

WATER INTAKE ANALYSIS AND PERFORMANCE OF YEARLING WEST AFRICAN DWARF GOATS FED DIETS CONTAINING GRADED LEVELS OF CASHEW NUT SHELL AS SUPPLEMENT TO GUINEA GRASS.

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ABSTRACT

Twelve (12) yearling West African dwarf bucks aged about 12 months old , with a weight range of 7.25 - 8.27kg were used in a feeding trial to evaluate the water intake and performance of goats, fed graded dietary levels of cashew nutshell as supplement to *Panicum maximum* . The goats were fed diets containing graded levels of cashew nut shell at 0% ,10%, 15% and 20% for treatments T1, T2, T3 and T4 respectively, at 150g/goat/day, the goats were fed *Panicum maximum* at 500g/goat/day 2 hours before the concentrate was fed and known volume of water was served . The experiment lasted for 35 days after an adjustment period of 7 days. Samples of the supplement diets and the forage were analysed for their proximate composition using the methods outlined by AOAC (2000) .The experimental design was a complete randomized design , data were analysed by a one-way analysis of variance, with the aid of SAS 2000 edition. The values for all the performance parameters were not significant ($P>0.05$). The total daily feed intake values ranged from 423.40 to 451.70g. The total weight gain ranged from 0.41to 0.49kg All the water intake parameters were not significant. .it was therefore concluded that the water intake was determined by the dry matter intake of the goats , 15% level of inclusion of cashew nutshell in supplement diets of yearling West African Dwarf Goats had no adverse effects on concentrate intake and goat performance. 15% level of inclusion of cashew nut shell in supplement diets for yearling west African dwarf goats was recommended as it enhanced optimal performance

Keywords: Water Intake, Performance, Yearling, West African dwarf Goats, Cashew nut shell.

INTRODUCTION

About 85% of small holders in Nigeria keep West African dwarf goats, exploiting their ability to convert roughages to edible meat, convenience of handling, early maturity, and short reproductive cycle, hence making them a major source of income for daily cash needs and security against crop failure . It is the most dominant breed of small ruminants and make up 38% of goats found in West African humid zone (Gall, 1996).

Generally the feeding pattern of these dwarf goats is characteristic of the native husbandry practice whereby they scavenge for food to meet their daily

nutrient requirements. Feed shortages during the long dry season and sometimes during the wet season constitute a constraint to livestock production in every production system in Nigeria.

The success of nutritional management depends on supplying enough water for an animal (NRC, 2007). Water helps in temperature regulation, transporting waste from the body and digestion. Water is obviously important for goats and the quantity required depends on that needed for the maintenance of normal water balance and to provide for satisfactory level of production. Requirements vary with age, environmental temperature and the quantity of fat in the body. Water requirement may be met by free consumption, but other important sources are water contained in feed ingested and metabolic water resulting from oxidation of energy sources. Major sources of water loss include those from urine, lactation, evaporation and perspiration.

Research data on performance for Growing West African dwarf goats fed cashew nut shell based supplement diets are available (Okolo *et.al*, 2012; Ocheja *et.al*.2018), but water intake data for yearling West African Dwarf goats in relation to supplement diets containing graded levels of cashew nut shell appear to be unavailable thus necessitating this study; more over global warming and climate change calls for research on water intake and utilization in livestock since water availability is already becoming an issue in some areas.

This study was therefore designed to evaluate the water intake and performance, of yearling West African dwarf goats fed diets containing graded levels of cashew nut shell as supplement to guinea grass (*Panicum maximum*).

MATERIALS AND METHODS

Location of Experiment

The feeding trial was carried out at the small ruminants section of the Livestock Teaching and Research Farm, Department of Animal Production, Kogi State University, Anyigba (Latitude 7° 15' and 7° 29'N of the equator and Longitudes 7° 11' and 7° 32' East of the Greenwich Meridian (Ifatimehin *et al.*, 2009). It is located in the derived Savannah zone of Nigeria. The annual rainfall ranges between 1400mm – 1500mm with about 6-7 months of rainfall. The ambient temperature ranges from 25 °C

to 35 °C with the highest in March and April (Kowal and Knabe, 1972).

Experimental Animals, Feed Materials and Experimental Procedure

The experimental feed materials were cashew nut shell, cereal spent grains bamabara nut offal, maize offal, table salt, rice offal, wood ash, mineral premix and guinea grass. The cashew nut shell was collected 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 Guinea grass were harvested from Kogi State University, Campus, Anyigba.

Twelve (12) yearling West African dwarf bucks with weight range of 7.25 – 8.27 kg and aged about 12 months old, were sourced from Anyigba and its environs. They were conditioned to stability by feeding them adequately for seven days. The goats were ear-tagged for identification and were randomly divided into 4 treatments of 3 goats each. The

experiment lasted for 35 days, after an adjustment period of seven (7) days. Animals in treatments T₁, T₂, T₃, and T₄ were fed with experimental diets containing 0, 10, 15 and 20 %, levels of inclusion of cashew nut shell respectively at 150 g/goat/day.(Table 1) The guinea grass were fed at 500 g/goat/day on cut and carry basis after wilting for 24 hours to reduce the moisture content.. All the animals were given known volume of water. Dry matter intake was calculated from differences between absolute feed served and leftover. Weekly weight gains were taken in the morning before feeding.

The water intake was determined by serving the goats known volume of water and subtracting the left over from the volume of water served. after subtracting the evaporation loss. The evaporation loss was determined by placing an equal volume of water at the corridor of the goat pens and checking the volume left the following day. The volume of the left over water was subtracted from the volume of water placed at the corridor, the difference was the evaporation loss.

Table 1: Composition of Experimental Diets (% DM)

Ingredients	Composition/Treatments			
	T ₁	T ₂	T ₃	T ₄
Cashew nut shell	0.00	10.00	15.00	20.00
Maize offal	30.00	23.00	21.00	20.00
Bambara nut offal	20.00	20.00	20.00	20.00
Cereal Spent Grains	28.00	28.00	28.00	28.00
Rice offal	18.50	15.50	12.00.	11.00
Wood ash	1.50	1.50	1.50	1.50
Table salt	1.50	1.50	1.50	1.50
Mineral Premix	0.50	0.50	0.50	0.50
Total	100	100	100	100
Calculated nutrient content (% DM)				
Nutrients				
Crude protein	18.25	18.10	18.00	17.95
Crude fibre	16.55	16.30	15.85	15.20
ME (Kcal/kgDM)	2865	2940	2970	3005

Chemical Analysis

Samples of experimental diets, guinea grass (after drying in an oven) were prepared for analysis of their proximate composition. The protein content of the samples were determined by Kjeldahl method. Ether extract, crude fibre and ash content determination were according to standard procedure (AOAC, 2000). 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.

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 separated using least significant difference (LSD). With the aid of SAS 2000 edition.

RESULTS AND DISCUSSION

Proximate Composition of Supplement Diets and *Panicum maximum*

The proximate composition of supplement diets and *Panicum maximum* is presented in Table 2

The protein values of 17.17 to 17.69 % for the concentrate diets were iso-nitrogenous, they also fell within the values of 12 to 18% recommended for growing ruminants in the tropics by NRC (1996). The protein value of 10.48 % for *panicum maximum*

was lower than recommended values but could be compensated for by the concentrate diets, this value was however higher than the critical protein value of 8% reported by Lakpini *et al.* (2002) required to supply adequate ammonia for normal rumen

functions. The crude fibre range of 16.89% to 18.80% for the concentrates were adequate for the goats.

The ash and dry matter values were similar across the treatments.

Table 2: Proximate Composition of Experimental Diets and *Panicum maximum* (% DM)

Nutrients	Treatments/Diets				
	T1	T2	T3	T4	Panicum maximum
Crude protein	17.69	17.56	17.17	17.32	10.48
Crude fibre	16.89	17.00	18.05	18.80	24.53
Nitrogen free extracts	57.51	51.23	49.47	45.90	51.64
Ether extracts	4.48	10.84	12.04	14.99	1.90
Ash	3.43	3.28	3.29	3.01	11.45
Dry matter	90.66	90.59	90.97	90.18	64.98

Water Intake Analysis

The values for daily water intake, total water intake, water intake/dry matter intake and water intake/live weight gain were all not significantly ($P < 0.05$) different across the treatment means

The water intake values, though not significant still followed the same trend as the dry matter intake, this was in line with the report of Okagbare *et al.* (2004)

that water intake was largely determined by the dry matter intake. This position was also supported by Taiwo *et al.* (2005) who reported that more water was consumed as feed intake increased. This water intake trend also could mean that cashew nut shell does not contain any substance capable of increasing water intake.

Table 3: Water Intake Records of Yearling West African Dwarf Goats Fed *Panicum maximum* and Supplement Diets Containing Graded Levels of Cashew nut Shell.

Nutrients	Treatments/Diets				SEM
	T ₁ (0 % CNS)	T ₂ (10 % CNS)	T ₃ (15 % CNS)	T ₄ (20 % CNS)	
Total Water Intake(ml)	10853	10700	10317	10637	13.34
Daily Water Intake(ml)	318.66	315.71	317.47	303.90	2.22
Water Intake/Live Weight Gain(ml/g)	1.52	1.46	1.34	1.43	1.26
Water Intake/Dry Matter Intake(ml/g)	0.72	0.70	0.66	0.69	1.55

SEM Standard Error of the Means

CNS= Cashew Nutshell

Performance Characteristics of Experimental Animals

The performance characteristics of the experimental goats is presented in Table 4

All the performance parameters determined were not significantly ($P > 0.05$) different from one another. The values also did not follow any definite trend for all the performance parameters determined. This result was at variance with the reports of Okolo *et al.* (2012), and Ocheja *et al.* (2020) who both obtained significant ($P > 0.05$) differences in nearly all the performance parameters evaluated with growing West African dwarf goats fed supplement diets containing graded levels of cashew nutshell. The observed discrepancies may be due to differences in

the ages of the goats as well as the levels of inclusion of cashew nutshell in the supplement diets used in the studies. The total weight gain of 0.41 to 0.49 kg was far lower than 4.50 to 5.00 kg reported by Olomola *et al.* (2008), for West African dwarf goats fed groundnut cake, urea and rumen epithelial wastes in cassava flour and citrus pulp-based diets, this very wide discrepancy could however not be explained. The total daily feed intake of 423.40 to 451.70 was higher than 235.91 to 388.32g reported by Ifut *et al.* (2008) for West African dwarf goats fed forages supplemented with brewers dried grains. The observed difference could be due to differences in the forages and concentrates fed to the goats.

Table: 4 Performance of Yearling West African Dwarf Goats fed *Panicum maximum* and Supplement Diets Containing Graded Levels of Cashew Nut Shell

Parameters	Treatments/Diets				SEM
	T ₁ (0 % CNS)	T ₂ (10 % CNS)	T ₃ (15 % CNS)	T ₄ (20 % CNS)	
Initial weight (kg)	7.27	8.18	8.27	7.67	0.22
Final weight (kg)	7.70	8.67	8.68	8.10	0.20
Total weight gain (kg)	0.43	0.49	0.41	0.43	0.16
Daily supplement intake (g)	89.70	86.70	81.10	84.70	2.70
Daily forage intake (g)	348.20	336.70	362.06	367.80	5.68
Total daily feed intake (g)	437.90	423.40	443.16	451.70	7.55
Feed conversion ratio	35.63	30.24	37.84	36.75	8.95

SEM = Standard Error of the Means.

CNS= Cashew Nutshell

CONCLUSION AND RECOMMENDATIONS

Conclusion

The numerical differences in water intake was determined by the dry mater intake of the goats Fifteen percent (15%) level of inclusion of cashew nutshell in supplement diets for yearling West African dwarf goats produced optimum feed intake and growth performance

Recommendations

Fifteen percent (15%) level of inclusion of cashew nut shell is recommended in supplement diets for yearling West African dwarf goats for optimum growth performance.

Goats should be provided adequate quantity of water on daily basis

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