SMGroup

International Journal of Animal Science

Research Article

Growth Performance and Nutrient Digestibility of West African Dwarf (WAD) Goats Fed Bread Waste and *Moringa Oleifera* Leaf

Ayandiran SK*, Odeyinka SM and Odedire JA

Department of Animal Sciences, Obafemi Awolowo University, Nigeria

Article Information

Received date: Feb 27, 2019
Accepted date: Mar 14, 2019
Published date: Mar 20, 2019

***Corresponding author**

Ayandiran SK, Department of Animal Science, Obafemi Awolowo University, Ile Ife. Osun Sate, Nigeria,
Tel: +234806-274-8481;
Email: skayandiran@gmail.com

Keywords Performance; WAD goats; Bread waste; *Moringa oleifera*

Abstract

In a twenty-week trial, twenty West African Dwarf (WAD) goats (7.00 – 8.00 kg) were randomly allotted into four treatments in a completely randomized design to evaluate the growth performance and nutrient digestibility of WAD goats fed bread waste and *Moringa oleifera* leaf. Four diets (T1, T2, T3 and T4) were compounded by inclusion of bread waste and *M. oleifera* leaf at 0, 25, 50 and 100% levels. The goats were fed at 3% of their body weight. Performance parameters such as feed intake, daily weight gain and feed conversion ratio were evaluated. During digestibility trial, individual goats were put in a metabolism cage for easy collection of faeces and urine. The CP content of diets containing bread waste and *M. oleifera* leaf (T2, T3 and T4) were higher than T1 diet. There was no significant difference ($p>0.05$) in the feed intake of the animal across the treatments. Animals fed diets T4 (34.38) had significantly highest ($p<0.05$) daily weight gain compared to T3 (26.67), T2 (21.88) and T1 (20.84). The diets T2, T3 and T4 were significantly higher ($p<0.05$) in digestible energy (59.23, 62.54 and 62.84% respectively) and crude protein (63.34, 69.39 and 72.39% respectively) compared to the control diet. Furthermore, the nitrogen balance was significantly highest ($p<0.05$) in T4 (2.22 g/day), T3 (1.92 g/day), then T2 (1.50 g/day) and T1 (1.45 g/day) which were significantly the same ($p>0.05$). Hence, the nitrogen retention (%) was significantly higher in goats fed diets T4 (74.69 g/day) and T3 (68.61 g/day) than T2 (55.85 g/day) and T1 (54.86 g/day). It could be concluded that inclusion of bread waste and *M. oleifera* in the diet of goats led to improved performance characteristics.

Introduction

Dry season feeding of livestock especially ruminants in the tropics has always been a problem to farmers since very little quality pasture exists during this period and even the available feedstuffs from such sources are insufficient to provide nutrients beyond maintenance requirements [1]. Thus, low quality feeds especially in terms of energy and protein lead to undernourishment and low productivity. This resulted in the evaluation of alternative and cheap agro-industrial by-products as sources of feed [2]. Some of the non-conventional feedstuffs (agro-industrial wastes) used as substitute for the conventional feedstuff include cassava peel, brewer's dried grain, pineapple waste, flour dust, biscuit waste, bread waste, noodle waste, cocoa pod meal and shrimp waste. Bread is one of the most widely consumed food products in the world and bread making technology is probably one of the oldest technologies known [3]. The product is basically made of wheat flour, yeast, fat, sugar, salt and water [4]. Bread waste, a by-product of bakery industry is rich in energy, low in fibre but high in vitamin [5]. *Moringa oleifera* commonly called horse radish tree is an inexpensive protein source for livestock feeding [6]. Hence, this study investigates the performance characteristics of WAD goats fed bread waste and *Moringa oleifara* leaf.

Material and Methods

The twenty-week goat nutrition trial was carried out at the Teaching and Research Farm Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria. Bread wastes were collected then oven dried at 60°C for 12 hours, packaged in polythene bag and stored in a cool dry place for subsequent use. *Moringa oleifera* leaves were obtained from the Sheep and Goat Unit, Obafemi Awolowo University Teaching and Research Farm and air dried for 4 days. Four concentrate diets (T1, T2, T3 and T4) were compounded by inclusion of bread waste and Moringa leaf at 0, 25, 50 and 100% levels (Table 1) which were fed to WAD goats at 3% of their body weight. Twenty weaner WAD goats of both sexes were randomly allotted to four treatments in a Completely Randomized Design. Each of the animals was weighed before the commencement of the experiment and subsequently weekly throughout the experimental period. Left-over feed was weighed to estimate the feed intake from the feed offered. Two digestion trials of 7 days each were carried out in which the animals were kept in metabolism cages for easy collection of faeces and urine. The stored samples of faeces were bulked, thoroughly mixed, ground and sub-sampled for chemical analysis. Proximate component

Table 1: Gross composition of experimental diets for the WAD goats.

Ingredient (%)	T1	T2	T3	T4
Corn bran	40.00	30.00	20.00	-
Brewer's dried grain	40.00	30.00	20.00	-
Bread waste	-	**10.00**	**20.00**	**40.00**
Moringa oleifera	-	**10.00**	**20.00**	**40.00**
Palm kernel cake	16.00	16.00	16.00	16.00
Bone meal	3.00	3.00	3.00	3.00
Vitamin premix	0.50	0.50	0.50	0.50
Salt	0.50	0.50	0.50	0.50

Table 2: Proximate composition of the experimental diets fed to WAD goats.

Parameter (%)	T1	T2	T3	T4
Dry Matter	91.98	90.79	90.57	89.50
Crude Protein	15.34	17.10	17.76	18.28
Crude Fibre	13.50	11.90	10.58	10.01
Ether Extract	6.17	8.41	8.38	10.27
Ash	8.50	7.20	7.50	7.10
Nitrogen Free Extract	46.47	50.09	47.35	44.84

Table 3: Performance characteristics of WAD goats fed bread waste and *Moringa oleifera* leaf.

Parameter	T1	T2	T3	T4	SEM	PROB
Feed Intake (g/day)	159.00	179.25	180.00	193.00	6.49	0.28
Initial Weight (kg)	7.38	8.25	7.43	7.25	0.30	0.12
Final Weight (kg)	9.88	10.87	10.63	11.38	0.37	0.37
Weight Gain (kg)	2.50^{b}	2.63^{b}	3.20^{ab}	4.13^{a}	0.22	0.03
Weight Gain (g/day)	20.84^{b}	21.88^{b}	26.67^{ab}	34.38^{a}	1.82	0.04
Feed Conversion	8.07^{a}	8.32^{a}	6.61^{ab}	5.67^{b}	0.42	0.05

^{abc}: Means in a row with different superscripts differ significantly (p<0.05)

Table 4: Apparent nutrient digestibility coefficients of the experimental goats.

Parameter (%)	T1	T2	T3	T4	SEM	PROB.
DDM	61.31^{a}	53.14^{ab}	54.99^{ab}	51.41^{b}	1.61	0.04
DE	51.32^{b}	59.23^{a}	62.54^{a}	62.84^{a}	2.62	0.03
DCP	55.02^{b}	63.34^{ab}	69.39^{a}	72.39^{a}	1.20	0.03
DCF	57.39^{ab}	52.44^{b}	57.11^{ab}	60.90^{a}	2.18	0.05
DEE	46.35^{b}	57.87^{a}	55.31^{ab}	61.11^{a}	1.84	0.48
DAsh	55.43	58.15	50.55	53.93	0.67	0.25

of experimental diets, faeces and nitrogen content of urine were determined using the standard procedures of the [7]. Data obtained were subjected to analysis of variance procedure of General Linear Model and the Duncan's New Multiple Range Test option of [8] was used to test treatment effects and detect significant differences among means.

Table 5: Nitrogen utilization of goats fed bread waste and *Moringa oleifera* leaf.

Parameter (g/day)	T1	T2	T3	T4	SEM	PROB.
Nitrogen Intake	2.55^{b}	2.71^{ab}	2.80^{ab}	2.97^{a}	0.06	0.04
Faecal Nitrogen	0.82^{ab}	0.91^{a}	0.59^{c}	0.41^{c}	0.08	0.03
Urinary Nitrogen	0.29	0.30	0.29	0.35	0.03	0.82
Nitrogen Balance	1.45^{c}	1.50^{c}	1.92^{b}	2.22^{a}	0.12	<0.0001
Nitrogen Retention (%)	54.86^{b}	55.85^{b}	68.61^{a}	74.69^{a}	3.31	0.03

Results and Discussion

Table 2 shows the proximate composition of the experimental diets fed to WAD goats. The T1 diet had the highest DM content followed by T2, T3 and least T4. The CP content of diets containing bread waste and *M. oleifera* leaf (T2, T3 and T4) were higher than T1. Similarly, the EE values of T2, T3 and T4 were higher than T1. The CF content of T1 was higher than T2, T3 and T4. The DM content decreased with an increasing inclusion level of bread waste and *M. oleifera* leaf in the experimental diets but higher than that reported by [9]. The CP content of the diets in this study is more than the minimum of 8% necessary to provide the minimum ammonia levels required by rumen microorganisms for optimum activity [10]. Thus, substitution of bread waste and *M. oleifera* leaf in diets of goats met the minimum energy and protein requirement for maintenance and production functions of goats. There was no significant difference ($p>0.05$) between the feed intake (g/day) of the goats fed the experimental diets (Table 3). The goats fed T4 had significantly highest ($p<0.05$) weight gain (g/day) compared to T3, T2 and T1. The daily feed intake in the study was higher than concentrate intake recorded by [11]. This affirmed the report of [12] that concentrates supplementation brings about increase in the dietary protein and this accounted for the observed increase in feed intake. The daily weight gain in this experiment was similar to 23.33 – 28.57 g/day stated by [13] but lower than (35.00 – 45.54 g/day) reported by [11]. Also, the feed conversion in this study agreed with 6.70 – 10.30 obtained by [14]. Hence, inclusion of bread waste and *M. oleifera* leaf in the diets consequently improved the animal's body tissue build up. The dry matter digestibility coefficient was significantly highest ($p<0.05$) in T1 than other diets (Table 4). The diets containing inclusion levels bread waste and *M. oleifera* (T2, T3 and T4) were significantly higher ($p<0.05$) in digestible energy and crude protein coefficients compared to diet T1. The diet T4 had significantly highest ($p>0.05$) digestible crude fibre followed by T1, T3 and T2. The crude protein digestibility was lower than 71.90 – 84.90% reported by [15]. Furthermore, the crude fibre digestibility value in this study was similar to 52.52 - 65.13% [11]. The increase in the apparent digestibility coefficients of digestible energy, crude protein and crude fibre in diets containing bread waste and *M. oleifera* could be attributed to its easily digestible quality which increased activities of degrading bacteria in the rumen. There was significant difference in the nitrogen utilization of goats fed the experimental diets (Table 5). The animals on diet T4 had the significantly highest nitrogen intake, followed by diets T2, T3 and T1. Furthermore, the nitrogen balance was significantly highest ($p<0.05$) in T4, followed by T3, T2 and T1. Hence, the nitrogen retention (%) was significantly higher in goats fed diets T4 and T3 than T2 and T1. Nitrogen balance is described as a good indicator of the protein value of a diet [16]. All the diets in this study had positive nitrogen balance

which indicates adequacy in protein requirement for maintenance. The nitrogen balance here was higher than 1.34 – 1.69 obtained by [16] but lower than 2.75 – 3.75 [17]. Also the nitrogen retention percentage was higher than 49.88 – 53.46% reported by [11] but lower than 68.37 – 81.17% obtained by [18] for WAD goats fed mango seed kernel supplemented with *Moringa oleifera* leaf. The diets containing bread waste and *M. oleifera* had higher nitrogen balance and retention percentages.

Conclusion

It could be concluded that inclusion of bread waste and *Moringa oleifera* in the diet of WAD goats led to improved growth performance and nutrient digestibility.

References

1. Tsige-Yohannes Habte. Livestock feed security and associated impacts on sustainable agricultural development. Proceedings of the 7th conference of the Ethiopian Society of Animal Production (ESAP) held in Addis Ababa, Ethiopia, 26-27 May 1999. Ethiopian Society of Animal Production. Addis Ababa, Ethiopia. 2000; 51-61.
2. **Purcell WD. Problem, need, opportunities and prescription for the future. Sheep and Goat. 1998; 14: 160-120.**
3. Selomulyo VO, Zhou W. Frozen bread dough: Effects of freezing storage and dough improvers. Journal of Cereal Sciience. 2007; 45: 1-17.
4. Badifu SO, Chima CE, Ajayi YI, Ogori AF. Influence of mango mesocarp flour supplement to micronutrient; physical and organoleptic qualities of wheat-based bread. Nigerian Food Journal. 2005; 23: 59-68.
5. Al-Tulaihan AA, Najib H, Al-Eid SM. The nutritional evaluation of locally produced dried bakery waste (DBW) in the broiler diets. Pakistan Journal of Nutrition. 2004; 3: 294-299.
6. Odeyinka SM, Oyedele OJ, Adeleke TO, Odedire JA. Reproductive performance of rabbits fed Moringa oleifera as a replacement for Centrosema pubescens. In: 9th World Rabbit Congress Verona, Italy June 10 -13, 2008; 411-415.
7. Association of official analytical chemists. Official methods of Analysis 16th edition. Washington D.C USA. 2000.
8. SAS Users Guide Statistics, SAS inc. Cary, North Califonia, 2008 edition.
9. Asaolu V, Odeyinka SM, Akinbamijo O. Evaluation of anthelmintic attributes of Moringa and Bamboo leaves in gastrointestinal Nematode-Infested West African Dwarf Goats. Journal of Natural Sciences Research. 2012; 2: 45-53
10. Norton BW. Studies of the nutrition of the Australian goat. Thesis (D.Agr.Sc.) - University of Melbourne. 2003.
11. Ayandiran SK, Odeyinka SM, Makinde OA. Utilization of wheat offal-carried pineapple waste meal in the diet of West African Dwarf goats. Bulletin of Animal Health and Production in Africa. 2012; 60: 501-510.
12. Arigbede OM. Performance of West African Dwarf goats fed Panicum maximum basal diet with different sources of protein supplements. International Journal of Agricultural Sciences. 2007; 1595-9694.
13. Odeyinka SM. Effects of feeding varying levels of Leucaena leucocephala and Gliricidia sepium on the intake and digestibility of West African Dwarf goats. Nigerian Journal of Animal Production. 2007; 28: 61-65.
14. Alikwe PCN, Faremi AY, Fajemisin AN Akinsoyinu AO. Performances and nitrogen utilization of West African Dwarf Goats fed soybean and dried poultry waste-based concentrates as supplements to Cynodon nlemfuensis basal diet. Journal of Applied Sciences in Environmental Sanitation. 2011; 6: 181-189.
15. Ahamefule FO, Elendu C. Intake and digestibility of WAD bucks fed cassava leaf-maize offal based diets. Journal of Animal and Veterinary Advances. 2010; 9: 535-539.
16. Babayemi OJ, Bamikole MA. Nutritive value of Tephrosia candida seed in West African Dwarf goats. Journal of Central European Agriculture. 2006; 7: 731-738.
17. Oni AO, Arigbede OM, Oni OO, Onwuka CFI, Anele UY, Oduguwa BO, Yusuf RO. Effect of feeding levels of dried cassava leaves (Manihot esculenta, Crantz) based concentrates with Panicum maximum basal on the performance of growing WAD goats. Livestock Science. 2010; 129, 24-30.
18. Okoruwa MI, Omoragbon E, Obiku A. Effect of Moringa oleifera supplementation on acceptability and nutrient utilization of goats fed mango seed kernels. Advances in Life Science and Technology. 2015; 35: 78-83.