



NIGERIAN SOCIETY FOR ANIMAL PRODUCTION



Proceedings of



Conference

(NSAP - OGUN 2008)

THEME:

**ANIMAL AGRICULTURE
TOWARDS MILLENNIUM
DEVELOPMENT IN NIGERIA**

Edited by:

O. A. Adeyemi ▪ A. M. Ogungbesan ▪ A. O. Dada ▪ O. O. Eniolorunda
H. A. Awojobi ▪ D. B. Oke ▪ J. A. Agunbiade

COLLEGE OF AGRICULTURAL SCIENCES

Olabisi Onabanjo University
Yewa Campus, P.M.B. 0012, Ayetoro, Ogun State



UTILIZATION OF WHOLE CASSAVA PLANT (TMS 0581) BY WEST AFRICAN DWARF GOATS

O. E. FASINA¹, O. O. IJADUOLA¹, A. I. BELLO¹ AND O. O. FAYINMINU²

¹Department of Animal Production, ²Department of Crop Production, College of Agricultural Sciences, Olabisi Onabanjo University, Ago Iwoye, Ogun State

Summary

Growth and metabolic studies were conducted with twenty four goats (12 males and 12 females). They were fed on ration consisting of basal fresh *P. maximum* and cassava chips alone or in combination with cassava hay (T1, T2, T3 and T4). Cassava supplements were offered at 1% liveweight (DM). Supplementation with cassava chips, with or without cassava hay decreased ($P < 0.0001$) *P. maximum* DM intake. However, total DMI of the animals fed cassava-based diets was significantly ($P < 0.0001$) higher than DMI of animals fed T1. Digestibilities of DM, CP and CF were also significant ($P < 0.0001$). Although N intake values were not significant ($P > 0.0001$), animals fed T1 recorded the least N retention value ($0.03\text{g/day/W}^{0.75}$).

© 2008 Nigerian Society for Animal Production. All rights reserved.

Introduction

Inadequate nutrition due to shortage of good quality forage all year round is one of the major problems facing ruminant production in Nigeria. Forage shortage is more severe in the dry season when ruminants subsist on very poor quality forage and crop residues and this results in corresponding low levels production performance. Weight losses which may be up to a fifth of the animal's body weight had been reported (Umunna, 1981). This therefore calls for the utilization of crops that will supply all year round green fodders to ensure adequate intake of protein as well as tubers/ roots for energy.

Cassava (*Manihot Spp*) is the most important annual root crop (IFPRI, 2000) grown widely by tropical and sub tropical farmers. It is the highest supplier of carbohydrates among staple crops and it ranks fourth among food crops in developing countries after maize, rice and wheat (FAO, 1995). In parts of Nigeria where Cassava is grown, its forage and discarded roots are left on the farms or homesteads to rot. The crude protein of its leaves and tender stem is about 23% (Akinfala and Tewe, 2001).

Even though scavenging ruminants usually feed on Cassava forage and discarded roots, there is still paucity of information on the use of specific clones of whole cassava plant in feeding ruminants.

The paper reports on intake and nitrogen utilization by goats fed *Panicum maximum* with or without cassava (TMS 0581) forage and chips.

Materials and methods

The experiment was conducted at the Teaching and Research Farm, College of Agricultural Sciences, Olabisi Onabanjo University.

Twenty four yearling goats weighing 6.90 - 7.91kg liveweight (12 males and 12 females) were used in a 2 x 4 factorial experiment to access the intake and digestibility of nutrients from the test ingredients. The animals were dewormed and treated against ectoparasites as a routine exercise. They were equally allotted into four treatment groups, balanced for sex and

bodyweight and kept in individual metabolic cage.

Discarded roots and forage of TMS 0581 were obtained from International Institute of Tropical Agriculture (IITA), Ibadan. They were obtained fresh at the time of root harvest (12 months old) and immediately processed. The discarded roots were washed to remove soil and processed into chips. Both cassava chips and forage were properly dried with the aid of the sun before being fed to the experimental. *Panicum maximum* from natural pasture was harvested daily and fed fresh. The test ingredients were offered thus:

T1: *Panicum maximum* only

T2: *Panicum maximum* and Cassava chips

T3: *Panicum maximum*, Cassava hay and chips

T4: *Panicum maximum*, Cassava hay and chips

Cassava supplements were offered at 1% (dry matter basis) of liveweight. T3 and T4 had ratios of Cassava hay and chips 1: 1 and 1: 2 respectively. *Panicum maximum* was offered at 3% bodyweight for animals assigned to T1 while it was offered at 2% for the rest.

The experiment involved an initial adjustment of 14 days to allow the experimental animals adjust to confinement and diets followed by a collection period of 7 days. Animals were weighed before and after the experimental period. The quantity of feed offered, feed residue, faeces and urine determined during the collection period. 10% of the faeces and urine collected daily from each animal were kept and pooled over the 7 days period. Nitrogen loss from the urine by volatilization was prevented by introducing 15ml of 10% H₂SO₄ into collection bottles. Samples of faeces voided per day were dried in an oven at 60°C to constant weight. They were then properly bulked, thoroughly mixed, ground and sub-sampled for chemical analysis.

Proximate component of test ingredients and faeces samples were determined and urine samples were analysed for nitrogen (AOAC, 1995).

Data generated were subjected to analysis of variance using the procedure of Statistical Analysis System (SAS, 2002). Treatment means were differentiated using Duncan's Multiple Range Test.

Results and Discussion

The nutritive value of the test ingredients are presented in Table 1. The dry matter content recorded were of the same ($P>0.0001$), however, the values for the crude protein content were significantly different ($P<0.0001$). The dry matter content of 88.82% recorded for *P. maximum* was higher than the range of 12.50–22.90% DM reported for tropical grasses by Akinyemi and Onayinka (1989) and Arigbede *et al* (2004). The crude protein content of TMS 0581 forage was higher than that of *P. maximum* and the minimum level of requirement of 9.60–15% for ruminant animals (NRC, 1981). The chemical composition of forages is affected by factors such as stage of maturity, type and level of fertilizers applied and the variety of the forage (Ademosun, 1973). The low crude protein and high dry matter content of *P. maximum* might be attributed to the fact that the trial was carried out during the dry season.

Table 2 shows the performance characteristics of the animals. Supplementation with cassava hay and chips had a significant ($P<0.0001$) effect on daily dry matter intake (DMI) and weight gain. Total dry matter intake of animals fed diets T2, T3 and T4 was significantly ($P<0.0001$) higher than dry matter intake of animals fed T1. DM, CP and CF digestibility also varied appreciably ($P<0.0001$). Higher values were recorded by cassava based diets.

Even though values reported for N intake were not significantly different ($P>0.0001$), animals fed T1 had the least N balance value, resulting from high faecal N excretion. This indicates inadequate energy intake resulting in mobilization of tissue proteins to provide the needed energy.

The improved performance of animals fed cassava supplement(s) was attributed to the readily fermentable carbohydrate in the chips thereby making it possible for the rumen microbes to utilize available protein. The poor performance of animals in T1 could be attributed to unfavourable rumen environment for microbes due to low crude protein and energy content (as indicated by the NFE) of *P. maximum*.

Conclusion

The result of this study shows that feeding cassava chips or combination of cassava chips and hay supports

growth in goats. It also highlights the importance of Cassava chips and hay as dry season feed.

References

- Ademosun, A. A. (1973). Nutritive evaluation of Nigerian forages. IV. The effect of stage of maturity on the nutritive value of *Panicum maximum*. *Nig. Agric. J.*; 10: 170–177.
- Akinfala, E. O. and Tewe, O. O. (2001). Utilisation of whole cassava plant in the diets of growing pigs in the tropics. *Livestock Res. For Rural Dev.* (13) 5. www.cipav.org.co/lrrd/lrrd13/5/akin135.htm
- Akinyemi, A. A. and Onayinka, E. O. (1989). The productivity and caring capacity of *Panicum maximum* planted. *Nig. J. Agric. Sc.*, 4 (1): 33–38.
- AOAC (1995). Official methods of analysis. 16th Ed. Association of Official Analytical Chemists, Washington, D. C.
- Arigbede, O. M., Olanite, J. A. and Oni, A. O. (2004). Voluntary intake, digestibility and performance of West African dwarf goats fed graded levels of *Panicum maximum* and *Stylosanthes hamata*. *Proc. 29th Annual NSAP Conf.* pp 353–358.
- IFPRI (2000). Roots and Tubers for the 21st Century: Trends Projections. Agric. And the Env. Discussion Paper 31. G. J. Scott, M. W. Rosegrant and C. Ringler (eds). Int. Food Policy Research Institute, Washington D. C., USA.
- NRC (1981). Nutrients requirements of goats: Angora, dairy and meat goats in temperate and tropical countries. Nutrients Requirement of Domestic Animal, No. 15. National Research Council, Washington DC.
- SAS (2002). Statistical Analysis System User's Guide. SAS Institute Inc., Cary, USA.
- Umunna, N. N. (1981). Utilization of poor quality roughages: the replacement value of urea for groundnut cake in sheep diets. *Nutr. Report Int.*, 24(5): 973–983.

Table 1: Chemical Composition (% Dry matter) of test ingredients

Components	Test Ingredients			
	Cassava Hay	Cassava Chips	<i>Panicum maximum</i>	SEM
Dry Matter	88.66	88.57	88.82	0.34
Crude Protein	18.51 ^a	5.87 ^c	9.82 ^b	0.03
Crude Fibre	20.49 ^a	13.41 ^c	39.71 ^a	0.10
Ether Extract	5.52 ^a	4.27 ^b	2.54 ^c	0.06
Ash	16.75 ^a	7.81 ^c	10.32 ^b	0.02
Nitrogen Free Extract	38.73 ^b	68.64 ^a	37.61 ^c	0.07

^{abcd} Means along the same row with different superscripts were significantly different ($P<0.0001$)

Table 2: Liveweight Changes, Dry Matter Intake and Nutrient Utilization by Goats Fed P. Maximum With Or Without Cassava Supplement

Parameters	T1	T2	T3	T4	SEM
Initial Liveweight (kg)	7.78	7.50	6.90	7.91	0.16
Final Liveweight (kg)	6.63 ^b	7.60 ^{ab}	7.00 ^b	8.03 ^a	0.08
Weight gain (g/day)	-164.29 ^c	14.29 ^b	14.29 ^b	35.71 ^a	0.0003
Dry Matter Intake (g/day)					
P. maximum	174.29 ^a	139.76 ^b	118.10 ^d	129.80	0.47
Cassava Hay	-	-	20.76 ^a	13.51 ^b	0.47
Cassava Chips	-	69.20 ^a	43.22 ^c	57.82 ^b	0.22
Total Dry Matter Intake (g/day)	174.29 ^d	208.96	182.08 ^c	201.13 ^{ab}	0.41
Dry Matter intake (g/day/Wkg ^{0.75})	39.63 ^c	45.83 ^a	42.54 ^b	42.45 ^b	0.26
Total N- Intake (g/day)	2.74	2.84	2.88	2.98	0.001
Feecal-N- (g/day)	2.51 ^a	1.46 ^{bc}	1.28 ^c	1.54 ^b	0.003
Urinary N- (g/day)	0.10	0.07	0.09	0.10	0.0001
N-balance (g/day)	0.13 ^c	1.31 ^b	1.51 ^a	1.34 ^b	0.0003
N-balance (g/day/W ^{0.75})	0.03 ^c	0.29 ^b	0.35 ^a	0.28 ^b	0.0001
Apparent Nutrient Digestibility (%)					
Dry Matter	39.92 ^b	66.49 ^a	68.28 ^a	66.12 ^a	0.32
Crude Protein	8.35 ^c	48.85 ^b	55.72 ^a	48.36 ^b	0.20
Crude fibre	40.37 ^c	63.89 ^a	61.88 ^a	57.48 ^b	0.67

^{abcd} Means along the same row with different superscripts were significantly different (P<0.0001)