mean corpuscular haemoglobin concentration were not significantly different. There was no significant difference in terms of digestibility of DM, CP, CF, EE, and Ash across the treatments. The cost of production showed no significant differences across the treatments means, but treatment A with 40% fore-stomach digesta and 60% African locust bean pulp was recorded the least cost of ₦332.51 and is recommended to farmers for feeding ruminant animals.

Keyword: Rumen Content, African Locust Bean Pulp, Poultry Litter, Non Protein Nitrogen Sources, Growing, Uda Rams

Introduction

Ruminant animals play active role in converting feedstuffs of no human dietary value to meat and milk. Efforts have been on using such feeds to reduce cost of feeds and subsequently cost of animal production. In recent years, several authors (Garba and Maigandi, 2008; Fawolu and Fajemisin, 2011) investigated the use of cheap agro-industrial by-products and waste materials; such as slaughter/abattoir waste and poultry droppings and cassava peels at various levels of inclusions in small ruminant diets to determine their efficiency of utilization in term of growth and production. Also with a view to identifying the most suitable one in terms of nutrition, cost effectiveness and year round availability.

The findings will further buttress the need for the populace in the developing world's to turn to these cheaper sources of protein to combat the problem of malnutrition.

Materials and Methods

Experimental Site

The study was conducted at Katagum, Zaki Local Government Area, Bauchi State. Zaki is a Local Government Area in Bauchi State, Nigeria, and its coordinates are 12°08'N and 10°17'E. It has an area of 1,436km² and a population of 191,457 as at 2006 census. The postal code of the area is 752. The predominant ethnic groups in the area are the Hausa with some Kanuri and Kare-Kare in the east of the area. Zaki Local Government Area has two main seasons, the dry season, which last from October to May/June and the rainy season that last from June/July to September. Zaki Local Government Area as part of the sahel region of Nigeria is blessed with abundant livestock resources because of its climate which is more suitable for livestock production, due to absence of Tse-tse fly on the open grassland. The experiment was conducted between the months of July-October 2019.

Experimental Materials

Rumen contents (RC), Africa locust bean powder, poultry litter, Urea, water mixing bowl, masking tape, marker and weighing scale.

Experimental Animals and their Management

Sixteen (16) growing Uda rams weighing between 20 and 25kg and 6-7 months of age were purchased from Gamawa town of Bauchi State for the experiment. The rams were transported to Zaki Local Government Area. On arrival, the rams were quarantined, dewormed and sprayed against ecto parasites (using permethrin). The experimental rams were allocated to four different dietary treatment groups and water was provided *ad-libitum*. The feeding trial lasted for eighty four (84) days.

Experimental Design and Feeding Procedure

The experimental design used was complete randomized design (CRD). A total of 16 growing Uda rams were used, such that each treatment contained four replicates. Each group of four animals was assigned to one of the experimental diets for 84 days feeding trial. Each ram was fed individually at the rate of 2kg/ram body weight. Apart from the experimental diets (Table 1), each animal was fed the concentrate diet with the formulation shown in Table 2 at the rate of 1kg.

RESULTS AND DISCUSSIONS

Chemical Composition of the Experimental Diets

Chemical compositions of the experimental diets are present in table 5. Crude protein content was higher in treatment A (16.43%) which was higher than the 6-8% CP recommended by Norton (2003) for growing sheep and goat. Gatenby (2002) indicated 10-12% CP as moderate level for ruminant production.

The higher CP content in this study could be due to the ensiling effect like rapid increase in soluble component of crude protein due to proteolysis and deamination. The DM value (89.61%) obtained in this study was similar with the values of (87.61-87.71%) observed by Ochepo *et al.* (2012) in diets containing sugarcane peels. The higher DM value might be attributed to the types of materials used which were all dried. Higher DM suggest a good source of energy and roughage that could enhance rumination and prevent digestive upset in the rumen.

The crude fibre value (10.11-9.63%) in the present study were lower than the value (31.30-33.60%) obtained by Ahmed *et al.* (2007) when sugarcane baggase was ensiled with chicken manure. This may be as a result of the experimental materials present in the ensiled mass. Ether extract values (8.14 – 6.93%) obtained from this trial was higher than those reported by Tukur and Maigandi (2010). These authors obtained EE values ranged of (4.3-5.5%) when fattening rams was fed varying levels of fore-stomach digesta (FSD). The higher ether extract (EE) in diets indicate fats content which give rise to high concentration of volatile fatty acid (VFA).

The Ash values 6.52-7.69% in the present study was lower than (12.91-19.54%) reported by Garba *et al.* (2010) when *Guirera Senegalensis* was fed to yankasa rams as complete diets.

GROWTH PERFORMANCE

Growth performance of the experimental animals higher in feed intake is a good indication of proper utilization of the experimental diets (ensiled FSD with ALBP NPN) by the animals, which could also be attributed to the aroma and palatability of the ensiled diets. Initial, final body weight (BW), daily feed intake (DFI) weight gain, average daily weight gain (ADWG), total feed intake, feed conversion ratio and dry matter intake percentage body weight (DMI%BW) of growing uda rams fed graded levels of the experimental diets were shown in table 2.. Statistical analysis revealed that, there was no significant different ($p>0.05$) effects among the experimental diets across the various treatments on the life weight gain and average daily weight gain. The results of voluntary feed intake were varied statistically ($p<0.001$) among the treatments. Treatment D and C had the higher feed intake. Variation in feed intake between treatments could be as a result of better quality of the materials (urea and poultry litter) used to treat fore-stomach digesta (FSD) and African locust bean pulp (ALBP) which might have aided better intake and improved palatability of the diets.

These results are in line reported by Mondal *et al.* (2013) who found that inclusion of Dry rumen contents (DRC) in diets at 0, 5 and 10% DRC did not affect final live weight and average daily gain (ADG) in kids and lambs.

Dry matter intake as percentage body weight was significantly different ($p<0.001$) between the treatments. DMI% BW indicates the nutritional quality of the feed with minimal wastage. The DMI% BW generally indicates that the animals on the various diets showed positively DM status by

consuming more than (2) percent of their body weight. The values obtained in this study fall within the range of 2.18-3.78% reported by Olorunnisomo (2010) for sheep fed maize and amaranth fodder.

NUTRIENT DIGESTIBILITY

The result of nutrient digestibility is present in table 3. The result showed that nutrient in the experimental diets was well utilized. The digestibility of the nutrients obtained in this present study was comparably high. Muhammad *et al.* (2016b) observed similar trend when uda rams were fed graded levels of *Parkia biglobosa* yellow fruit pulp. Wada *et al.* (2014) observed medium digestibility (40-60%).

Generally, the entire nutrients digestibility in this study was higher and the high digestibility could be attributed to the inclusion level of urea and poultry litter in the experimental diets as source of protein. This agreed with the report of Garba and Maigandi (2008) that adequate nitrogen in diets enhanced the activities of rumen microbes which eventually improved the overall nutrient digestibility.

The dry matter (DM), Crude fibre (CF), Crude protein (CP) Ether extract (EE), and ASH digestibility in present trial were comparable to the finding of Muhammed *et al.* (2016b) and higher than the report of Wada *et al.* (2014a). DM values in this study ranges from 75.63-83.44% and that of Muhammad *et al.* (2016b) ranged from 77.22-78.02%.

CP values obtained in the present research ranges from 78.74-84.58% which is higher than the values 24.48-32.27% reported by Wada *et al.* (2014a).

CONCLUSIONS AND RECOMMENDATION

The result showed that daily feed intake was significantly higher in treatments C (1.21kg) and D (1.22kg) than in treatment A (1.08kg) and B (1.09kg). Dry matter intake as % BW was significantly higher in treatments C and D than in treatment A (1.08kg) and B (1.09kg).

Therefore treatment D was recommended due to the high DFI, weight gain and low in FCR.

Table 1: Chemical Composition of the Experimental Diets and Concentrate Mixture

	Treatments				
	A	B	C	D	Concentrates
Parameters (%)					
Dry matter	89.61	89.11	88.60	89.59	98.10
Crude protein	16.43	15.96	16.11	16.19	14.93
Crude fibre	9.63	10.11	9.72	9.65	28.00
Ether extract	8.14	6.93	7.29	7.39	4.50
Ash	7.69	6.52	6.86	6.93	6.00

Table 2: Performance Characteristics of Uda Rams Fed Experimental Diets

	Treatments				SEM	LOS
	A	B	C	D		
Parameters						
Initial BW(kg)	20.25	20.50	21.75	19.50	0.35	NS
Final BW (kg)	26.50	26.00	28.25	26.75	0.39	NS
DFI (kg)	1.08 ^b	1.09 ^b	1.21 ^a	1.22 ^a	0.01	***
Weight gain (kg)	6.25	5.50	6.50	7.25	0.28	NS
ADWG (g/day)	74.40	65.48	77.38	86.31	3.38	NS
TFI(kg)	90.72	91.56	101.64	102.48	4.78	NS
FCR	14.52	16.65	15.64	14.14	0.78	NS
DMI % BW	4.32 ^b	4.36 ^b	4.84 ^a	4.88 ^a	0.03	***

TFI = Total Feed Intake DMI(% BW) = Dry Matter Intake as % Body Weight LOS = Level of significance NS = Not Significant FCR= Feed Conversion Ratio DFI = Daily Feed Intake ***= p<0.001 abc, means within the same row with different superscript are significantly different (p<0.001).

Table 3: Nutrients Digestibility of Experimental Rams

	Treatment				SEM	
	A	B	C	D		
Parameters (%)						
DM	82.70	82.88	78.14	84.20	0.55	NS
CP	84.58	78.74	83.67	80.45	1.06	NS
CF	82.68	82.54	81.64	76.03	0.93	NS
EE	78.45	79.47	80.78	79.86	0.88	NS
ASH	66.13	64.16	70.65	71.48	1.04	NS

DM = Dry Matter CP = Crude Protein CF = Crude Fibre EE = Ether Extract ASH = Ash

REFERENCE

- Ahmed, G. M., Salih, A. B. and Nagwa, E. G. (2007).Improvement of Digestibility of surgarcane bagasse by fermentation with chicken manure.*Resources Journal of Agriculture and Biological Sciences*, 3(2): 115-118.
- Fawolu, T. S and Fajemisin, A. N. (2011). Performance and micro-mineral utilization by West African Dwarf rams fed rumen content- poultry droppings mixed based diets. In: A. A. Adeniji, E. A Olatunji and E. S. Gana (eds.) *Value Re-Orientation in Animal Production: A key to National Food Security and Stable Economy*. Proceedings of the 36th Annual Conference of the Nigerian Society for Animal Production (NSAP), 13th -16th march, held at Merit House/Raw Materials Research and Development Council, Abuja. Pp533-535.
- Garba, Y., and. Maigandi, S. A. (2008). Nutrient digestibility and utilization by growing lambs fed ensiled fore-stomach digesta (FSD) with poultry litter waste (PLW). In Repositioning Animal Agriculture for the Realization of National Vision 2020. Pp 222-225.
- Garba, Y., Mohammed, A. S., Muhammad I. R, and Nasiru, A. (2010). Intake and Nutrient digestibility by Yankasa rams fed graded levels of *Guira senegalensi* as a complete diet. In: O. J, Babayemi, O. A. Abu and E. O Ewuola (eds) *Fast-tracking Animal Agriculture in a Challenged Economy. Proceedings of the 35th Annual Conference of the Nigerian Society for Animal production (NSAP) 14th-17th March*, held at University Ibadan, Nigeria. Pp514-517.
- Gatenby, R.M. (2002). *The Tropical Agricultural series*. In: A. J. Smith (ed). Macmillan Publishers Ltd. Between Town Roads, CTA, Post Bus 380,6700 A.J Wageningen, Netherland. Pp 32-33.
- Mondal, S., Haldar, S., Samanta, I., Samanta, G. and Ghosh, T.K. (2013).Exploring nutritive potential of undigested rumen contents as an ingredient in feeding of goats.*Anim. Nutr. Feed Technol.*, 13:79-88.
- Mohammed, Y. S., Mustafa MW, Bashir N and Mokhtar AS. 2013. Renewable energy resources for distributed power generation in Nigeria: A review of the potential. *Renewable and Sustainable Energy Reviews*. Vol 22: 257–268.
- Norton, B. W. (2003). The nutritive value of tree legumes In: *Gutteridge, R. C., Shelton, H. M. (eds). Forage Tree Legumes in Tropical Agriculture. Tropical Grassland Society of Australia Inc., St Lucia Queensland. CAB International* Pp 192-201.
- Ochepo, C. O., Ochepo, G. O and Ayoade, J. A (2012). The utilization of complete diet containing sugarcane peels by Goats. In I. I. Bitto, F. G. Kaankuka and S. Attah (Eds) *Sustainable Animal Production for National Food Security and poverty Alleviation*. Proceedings of the 37th Annual conference of the Nigerian Society for Animal Production (NSAP), 18th -21st March, held at the collage of Animal Science, University of Agriculture, Makurdi, Nigeria. Pp 507-511.
- Olorunnisomo, O. A. (2010). Nutritive Value of Conserved Maize amaranth or Maize amaranth mixture as dry season fodder for growing West African Dwarf Sheep. *Livestock Research for rural development*. 22: 191-194.
- Tukur, H. M., & Maigandi, S. A. (2010). Performance of fattening Rams fed varying levels of fore-stomach digesta. *Journal of Agriculture and Environment*, <5(1 and 2), 51-61.
- Wada, N. I., Njidda, A. A., Olafadehan, O. A., & Bello, B. (2014). Effect of Graded Levels of *Parkia Biglobosa* in a Concentrate Diet on Growth Performance, Digestibility and Nitrogen Utilization of Yankasa Rams. *Global Journal of Biology), Agriculture and Health Sciences*, 3(4), 65-70.
- Muhammad, N.B.M. Miana, K.M, Aljameel, S.A Maigandi and Buhari (2016b). Nutrient intake and Digestibility of uda rams fed Graded levels of parkia bigblobosa *Int.J. of Livestock research* 6(5): 33-42.