

## Original Research Article

## A Survey on Availability and Utilization of Forages by West African Dwarf Goats in Cross River State, Nigeria

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**Abstract:** A survey on the availability and utilization of forages by the West African Dwarf (WAD) goats was conducted across the three senatorial districts in Cross River State. Out of the three hundred questionnaires administered to elicit information from the small holder rural farmers, 97% were found to keep WAD goats. Six forages were reported to be commonly used in following order of availability: *Alchornea cordifolia* > *Bambusa vulgaris* > *Gmelina arborea* > *Aspilia africana* > *Panicum maximum* > *Andropogon tectorum*. The forages were offered fresh to the animals by 71% of the small holder rural farmers, 22% offered as dry forages while 7% of the farmers offered as wilted leaves. Only 14% of the farmers reported to feed forages only, 45% fed in combination of other substitutes and 41% combination of forages. The study therefore concluded that there are different forages available for utilization by WAD goats but only few are utilized by the farmers across the state; there is therefore further need to research on these forages with high nutritive value with respect to improving the feed resources for goats in the tropics.

**Keywords:** Forages, goats, small holder, nutrients, quality.

### INTRODUCTION

In Nigeria, livestock production in the villages is generally based on traditional management system and the species kept are small ruminants (goats and sheep), poultry, rabbits and pigs. The small ruminants are grazed on flat land, roadside, forest land and on land not used for agriculture, using the free range systems. Small ruminants especially goats, are seen as a symbol of prestige and can also be used as political gift during rallies and other traditional rites (Bamikole and Babayemi, 2004). Jaitner *et al.*, (2001) also indicated that small ruminants are kept mainly to generate income as savings and for ceremonial purposes. Goats especially are important components of the rural smallholder farming, contributing milk, meat, fibre and skin (Gefu, 1992). They provide between 25 and 30% of the total lean meat consumed in Nigeria (Devendra, 1990). In recent years, goats have assumed greater importance in attempting to bridge the protein intake deficiency gap resulting from high price of beef. Peacock (1996) enumerated some special attributes of goats such as high fertility, tolerance to adverse weather and diseases, favourable cost-yield ratios and ease of management.

Inadequate nutrition has been the major factor limiting the expansion of goat production in Nigeria (Gefu, 1992). The quantity and quality of grasses and other forage plants fluctuate with seasons and stages of maturity (Barry and McNabb, 1996). Consequently, there has been a growing trend in many regions throughout the developing world to identify potentially important feed sources among forage plants and to explore the possibilities of including same beneficially to ruminant diets (Makkar, 2000). The drive towards these goals has been prompted by severe feed shortages, severe and prolonged drought periods, continuing low per animal performance, mortality and uneconomic production (Adegbola, 2002).

Furthermore, the major constraint in feeding small ruminants is that the pasture quality and availability becomes very low in the dry season. This is particularly important in the tropics where native pastures and crop residues contribute to the major feed resources (Ayuk *et al.*, 2002) and the unpredicted seasonal fluctuations of the forages during the dry season (Ayuk *et al.*, 2012). More so, goats can survive, produce and reproduce due to selective intake of a wide

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variety of trees, forbs, grasses, herbs and non-conventional feedstuffs, thereby enabling them to switch feed groups when preferred ones are in limited supply (Strangel, 1993). Forages of different species have been cultivated in many parts of Nigeria for alley farming as well as for their protein and ash contents (Singh, 2001). Shrubs have long been known to contain 20 - 30% CP, 12 - 18% CF, and 500 - 650 ppm xanthophyll and they are sometimes called forage or top feed. Forages help to guard against feed shortages in animal production. Forages are less affected by seasonal dry conditions because of their more extensive root system and longer life-span.

This study was designed to assess the various forages used by rural farmers in feeding West African Dwarf (WAD) goats across the three senatorial districts of Cross River State, Nigeria.

## MATERIALS AND METHODS

### Study Location

The study was conducted in the three senatorial districts of Cross River State - Northern, Central and southern districts. In each of the senatorial districts, two Local Government Areas were selected from which two villages were randomly picked and used as sample areas with which information regarding the research was sought. Random sampling was done in the selection of the Local Governments and the Villages.

Based on this, the following were selected:

Northern senatorial district:

Local Government Areas selected

(i) Ogoja: Ishibori and Ekajuk villages

(ii) Bekwarra: Ugboro and Arikang villages

Central senatorial district:

Local Government Areas selected

(i) Ikom: Okuni and Adijinkpor villages

(ii) Etung: Efraya and Etomi villages

Southern senatorial district:

(i) Akpabuyo: Ikot Adiaha Eneyo and Abakod villages

(ii) Odukpani: Ifako-Okoyong and Odor Uyi villages

### Data Collection

A total of 300 structured questionnaires were administered to the farmers in the study area. Relevant information was collected through these questionnaires and where difficulties were encountered by the respondents, direct interviews were adopted. The questionnaires were structured to obtain the following information: Animal breed, general management, common forage plants and the availability, usage and mode of presentation of the forage to the animals. Completed questionnaires were collected and analysed through descriptive statistics using percentages.

### Chemical Analysis

Specimens of the forages reported to be used in feeding WAD goats by respondents in the study area were harvested, pressed, labeled, dried and taken to the Botany laboratory, University of Calabar for proper taxonomic identification. Dried samples of the identified forages were taken to the biochemistry laboratory for proximate determinations such as dry matter, crude protein, crude fibre, ash, ether extract and NFE according to AOAC (2000) methods.

## RESULTS AND DISCUSSION

Result of the total number of respondents interviewed (Table 1) shows that 36% of the farmers kept goats, 15% kept sheep, 11% kept pigs while 3% kept cattle and 35% kept different poultry species. On the methods of keeping animals; the data revealed that 59% of farmers kept animals in mixed population while 41% kept in single population and for sole ownership 76% while 24% was on contractile agreement. Table 2 shows the estimated number of farm animal population in a single and mixed herd owned by farmers in the study area. The data revealed that 46% of the farmers kept their animals in a single population. The goat number reported by farmers was contrary to that of Carles (1983), who reported average number of 5 - 7 goats per household. However, the 67 farmers who kept farm animals in a mixed population keep an average of 10.76 goats, 5.1 sheep, 7.49 fowls and 1.22 ducks. This agrees with the flock size population of 1 - 15 and 65 - 70 goats and sheep respectively (Matthewman, 1999).

Table-3 shows forage plants pattern of utilization. The number of forages commonly used by the respondents numbering seven is the smallest. This agrees with the report on type and variety of forages that can be used for feeding small ruminants depending on climatic conditions and the vegetation. For instance, there were 42 different forages available to goats in Indonesia (Dahlanuddin, 2001) and 20 browse species was important for goats in Burkina Faso (Sanon *et al.*, 2007). The respondents reported that the commonly used forages were *Andropogon tectorum*, *Panicum maximum*, *Baphia nitida*, *Alchornea cordifolia*, *Aspilia africana* and *Bambusa vulgaris*. In terms of method of feeding, 14% of respondents fed forages alone, 45% fed forages with other substitute while 41% fed a combination of forages. This agrees with the findings of Leng (1990), that farmers in developing countries generally add fresh green herbage to straw-based diets to animals. Furthermore, on the form in which forages are offered to the animals, 71% reportedly fed the forages fresh, 22% fed dry and 7% offered as wilted forages. The respondents who reported the use of leaves and pods in feeding animals were 72%; five of them reported 5% for the use of pods and 23% of the respondents used forages. The commonly available forages in order of availability reported by the respondents were *Baphia nitida* > *Alchornea cordifolia* > *Bambusa vulgaris* > *Gmelina arborea* > *Aspilia*

*africana* > *Panicum maximum* > *Andropogon tectorum*. However, 81% of the respondents reported that forages occur naturally. This is in line with the reports of Agbede (2006) that naturally occurring forages form the basis for sheep and goats farming in the tropics.

The result of the proximate composition of the commonly used forages by the respondents is presented in Table 4. Values obtained showed no significant ( $P > 0.05$ ) differences between the treatment groups. The values did not show any consistent trend in the study. *Bambusa vulgaris* recorded the highest percentage of crude fibre (41.85%) while *Aspilia africana* (12.80%)

recorded the least. This may have been due to the dry season in which the experiment was conducted. Fibre is important in the diet of farm animals; it acts as energy diluent and boosts intestinal passage of digester. The absence of fibre in diets will lead to incidence of a wide range of diseases including obesity, diabetes mellitus and colon biventricular problem (Oke *et al.*, 2007). The high ash values of the forages except *Andropogon tectorum* may have been an indication of high mineral content of the forages. However, the proximate values so obtained were contrary to those reported by Obua *et al.*, (2012); Philip and Owen (2014).

**Table-1: Scope of farm animal husbandry in different Local Government Areas of Cross River State**

Criterion	Response	No. of respondents	Percentage
Keeping of livestock	Yes	113	38
	No	187	62
	Total	300	100
Type of farm animals kept	Goats	41	36
	Sheep	17	15
	Fowl	24	21
	Duck	16	14
	Cattle	3	3
	Pig	13	11
	Total	113	100
Keeps farm animals in mixed population	Yes	67	59
	No	46	41
Mode of ownership of farm animals	Total	113	100
	Sole ownership	86	76
	Contractual agreement	27	24
	Total	113	100

**Table-2: Estimates of farm animal population in single and mixed herd owned by farm Households in Local Government Areas of Cross River State**

Criterion	Total number of Respondents	Response	Animal population	Average animal population per household	Percentage
Single farm animal population	46	Goats	143	0.35	35
		Sheep	107	2.33	26
		Fowl	138	0.33	34
		Ducks	18	0.39	4.00
		Cattle	0	0.00	0.00
		Pigs	3	0.00	1.00
		Total	409	3.76	100
Mixed Livestock Animal Population	67	Goats	721	0.41	41.00
		Sheep	396	0.22	22
		Fowl	502	0.29	29
		Ducks	82	0.05	5
		Cattle	29	0.02	2
		Pigs	31	0.02	2
	Total	1,761	26.27	100	

**Table-3: Forage plants and pattern of utilization and order of availability**

Response	Frequency	Percentage
Do you feed forage plants to your animals?		
Yes	261	97
No	7	3
Total	268	100
If yes, name forage plants commonly used <i>Gmelina arborea</i> , <i>Alchornea</i> , <i>cordifolia</i> , etc.		
How forage plants are fed animals?		
Fresh	187	71
Dry	60	22
Wilted	20	7
Total	267	100
How forage plants are offered to animals?		
Forage alone	47	14
Forage with other feed substitutes		
	162	45
Combination of forage plants		
	148	41
Total	357	100
Parts of forage used in feeding animals?		
Leaves	83	23
Pods	5	5
Both	161	72
Total	249	100
Are forage plants naturally occurring or planted?		
Naturally occurring	261	87
Planted	29	13
Total	290	100

**Table- 4: Proximate composition of selected forages**

Parameter	<i>Andropogon tectorum</i>	<i>Panicum maximum</i>	<i>Aspilia africana</i>	<i>Gmelina arborea</i>	<i>Alchornea cordifolia</i>	<i>Bambusa vulgaris</i>	SEM
DM (%)	86.52	98.23	98.36	96.75	97.54	96.86	10.17
Crude protein (%)	22.75	2.42	12.51	13.24	7.95	8.29	2.80
Ether extract (%)	5.24	2.86	1.94	2.12	3.45	2.02	0.52
Crude fibre (%)	3.93	2.17	1.28	1.46	1.75	5.84	4.86
Ash (%)	16.38	2.89	1.79	2.32	2.25	2.35	0.48
NFE (%)	41.22	87.89	80.84	77.61	82.14	82.35	6.96
Energy (Kcal/kg)	1735.20	1802.60	1826.20	1778.60	1116.10	1045.00	12.47

SEM: Standard error of mean

## CONCLUSION

Many forages are available for ruminant feeding, but only a few are used by the small holder farmers in Cross River State. Six forages were commonly used in the following order of their availability; *Alchornea cordifolia* > *Bambusa vulgaris* > *Gmelina arborea* > *Aspilia africana* > *Panicum maximum* > *Andropogon tectorum*. Awareness through research can promote these forages that have high nutritive values and also acceptable by goats that have catholic taste to enhance their productivity.

## REFERENCES

1. Adegbola, A. A. (2002). Nutrient intake, digestibility and rumen metabolites in bulls fed rice straw with or without supplements. *Nigerian Journal of Animal Production*, 29(1), 40-46.
2. Agbede, J. O. (2006). Characterisation of the leaf meals, protein concentrates and residues from some tropical leguminous plants. *Journal of the Science of Food and Agriculture*, 86 (9), 1292 – 1297.
3. AOAC (2000). Association of Official Analytical Chemists, Official Methods of Analysis. 17<sup>th</sup> Edn. Washington D. C. Vol. (3), 69-90.
4. Ayuk, A. A., Iyayi, E. A., & Okon, B. I. (2002). Proximate composition and tannin content of some multipurpose tree leaves. *Global Journal of Agricultural Sciences*, 1(2), 77-80.
5. Ayuk, A. A., Kalio, G. A., Agwunobi, L. N., & Okon, B. I. (2012). Agro by product feedstuffs and livestock management for rural livelihood in Cross River State. *Journal of Agricultural Science* 3(2),191-197.
6. Bamikole, M. A., & Babayemi, O. J. (2004). Feeding goats with Guinea grass – verano stylo and Nitrogen fertilizer grass with energy concentrate. *Archivos de Zootecnia* 53(201), 13-24.
7. Barry, T. N., & McNabb, N. T. (1996). Secondary compounds of forages, In: Nutrition of Herbivores, Hadcer, J. B. And Termouth, J. H. (eds.), Sydney, 91 - 120.
8. Carles, A. B. (1983). Sheep Production in the Tropics, Oxford University Press, New York, Pp. 2-13.
9. Dahlanuddin, H. (2001). Forages commonly available to goats under farm conditions on Lombok Island, Indonesia, *Livestock Research for Rural Development*, 13-1.
10. Devendra, C. (1990). Shrubs and tree fodders for farm animals. *Proceedings of the International Development Research Center Workshop*, Denpasar, Indonesia, July, 24-29.
11. Gefu, O.J. (1992). Understanding small ruminant production in Nigeria. *World Review of Animal Production*, 20 (3), 35-38.
12. Jaitner, J., Sowe, J., Secka-Njie, E., & Dempfte, L. (2001). Ownership pattern and management practices of small ruminants in Gambia. Implications for breeding programmes, *Small Ruminant Research* 40, (2), 101-108.
13. Leng, R. A. (1990). Factors affecting the utilization of poor quality forage by ruminants particularly under tropical conditions, *Nutritional Research Review*, (3), 227-303.
14. Makkar, H. P. S. (2000). Quantification of tannins in tree foliage-a laboratory manual; a joint FAO/IAEA working document, Vienna, Australia.
15. Matthewman, R. W. (1999). Survey of small ruminant livestock production at the village level in the Derived Savanna and Lowland Forest zones of Southwest Nigeria, *Study No.24 University of Reading, Department of Agriculture and Horticulture*, 113.
16. Obua, B. E., Okocha, C. N., & Nwocha, L. E. (2012). Proximate composition and anti- nutritional factors of some forage species used in feeding rabbits in Umudike, Humid South Eastern Nigeria. *International Journal of Agriculture and Rural Development*, 15(3), 1275-1286.
17. Oke, D. B., Adeyemi, O. A., Oke, M. O. and Akinpelu, M. I. (2007). Utilization of citrus wastes in broiler diets. *Proceedings of the 32<sup>nd</sup> Annual Conference of Nigerian Society for Animal Production (NSAP)*, held at the University of Calabar, Nigeria, March 18 (21),18 – 21.
18. Peacock, C. (1996). Improving goat production in the Tropics. A manual for development workers. An Oxford farm African Publication. United Kingdom and Ireland,1-20.
19. Philip, C. N., & Owen, O. J. (2014). Evaluation of the chemical and phytochemical constituents of *Alchornea cordifolia* leaf meal as a potential feed for monogastric livestock. *International Journal of Pharmaceutical and Drug Analysis* 2(3), 360-365.
20. Sanon, H. O., Kabotea-Zoungrana, C., & Ledia, I. (2007). Behaviour of goats, sheep and cattle and their selection of browse species on natural pasture in a Sahelian area. *Small Ruminant Research* 67(1): 64-74.
21. Singh, R. (2001). Better understanding of the importance of legumes/fodder trees in the nutrition of small ruminants especially in the dry season. In: *Sustainable Ruminant Livestock Production in Small Pacific Region.2-3*.
22. Strangel, D. J. (1993). Nutrient cycling in sustaining crop livestock system in sub- Sahara; An overview of livestock and sustainable nutrient cycling in mixed farming system of sub-Saharan Africa. Vol. 2 *Technical paper at International Conference of ILCA Addis Ababa, Ethiopia Nov. (22), 38-39*.