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Research Article

Organ Weights of Carcass of Growing West African Dwarf Goats Fed Diets Containing Graded Levels of Steam-Treated Cashew Nut Shell

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Abstract

Twenty (20) growing west African dwarf goats were confined and fed concentrate diets containing 0% (T_1), 10% (T_2), 15% (T_3) and 20% (T_4) cashew nut shell at 100 g/goat/day to determine the effect of cashew nut shell on organ weights of the goats, the experiment lasted for 100days after an adjustment period of 14 days, the goats were served water ad Libitum. Fresh bamboo leaves were fed at 300 g/goat/day 2 hours before the concentrate. At the end of the feeding trial three (3) goats from each treatment were slaughtered, dressed and the heart, liver, kidney, lungs and spleen were cut off, weighed and converted to percentage of slaughter weight. the experimental design was a completely randomized design data obtained were subjected to one-way analysis of variance (ANOVA) and significant treatment means were separated using Least Significant Difference (LSD) option of SPSS version 16 of 2006 edition. Samples of browse species and the supplement diets were analyzed for their proximate composition using standard procedure (AOAC,1995). Daily supplement intake and total daily dry matter intake values ranged from 4461g (T_4) - 91.54g (T_1) and 216.75 (T_4) - 258.99g (T_2) and were significantly $p > 0.05$ different. Daily forage intake values ranged from 165.07 (T_1) - 176.10 (T_3) were not significantly ($p > 0.05$) different. All the organs weights determined did not show significant difference. All the organs weights were within normal range for growing west African dwarf goats. The weights for the heart ranged from 0.53 - 0.62 while those for lungs ranged from 1.31 - 1.40 all the values for the organs determined did not follow any definite trend. It was therefore concluded that cashew nut shell in concentrate diets for growing west African dwarf goats up to20% levels of inclusion was safe for the goats. Further research using higher levels of cashew nut shell as well as other classes of ruminant such as cattle and sheep was recommended.

Keywords: *Organs; Weights; Feed Intake; West African Dwarf Goats; Cashew Nut Shell*

Introduction

Feeding ruminants during the long dry season poses a lot of challenge to the small holders who represent the greater percentage of the producers in Nigeria and other parts of the tropics [1]. During the long dry season, feeds become scarce; most grasses are dried, low in nutritive value and are not suitable for production [2]. The cost of conventional feed ingredients such as maize, soya beans etc. has been on the increase from year to year, leading to increase in the price of animal protein. Also, the competition amongst man, animals

and industry for some of these feed ingredients has further worsened the situation [3]. The challenge in the millennium is s.ustain the livestock industry amidst food shortages so as to boost animal protein intake world wide [4]. Malu-kagu., *et al.* [5] stressed the importance of assessment and use of by-products in ruminant feeding in the tropics.

Given the above scenario, it would be worthwhile to seek alternative feed materials that are readily available, cheap, safe and nutritionally adequate and at the same time not in direct use by humans with a view to reducing the cost of animal protein, thereby making it more affordable for Nigerians.

Cashew nut shell is one of the agro bye-products (nonconventional feed stuff) whose potential has remained largely untapped it is the left over after the nut has been removed The use of this by- product. However, calls for proper evaluation of its safety for livestock feeding.

Aim of the Study

The aim of this work therefore, was to evaluate the organ weights of West African dwarf goats fed diets containing graded levels of cashew nut shell with a view to ascertaining their safety as well as correct use especially in terms of level of inclusion in goats diets.

Materials and Methods

Experimental site and housing facilities

The feeding trial was carried out a.t the Sheep and Goats Unit of the Livestock Teaching and Research Farm, Department of Animal Production, Kogi State University, Anyigba (Latitude $7^0 15^1$ and $7^0 29$ N of the equator and Longitudes $7^0 11^1$ and $7^0 32^1$ East of the Greenwich Meridean [6]. It is located in the derived Savannah zone of Nigeria. The annual rainfall ranges between 1400 mm - 1500 mm with about 6 - 7 months of rainfall. The ambient temperature ranges from 25^0C to 35^0C with the highest in March and April [7].

Experimental feed materials and preparation

The experimental feed materials were cashew nut shell, bamabara nut offal, maize offal, table salt, rice offal, fish offal meal, wood ash, bone-meal and bamboo leaves. The rice offal was collected from Alaide in Benue State while the bambara nut offal was purchased from market women in Anyigba, Kogi State. The table salt was obtained from Anyigba market. The cashew nut shell (Steam Treated for 20 minutes) was obtained from the Cashew Kernel Processing Factory, Kogi State University, Anyigba. The cashew nut shell was pounded using a mortar and pestle. All the feed ingredients were mixed together in varying proportions and ground. The bamboo leaves were harvested from Kogi State University, Campus, Anyigba.

Twenty (20) growing West African dwarf bucks with weight range of 6.15 kg to 6.30 kg and aged between 7 and 9 months, were sourced from Anyigba and its environs. They were conditioned to stability by feeding them adequately for 1 week. The animals were treated with Ivomec at 0.25 mL/goat to control both endo and ecto parasites. They were also injected with antibiotics (Oxytetracycline hydrochloride and procaine penicillin) at 3 mL and 2 mL per goat) to take care of scouring, nasal and ocular discharges and to provide a good health status. The animals were ear-tagged for identification and were randomly divided into 4 treatments of 5 animals each. The experiment lasted for 100days, after an adjustment period of seven (7) days. Animals in treatments $T_{1,}$ $T_{2,}$ T_3 and T_4 were fed with experimental diets containing 0, 10, 15 and 20%, levels of inclusion of cashew nut shell respectively at 100 g/goat/day. The Bamboo leaves were fed at 200 g/goat/day on cut and carry basis. All the animals were given water *ad libitum.* Dry matter intake was calculated from differences between absolute feed served and leftover. Weekly weight gains were taken in the morning before feeding. The following performance data were collected. Daily feed intake (supplement and forage), daily weight gain, Total weight gain and Feed conversion ratio. At the end of the feeding trial, three (3) animals were sacrificed and the respective organs to be assessed were cut off weighed and converted to percentage of slaughter weight.

Chemical analysis

Samples of experimental diets, steam- treated cashew nut shell and bamboo leaves (after drying in an oven) were prepared for analysis of their proximate composition. The protein content of the samples was determined by Kjeldahl method. Ether extract, crude fibre and ash content determination were according to standard procedure [8]. The nitrogen free extract (NFE) was calculated by subtracting the sum of the percentages of crude fibre, ether extracts, crude protein and ash from 100. The fibre component of each experimental diet, cashew nut shell and forage were further analyzed into, cellulose hemicellulose, lignin, Acid detergent fibre (ADF) and Neutral detergent fibre (NDF) [9].

Experimental design and statistical analysis

The experimental design was a completely randomized design (CRD). Data were analysed by a one way analysis of variance (ANOVA) and treatment means were compared (separated) (where there were significant differences) using least significant difference (LSD). With the aid of SPSS (2006) Statistical package for social science version 16.0.

Ingredients	Composition/Treatments			
	T_1	T_2	T_3	T_4
Cashew nut shell	0	10	15	20
Maize offal	20	15	13	10
Bambara nut offal	52	52	52	52
Fish offal meal	5.0	5.0	5.0	5.0
Rice offal	18	13	10	8.0
Wood ash	2.0	2.0	2.0	2.0
Table salt	1.0	1.0	1.0	1.0
Bone meal	2.0	2.0	2.0	2.0
Total	100	100	100	100
Calculated nutrient content (% DM)				
Nutrients				
Crude protein	18.70	18.15	18.09	18.01
Crude fibre	16.31	16.32	16.46	16.83
ME (Kcal/kgDM)	300	3050	3095	31321

Table 1: *Composition of experimental diets (% DM).*

Results and Discussion

Proximate composition and fibre fractions of experimental diets

The proximate composition, fibre fractions and pH of experimental diets fed to growing West Africa dwarf goats are a shown in table 2. The experimental diets where Iso-caloric and also Iso-protenous. The protein content of about 18% was adequate for growing goats in the tropies and also above the critical protein requirement of 8% [10]. The either extract of 5.05 to (T_1) was within the value recommended by Maithison., *et al*. [11]. However, 8.75% (T_2-)12.33 (T_4) were above recommended values and may impede fibre digestion Maithison., *et al.* [11].

Nutrients	Treatments			
	T_1	T_2	T_3	T_4
Crude protein	18.89	18.44	18.39	18.20
Crude fibre	16.33	16.58	16.62	16.85
Nitrogen free extracts	50.11	44.93	46.95	45.91
Ether extracts	5.05	8.75	10.64	12.33
Ash	9.62	8.30	7.40	6.71
Dry matter	93.35	94.99	95.57	91.75
Acid Detergent fibre	16.54	17.82	17.82	17.08
Neutral Detergent fibre	30.51	30.29	29.36	29.67
Cellulose	10.43	10.83	10.50	10.20
Hemicellulose	13.97	12.47	12.28	12.59
Lignin	6.11	6.79	6.58	6.88

Table 2: *Proximate composition and fibre fractions of experimental diets (% DM).*

Feed intake of experimental animals

The feed intake records are present in table 3, the forage intake ranged from 165.07g (T_1) to 176.10 (T_3) and were not significantly ($p > 0.05$) different, values for daily supplement intake and total daily dry matter intake showed significant ($p < 0.05$) differences, the total daily feed intake of 216.75 (T_1) to 256.61 (T_4) where higher than 130.74g - 210.37g reported by [12]. Arigbede., *et al.* but lower than 235 - 388.82g per day for West African dwarf goats reported by Ifut., *et al* [13].

Treatments					
Parameter	T_1	T_2	T_3	T_4	**SEM**
Daily supplement intake (g)	91.54[a]	85.650[a]	67.37b	44.65[c]	7.65
Daily forage intake (g)	165.07	173.34	176.10	172.10	1.67
Total dry matter intake (g)	256.61[a]	258.99[a]	243.47[b]	216.75[c]	2.96

Table 3: *Feed intake of experimental goats.*

Organ weights of experimental animals

Organ Weights of Growing West African Dwarf Goats Fed Bamboo Leaf and Supplementary Diets Containing Graded Level of Steam-Treated Cashew Nut Shell are summarized in table 4.

	Treatments				
	T_1	T_2	T_3	T_4	**SEM**
Organs	**(O% CNS)**	**(10% CNS)**	**(15% CNS)**	**(20% CNS)**	
Liver	1.66	1.76	1.57	1.67	0.12
Spleen	0.15	0.15	0.16	0.16	0.06
Heart	0.62	0.56	0.54	0.58	0.03
Lungs	1.39	1.40	1.34	1.31	0.12
Kidney	0.62	0.56	0.63	0.61	0.04

Table 4: *Organ weights (% of slaughter weight) of growing west African dwarf goats fed bamboo leaf and supplementary diets containing graded level of steam-treated cashew nut shell.*
SEM: Standard Error of the Means.

The weight of the liver, lungs, spleen, kidneys and heart were not significantly ($P > 0.05$) different. The values did not follow any definite trend for all the organs.

The non significance of the values for all the organs considered indicates that the inclusion of cashew nut shell in the diets did not significantly influence the weights of all the organs considered. Internal organs such as the liver and heart would vary by enlargement if the diets contained poisonous substances. However, since there was no significant differences, it implies that the cashew nut shell was safe for the goats. The kidney on the other hand is an excretory organ. Similarities or non significance in the values of the heart indicates that the kidney was not over burdened by the inclusion of cashew nut shell in the diets, thus the excretory functions of the goats were not impaired [14]. This result ranks with that of Okpanachi., *et al* [15]. Who recorded no significant differences with yearling West African Dwarf goats fed graded levels of cashew pulp meal based diets [16]. However recorded significant differences in the weights of the organs when they fed cassava peel meal based diets supplemented with African yam bean concentrate. The observed discrepancies could be traceable to differences in the diets fed to the goats.

Conclusion

Inclusion of cashew nuts shell in supplement diets for growing west African dwarf goats up to 20% had no significant ($p < 0.05$) effect on organ weights of the goats. Cashew nut shell at 20 percent level of inclusion was safe for the experimental goats

Recommendations

Further studies should be carried out using higher levels of inclusion of cashew nut shell.

Further studies should also be carried out using other classes of ruminant such as sheep and cattle. The use of agro by-products in goat feeding should be increasingly encouraged, however safety assessments are very necessary.

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