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Effects of varying levels of groundnut haulms and cowpea shell on the performance of weaner Red Sokoto goats.

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Abstract

Four diets containing 16% crude protein were formulated with varying levels of groundnut haulms (GNH) and cowpea shell (CPS). The diets designated as Diets 1, 2, 3 and 4, contained 60% GNH/ 0% CPS; .40% GNH/20% CPS; 20% GNH/40% CPS and 0%GNH/60%CPS respectively. The diets were fed to sixteen kids of Red Sokoto goats [two males and two females per diet] for seventy days in order to study the effects of varying levels of GNH and CPS on feed intake, nutrient digestibilities and weight gains of the animals. The results showed that the highest dry matter and crude protein intakes by the animals obtained for Diet 2 were 477.30 g/ day and 77. 85g/ day respectively .The lowest water intake per kilogram dry matter intake was obtained on Diet 3 (2. 42l). Animals on Diet 2 had a better daily weight gain (85. 41g/ day) compared to those on the other diets. The highest feed conversion ratio was obtained on Diet 4 (7.35). Nutrient digestibilities were significantly ($p<0.01$) affected by treatments, with Diet 2 having the highest and Diet 4 the lowest. Based on higher weight gains for animals on Diet 2, which indicates a shorter time to attain slaughter weight, diets containing 40% GNH/20%CPS could be recommended for growing Red Sokoto goats.

Keywords: Performance, Red Sokoto goats, ground haulms, cowpea shell

Introduction

Nigeria's 34.5 million goats are primarily kept for meat, milk and skin production[RIM,1993]. They provided about 72,439 tonnes of meat in 1993, which accounted for 12.84% of the total lean meat available in the country (Shaib,Aliyu and Bakshi,1997). The level of animal protein intake has direct influence on the general well being and health of people in a developing country like Nigeria. According to Shaib *et al.* (1997), Nigerians consumed only 3.245g of animal protein per person per day in 1993, which is far below the 34g recommended by the Food and Agricultural Organisation (FAO) of the United Nations.

With the increasing demand for dietary protein in Nigeria due to population increase, more emphasis is being placed on small ruminants for production of meat (Trimnel et al., 1985), because they have certain advantages over cattle production. Their production is less capital intensive, requires less land and they are usually more prolific. Sheep and goats are generally termed as 'poor man's cow.

The Sudano-Sahelian belt, the traditional home of most of Nigeria's ruminant livestock, is characterized by a long dry season, where not only climatic conditions are extreme , but nutrition is often a limiting factor of production. Occurrence of diseases are also prevalent. It appears that crop

residues, which are easily available at low cost, will for a long time remain the major feeds for ruminant animals in this part of the country. Three of the most abundant crop residues and by-products available are groundnut haulms[GNH], cowpea shell[CPS] and maize offals[MO]. The availability of these agricultural wastes and by-products is always at peak immediately after harvest which falls between October-January of every year. Despite the upward changes in prices of these agricultural wastes due to demand, they remain some of the cheapest and most available feeds in the North –East sub-region of Nigeria.

Among the ruminants, goat seems to be the best in the utilization of coarse materials for the production of meat, preferring stuffs relatively rich in crude fibre (Williamson and Payne, 1978). The present study was therefore designed to investigate the effects of including various levels of groundnut haulms and cowpea shell in the diets on the performance of weaner Red Sokoto goats.

Materials And Methods

Sixteen weaners of Red Sokoto (Maradi) goats (8 males and 8 females) 8 to 12 months old and with an initial average weight of 10.6kg were allotted into four groups of four animals each, such that each group contained two male and two female animals. The animals were allocated to one of four diets and kept in individual pens with concrete floors and sufficient ventilation. The pens with in-built feeding compartments, were cleaned daily.

Four isonitrogenous diets (16% crude protein) were formulated in which cowpea shell and groundnut haulms were included at various lev-

Table1: Ingredients inclusion rates and chemical composition] of the diets fed to Red Sokoto kids [%.]

Ingredients	Diets			
	1	2	3	4
Maize offal	16.51	15.71	14.91	14.11
Cotton seed cake	20.99	21.79	22.59	23.39
Bone meal	2.00	2.00	2.00	2.00
Salt lick	0.50	0.50	0.50	0.50
Groundnut haulms	60.00	40.00	20.00	0.00
Cowpea shell	0.00	20.00	40.00	60.00
Total	**100.00**	**100.00**	**100.00**	**100.00**
Chemical composition				
Nutrients				
Dry matter	94.72	95.15	94.97	93.26
Organic matter	79.45	84.73	82.58	81.02
Crude protein	15.90	16.13	16.39	16.10
Ash	20.55	15.27	17.42	18.90
Acid detergent fibre	24.51	23.89	23.19	23.60
Neutral detergent fibre	39.03	39.16	39.10	39.40

els so that the two ingredients collectively constituted 60% of the diets. Ingredients inclusion rates and the chemical composition of the diets are shown in Table 1.

Goats were given *ad libitum* feeds and water daily. Feed refusals were weighed to estimate daily feed intakes. The animals were weighed at the beginning of the experiment and weekly thereafter. Digestibility trial was conducted about four weeks into the experiment. The animals were housed in individual metabolism cages with facilities for separate collection of faeces and urine. The diets were offered in feed troughs and water was provided. This was followed by a faecal collection period of six days The faeces were collected in polythene bags. Faeces voided daily by each animal were collected, weighed and oven-dried at 105°C for 24 hours. At the end of the collection period , all samples from each animal were bulked ,thoroughly mixed and 10% sub sample was taken for chemical analysis. Crude protein and ash components of the feed and faecal samples were determined using A.O.A.C.(1980) methods ,while acid detergent fibre and neutral detergent fibre were determined by the method of Goering and Van Soest(1970). Data were statistically analysed in a completely randomized design using the methods described by Steel and Torrie (1980).

Results and Discussion

The feed intake,nutrient intake and live weight changes of the kids are presented in Table 2.

Table 2: Nutrient intake and growth performance of kids fed various levels of groundnut haulms and cowpea shell [g/day.]

Parameters	Diets						
	1	2	3	4	SE	LSD	LS
DMI	368.10	477.30	452.30	356.60	25.09	77.31	*
OMI	292.40	404.50	373.50	289.10	20.65	89.21	**
CPI	58.52	77.85	74.13	57.4	14.05	17.47	**
ADFI	90.21	114.04	104.89	84.5	16.05	18.64	*
NDFI	143.70	186.90	176.90	140.50	9.81	30.24	*
WI,l/d	1.26	1.28	1.15	1.11	0.07	NS	NS
WI., l/kgDMI	3.29	2.55	2.42	2.91	0.17	0.53	*
Initial Average Wt, kg	10.10	10.30	11.20	10.80			
Final average Wt, Kg	14.94	16.28	16.56	14.38			
DWG	69.17	85.41	76.62	51.12	5.30	22.88	**
FCR, gfeed/g gain	5.38	5.59	6.04	7.35	0.68	NS	NS

Notes: DMI –Dry Matter intake; OMI – Organic Matter intake; CPI – Crude protein Intake; ADFI-Acid detergent Fibre Intake; NDFI- Neutral Detergent Fibre Intake; WI- Water Intake; DWG – Daily WeightGain; FCR- Feed Conversion Ratio; l/d – Litre/day l/kg DMI – litre/ kilogram Dry Matter Intake; g/d – gram/day; SE – Standard Error.; LSD-Least Significant Difference; LS – Level of significance; *- $P < 0.05$; ** - $P < 0.01$; NS – Not significant; wt – Weight; kg – kilogram.

The values for the mean DMI compared favourably with previous values of 408.89-692.40g/d obtained by Otaru *et al.* (1998) for Red Sokoto bucks averaging 17.93kg fed with gamba grass hay replaced at various levels by cotton seed cake and *lablab purpureus* hay. Adeloye (1994) obtained a mean DMI of 230-290g/d for West African dwarf goats aged four months, weighing 8.2 to 9.6kg, fed diets containing varying ratios of cowpea husk and maize milling waste. Higher levels of crude protein are known to stimulate DMI (Huston, Engdahi and Bales, 1988). The water intake values of 2.42 -3 .29 litres/kg DMI obtained were higher than the 1.76 -2.28 reported by Fomukong (1997) for Yankasa rams. A possible explanation could be the increased requirement of water for the dilution of blood whose production increase with protein level of the diet.

All the animals gained weight which indicated that the intake of energy and protein were well above maintenance requirements. The 51.12-85.41g/d daily weight gain (DWG) values reported in the present study agreed with the value of 80g/d obtained by Adeloye (1994) for West African dwarf goats.The effect of varying ratios of groundnut haulms and cowpea shell on the nutrient digestibilities of goats are presented in Table 3.

Dry matter digestibility (DMD) values obtained are similar to those reported by Adeloye (1994) and Jia *et al.* (1995). Diet 4 with 60% CPS had the lowest DMD. This is similar to the reports of Fomukong (1997) that high amounts of CPS reduced DMD. High values of crude protein digestibility (CPD) were reported in all the treatments. The increase in digestibility of protein with higher dietary levels has been reported (Ikhatua and Adu, 1981; Adu, 1982; Adegbola,Ogbonna and Nwachukwu,1988; Small and Gordon, 1990). The acid detergent fibre digestibility (ADFD) values are comparable to those reported by Jia et al. (1995). However, the neutral detergent fibre digestibility (NDFD) values were lower than those reported by Aregheore (1995). The variation may have been due to differences in the composition of the diets offered in the two experiments. The effects of CPS on nutrient digestibilities could be indicated by the following regression equations:

Table 3 : Nutrient Digestibilities of Red Sokoto goats fed various levels of groundnut haulms and cowpea shell.(%)

Parameters	Diets						
	1	2	3	4	SE	LSD	LS
DMD	50.78	58.10	53.61	44.95	0.96	4.12	* *
OMD	48.24	58.79	53.59	38.05	1.01	4.35	* *
CPD	70.83	73.86	72.31	68.05	0.83	3.60	* *
ADFD	10.15	18.22	11.21	8.55	1.60	6.91	* *
NDFD	24.56	34.21	27.81	15.63	1.49	6.46	* *

DMD- Dry matter Digestibility; OMD – Organic Matter Digestibility CPD – Crude Protein Digestibility; ADFD – Acid Detergent Fibre Digestibility; SE- Standard Error; LSD – Least Significant Difference; LS – Level of Significance; * * - $P < 0.01$.

DMD = 55.2-0.110CPS R square =26.6%
OMD =55.0-0.179CPS R square =27.2%
CPD =72.7-0.494CPS R square =26.6%
ADFD =13.8-0.059CPS R square =12.8%
NDFD =30.5-0.166CPS R square =30.7%

It may be inferred that the inclusion of CPS in the diets had negative effects on the various nutrient digestibilities.

Conclusion

Based on the higher weight gains of 85.41 g/ day obtained for animals on Diet 2 which indicates a shorter time to attain slaughter weight, diets containing 40% GNH/20% CPS could be recommended for growing Red Sokoto kids

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