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(RESEARCH ARTICLE)



Performance of West African dwarf goats fed cassava peels treated with nitrogen sources

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Abstract

A feeding trial was carried out for 60 days with 40 growing West African Dwarf (WAD) bucks aged 5 - 7 months with an initial weight of 5.25 kg±0.35 to determine their performance characteristics. The goats were randomly allocated to five treatments, each treatment had eight replicates. The experimental diets were compounded such that Diet T1 had 100% urea treated cassava peel. T2 60% untreated cassava peel, 40% cassava foliage. T3 60% untreated cassava peel, 40% poultry manure, T4 60% untreated cassava peel, 20% cassava foliage and 20% treated cassava peel. T5 60% untreated cassava peel, 20% cassava foliage, 20% poultry manure. The average live weight gain was significant ($P < 0.05$) across the treatment groups with T1 having higher value. Average daily weight gain ranged between 19.59 and 20.30(g/d) with T1 showing significantly ($P < 0.05$) higher value than other treatment groups. Feed conversion ratio was also best with Diet T1. It can be concluded that urea treated cassava peels enhanced better performance of growing WAD goats in the tropics especially in dry season when there is decline of natural herbage.

Keywords: Urea; Cassava foliage; Poultry manure; Buck; Treated

1. Introduction

Livestock production is an important venture 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, fibre, and manure to large number of low income earners [1]. The complex factor that affects livestock production is nutrition, as feed resources are limited in quantity and quality. 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 [2]. Goats are multi-purpose animals producing meat, milk and skin and hairs. However, out of these products, meat is the major form in which goats are consumed in Nigeria [3]. Goat meat is widely accepted and consumed in Nigeria because there is no taboo against it [4]. The demand for goat meat is very high especially in rural areas where it often commands higher market price than beef. Meat from goat is preferable to those from other animal species because of its flavour, tenderness and palatability [5]. The meat-goat industry has grown, providing many new opportunities for additional income on diversified farming operations. Meat-goat producers will need feeds that are economical and easily managed. The use of cassava peel, poultry manure and cassava foliage as non-conventional feed stuffs for goat production has generated much attention besides the availability of large quantities of cassava peel, cassava foliage and poultry manure which are often left to rot, thereby constituting environmental problem. There is need to put these wastes into productive use besides attempting to ameliorate the high cost of goat production and also providing cheaper animal protein to the populace. This study evaluated the performance characteristics of growing goats fed cassava peel treated with different nitrogen sources.

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2. Material and methods

This experiment was conducted at the Sheep and Goat Unit of the Teaching and Research Farm of Kogi State University, Anyigba in accordance with the Institution's animal ethical committee guideline. Anyigba lies between latitude 7°5'N and 7°21'E of the equator and longitude 7°11'N and 7°32'E of the Greenwich meridian, with an altitude of about 420m above sea level. The zone is characterized by 6-7 months of average annual rainfall of about 1600mm and the daily temperature ranges between 25°C and 35°C [6]. Fresh cassava peels, free from stumps were collected and grated before being subjected to hydraulic press for dewatering. The dewatered peels were then pulverized and sieved to obtain the coarse mash, which was then sun-dried for 2-3days before being loaded into bags for feeding animals. Cassava foliage was harvested fresh and sundried until the leaves became brittle for milling. Poultry manure was obtained from poultry enterprise that installed battery cage system, and sundried for 5-7 days, to enable easy milling. Four kilogramme (4kg) of urea fertilizer was dissolved in 100litres of water and then used to treat 100kg of cassava peels by spraying. The product was then pressed together to eliminate air while in the container. The product in the container was then covered with plastic sheet and ensiled for 21 days before being used for diet formulation [7]. Five supplementary experimental diets (Table 1) were compounded namely; T1 (100% urea treated cassava peel), T2 (60% untreated cassava peel +40% cassava foliage), T3 (60% untreated cassava peel+40% poultry manure), T4 (60% untreated cassava peel+20% cassava foliage+20% treated cassava peel) and T5 (60% untreated cassava peel+20% cassava foliage+20% poultry manure) [8].

A total of forty (40) West African Dwarf bucks of about 5-7 months, with initial weights of $5.25\text{kg} \pm 0.35$ were obtained from goat producers within Anyigba Town, and used for the feeding trial which lasted for 60 days [8]. The goats were treated against ecto-parasites and endo-parasites, besides vaccination against peste des petits ruminants (PPR).The goats were randomly assigned to five treatments in a Completely Randomized Design (CRD), and each treatment was replicated eight times. A 14 day adjustment period was allowed for the goats before data collection commenced. The experimental goats were allowed to graze for about 7 hours around Kogi State University Teaching and Research Farm, after which, they were fed supplementary rations based on 3% body weight. All goats in each treatment replicate were served feed and water *ad libitum*. Data on feed intake by individual animal was recorded daily and left over feed was weighed and subtracted from the total quantity offered to determine the daily feed intake. The average daily feed intake was obtained by dividing the total feed intake by the number of experimental days. Animals were weighed at the beginning of the experiment and subsequently weekly in the morning before feeding to determine the weight gain. Feed conversion ratio was determined as the ratio of intake to weight gain. Data collected were subjected to analysis of variance (ANOVA) and differences between treatment means were separated by Duncan using Statistical Software Package- Statistical Package for Social Sciences (SPSS) version 20.

Table 1 Gross composition (%) of experimental diets for growing West African dwarf goats

Ingredients	T1	T2	T3	T4	T5
Cassava Peel Meal+ Urea	100	-	-	20	-
Untreated Cassava peel Meal	-	60	60	60	60
Poultry Manure	-	-	40	-	20
Cassava Foliage	-	40	-	20	20
Total	100	100	100	100	100

Source:[8]

3. Results

3.1. Supplementary feed and dietary nutrient composition

The gross and proximate compositions of supplementary diets are shown in Table 2. The organic matter (OM) content of the concentrate supplements ranged between 94.23 and 95.18% while the crude protein values vary from 9.95% to 11.89%. The dry matter contents of the diets were 82.38 % in T5 to 85.60%T1. The Crude protein content of the treatment diets varied between 9.95% and 11.89% while the crude fibre content of the diets ranged from 9.68% to 10.95%. The values obtained for ether extract in this study ranged from 2.99 % to 3.25 %. Ash content of the supplementary diets ranged from 4.85% to 5.77% while the nitrogen free extracts ranged from 52.59% to 56.02%. The acid detergent fibre and neutral detergent fibre ranged from 15.90% - 31.85% and 29.22%- 50.01% respectively. The hemicellulose content of the treatment diets ranged from 11.42%-18.16%.

Table 2 Proximate composition of supplements for growing West African dwarf goats (%)

Nutrient	T1	T2	T3	T4	T5
Dry Matter	85.60	83.23	83.63	84.40	82.38
Organic Matter	94.45	94.75	94.23	94.85	95.18
Crude Protein	9.95	11.89	11.09	10.70	10.89
Crude Fibre	10.95	10.25	10.62	10.15	9.68
Ether Extract	3.13	3.25	3.25	3.20	2.99
Ash	5.55	5.25	5.77	5.15	4.85
Nitrogen Free Extract	56.02	52.59	52.63	55.20	54.00
Nuetral Detergent Fibre	29.22	39.95	50.01	29.00	39.73
Acid Detergent Fibre	17.80	26.05	31.85	15.90	25.23
Hemicellulose	11.42	13.90	18.16	11.42	14.50

T1 = 100 % Urea treated cassava peel, T2 =60 % untreated cassava peel + 40 % cassava foliage, T3 =60 % untreated cassava peel + 40 % poultry manure

T4 = 60 % untreated cassava peel + 20 % cassava foliage + 20 % urea treated cassava peel

T5 = 60 % untreated cassava peel + 20 % cassava foliage + 20 % poultry manure

The performance characteristics of growing WAD goats fed cassava peel treated with different nitrogen sources is presented in Table 3. Feed intake, body weight gain and feed conversion ratio were significantly ($P < 0.05$) different across the dietary treatments. All the experimental animals had adequate total feed intake, which ranged from 512.27 g/day to 565.37g/day across the treatments. The total daily feed intake obtained in this study is higher than the value reported by [9] who fed WAD goats with urea treated cassava peels as supplement to grazing natural pasture. Average daily gains significantly ($P < 0.05$) varied, and ranged from 19.59 - 20.30 g/day, with goats on Diet T1 having higher gain. Feed conversion ratio was best ($P < 0.05$) with T1 and worst with T2. The better feed conversion ratio for T1 is comparable to the report of [9] who fed 4 % urea treated cassava peel to goats. The possible reason for better performance of animals in T1 might be attributed to the urea treatment in which the cassava peel was subjected to which made the fermentable nitrogen more available in the rumen thereby bringing about better performance. This is in harmony with the report of [10] who opined that urea treatment improved weight gain of ruminant animals. Urea treatment of cassava peels could have increased microbial digestion and amount of digesta that moved through the gastro-intestinal tract with consequent increase in performance indices of animals.

Table 3 Performance of growing West African dwarf goats fed cassava peel treat with nitrogen sources

Parameters	T1	T2	T3	T4	T5	SEM
Initial Weight (kg)	5.32	5.33	5.31	5.50	5.50	-
Final Weight (kg)	6.78	6.51	6.50	6.93	6.74	-
Average Weight Change(kg)	1.46 ^a	1.26 ^b	1.19 ^c	1.43 ^a	1.24 ^b	0.02
ForageIntake(g/d)	410.50 ^a	400.20 ^a	380.40 ^b	390.10 ^b	381.10 ^b	12.34
Supplement Intake(g/d)	106.67 ^d	115.17 ^c	131.83 ^a	115.00 ^c	119.67 ^b	10.03
Total Daily Feed Intake (g/d)	517.17 ^b	565.37 ^a	512.23 ^b	505.60 ^c	500.77 ^c	0.27
Average DailyGain(g/d)	20.30 ^a	19.73 ^b	19.59 ^b	20.05 ^a	19.69 ^b	0.19
Feed Conversion Ratio	25.47 ^d	28.66 ^c	31.24 ^a	25.68 ^d	27.92 ^b	1.06

T1 = 100 % Urea treated cassava peel, T2 =60 % untreated cassava peel + 40 % cassava foliage, T3 =60 % untreated cassava peel + 40 % poultry manure

T4 = 60 % untreated cassava peel + 20 % cassava foliage + 20 % urea treated cassava peel

T5 = 60 % untreated cassava peel + 20 % cassava foliage + 20 % poultry manure

4. Conclusion

It can be concluded that treatment of cassava peels with urea resulted in better performance of growing WAD goats.

Compliance with ethical standards

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Disclosure of conflict of interest

All authors declare no conflict of interest exists.

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