

Original Article  
Agricultural Science

# Forage and Fodder Crop Production in Nigeria: Problems and Prospects

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## ABSTRACT [ENGLISH/ANGLAIS]

About 97 percent of Nigeria's ruminant animals are dependent on forage and fodder crops for their productivity. Forage and fodder crops are, therefore, central to the development of Nigeria's livestock industry. This feed resource, which consists mainly of grasses, legumes, browses, and cereal crop residues vary widely and are spread across the major agro-ecological zones of the country. The role of these forage and fodder crops in Nigeria's farming systems is particularly reflected in their contribution to soil fertility and the sustenance of the livestock sub-sector of the nation's economy. About 32.42 million hectares of grazing lands and 39.41 million hectares of crop lands in Nigeria provide substantial amount of feed for the country's livestock, both domestic and wildlife. Unfortunately, extensive areas of the grazing lands are composed of indigenous species, which are of low yield and quality. Hence, there is need to develop or adopt strategies, or technologies that will assist species to cope with and even overcome most of the factors which militate against high productivity. Such technologies, which should take into consideration the various agro-ecological zones in which these forage and fodder crops grow, in order to obtain useful results for dissemination to livestock producers, are discussed.

**Keywords:** Forage, fodder, Nigeria, problems, prospects

## RÉSUMÉ [FRANÇAIS/FRENCH]

Environ 97 pour cent des ruminants du Nigeria sont dépendants sur le fourrage et les cultures fourragères pour leur productivité. Les cultures fourragères et de fourrage sont, par conséquent, au centre du développement de l'industrie du bétail du Nigeria. Cette ressource d'alimentation, qui se compose principalement de graminées, de légumineuses, navigue, et les résidus de récolte des céréales varient considérablement et sont répartis dans les principales zones agro-écologiques du pays. Le rôle de ces cultures fourragères et de fourrage dans les systèmes agricoles du Nigeria est particulièrement reflété dans leur contribution à la fertilité des sols et la subsistance de l'élevage sous-secteur de l'économie de la nation. A propos de 32,42 millions d'hectares de pâturages et de 39,41 millions d'hectares de terres cultivées au Nigeria fournir une quantité importante de nourriture pour le bétail du pays, à la fois domestiques et sauvages. Malheureusement, de vastes zones de l'pâturages sont composées d'espèces indigènes, qui sont de faible rendement et de qualité. Par conséquent, il est nécessaire de développer ou d'adopter des stratégies ou des technologies qui aideront à faire face aux espèces et même à surmonter la plupart des facteurs qui militent contre une productivité élevée. Ces technologies, qui devrait prendre en considération les diverses zones agro-écologiques dans lesquelles ces plantes fourragères et les cultures fourragères croître, en vue d'obtenir des résultats utiles pour la diffusion aux producteurs de bétail, sont discutées.

**Mots-clés:** Fourrage, le fourrage, le Nigeria, problèmes, perspectives

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Accepted/Accepté:  
August, 2011

Full Citation:  
Shiawoya EL,  
Tsado DN. Forage  
and Fodder Crop  
Production in  
Nigeria: Problems  
and Prospects.  
World Journal of  
Life Sciences and  
Medical Research  
2011;1(4):88-93.

## INTRODUCTION

Forage and fodder crops include pasture and range vegetation, as well as crop residues derived from farm crops. Nigeria has a land area of 92.4 million hectares of which about 44% are under permanent pastures, which support its domestic ruminants of over 101 million [Federal Ministry of Agriculture and Water Resources [1]. It is estimated that only about 3% of this number of animals are reared on improved pastures; the remaining 97% are raised on low nutrient native pastures and farmlands [2]. The implication of this is the low output of animals per unit area. This situation is of particular concern,

especially in view of the very low animal protein intake of 10 g per caput per day, as against the Food and Agricultural Organization's recommended 36 g per caput per day [3], in the face of Nigeria's rising human population, currently about 140 million.

This paper, therefore, highlights the forage and fodder potentials of Nigeria's native pastures, the associated problems, and prospects for improvement.

## ROLE OF FORAGE AND FODDER CROPS IN NIGERIA'S FARMING SYSTEMS

Forage and fodder crops (including cereals and pulses) are a major component of today's agriculture. The other

components are livestock and fisheries. Forage and fodder crops are very central in the development of Nigeria's livestock industry. The bulk of the animal protein, especially milk and meat, consumed in Nigeria, derive from ruminant animals, which are dependent mainly on these crops. According to Kallah [4], grazing lands in Nigeria, including natural wetlands (*fadama*), woodlands and forest reserves, are estimated to cover about 32.42 million hectares, while cultivated croplands amount to about 39.41 million hectares. These lands provide substantial amount of forage and fodder, which are of vital importance in Nigeria's drive towards self-sufficiency in agricultural production, since they provide major source of feed, especially for the country's ruminant livestock, both domestic and wildlife.

Browse plants which are found across the zones and which make major contribution to livestock feed resources, particularly in the drier northern zones of the country, are also given in Table 2.

In spite of the infertile soils and hostile climatic environment, ruminant livestock survival in Nigeria has depended largely on the extensive native pastures, browses and farm crop residues across and within the various agro-ecological zones. These animals provide power, transport and most of the meat for human consumption, as well as the various valuable by-products such as bones, blood and hides and skins for the nation's industrial growth. In addition, they play a significant role in maintaining soil fertility through their dung or droppings and urine on the pasture land. They also help to build up soil fertility by protecting the land against rain, wind erosion, contributing towards the maintenance of soil humus, soil structure and soil moisture.

### Geographical Distribution and Major Characteristics

Nigeria's forage and fodder species vary widely and spread across the major agro-ecological zones of the country as shown in Figure 1.

## MAJOR PROBLEMS FACING FORAGE AND FODDER CROP PRODUCTION IN NIGERIA

### Low quality forage and fodder crop species

Extensive areas of Nigeria's grazing lands are composed of indigenous forage species with their various botanical characteristics. Most of the species grown, until of recent, are of the indigenous or local varieties that often have very low yields. Long periods of cropping, rough

topography and frequent bush burning, among other factors, have given rise to mixed tree, shrub and grass vegetation in the savanna zones of the country. The grasses are composed of both annuals and perennials, and the trees show features characteristic of plants growing in low rainfall areas. Various nutrients and minerals, such as nitrogen, phosphorus, potassium, among others, have also been found to be a key limiting factor in the proper development of our forage and fodder crops, and hence efficient utilization of these crops by our livestock. The importance of various soil minerals in the establishment, growth and utilization of forage species have been documented by a number of workers [5, 6].

### Inadequate input supply

In many developing tropical countries, Nigeria inclusive, inadequate forage seed supply has been a serious impediment to pasture development. Where such seeds are available they have been of poor quality, while the good quality seeds have been difficult to obtain due to high cost. Similarly, the use of fertilizer to improve the productivity of unimproved local forage species has been nearly impossible owing to high cost of the commodity.

### Poor land preparation

Improper land clearing and seedbed preparation have been a limiting factor in good forage growth and establishment, as this tends to suffer from weed invasion in particular. According to Humphreys [6], greater number of livestock can always be supported per unit area by the elimination of competition from weeds, shrubs, trees and such other obstacles.

### Human Activities

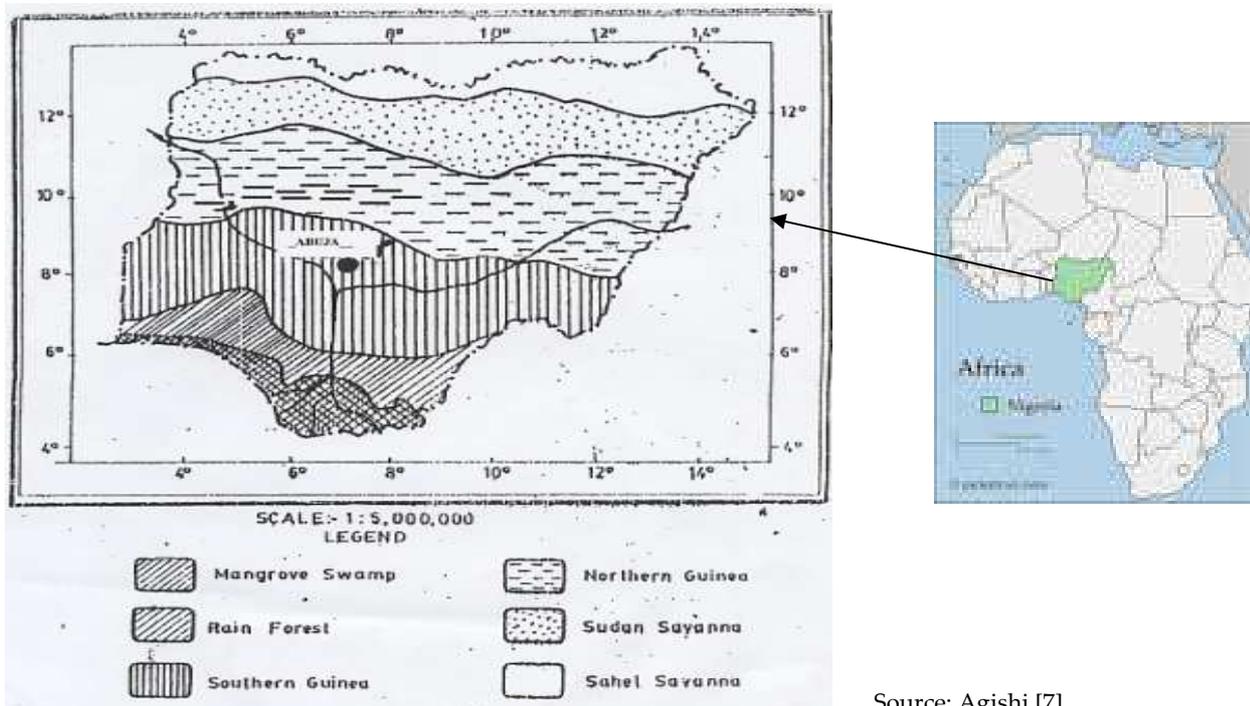
Farming, construction, industrial activities, etc. have resulted in shrinkage of natural forage land for livestock grazing. Other human activities, such as land excavations, giving rise to burrow pits and mining sites, have led to serious land degradation further reducing available land for forage production.

### Inadequate forage and fodder scientists

Inadequate number of forage scientists to conduct necessary research in the various aspects of forage and fodder crops has slowed down development in this area. Most indigenous forage and fodder species are low in yield and nutritive value [3].

**FIGURE 1**

Figure 1 shows the Major Agro-Ecological Zones of Nigeria



Source: Agishi [7]

**TABLE 1**

Table 1 shows the major agro-ecological zones against some important forage species and their yield potential

Agro-ecological zone	Annual precipitation (mm)	Some Important Forage Species		Yield potential (kg DM/ha)
		Botanical Name	Common Name	
Sahel savanna	450-650 (Droughts are frequent)	<i>Andropogon gayanus</i> (Kunth)	Gamba grass	500-3000
		<i>Cenchrus biflorus</i> (Roxb)	Karangiya (Hausa)	
		<i>Cenchrus Ciliaris</i> (Linn)	Buffel grass	
		<i>Pennisetum pedicellatum</i> (Trinn)	Kyasuwa (Hausa)	
Sudan savanna	650-1000 (Occasional droughts)	<i>Cymbopogon giganteus</i>	-	2000-80000
		<i>Digitaria decumbens</i>	Pangola grass	
		<i>Digitaria smutsii</i>	Wolly finger grass	
		<i>Hyparrhenia spp.</i> (Nees) Stapf	Thatching grass	
Northern Guinea Savanna	1000-1300 (Droughts may occur occasionally)	<i>Brachiaria brizantha</i>	-	5000-15,000
		<i>Echinochloa colonum</i> (L.) Link.	Jungle rice	
		<i>Pennisetum polystachion</i> (Linn.) Schult	Feathery pennisetum	
		<i>Setaria sphacellata</i>	Golden blue grass	
Southern Guinea Savanna	1,200-1500 (Rainfall usually occurs in a bimodal Pattern)	<i>Andropogonn tectorum</i> Schum. & Thon	Giant bluestem	Above 10,000
		<i>Cymbopogon giganteus</i> Chiou	-	
		<i>Megastachya mucronata</i>	-	
		<i>Panicum phragmatoides</i>	-	
Rain forest and Mangrove swamp	Well over 1,500mm (in a bi-modal pattern)	Mostly perennial grasses which grow in bi-modal pattern under the forest canopy and along the water courses. Such include:		
		<i>Panicum maximum</i> Jacq	Guinea grass	
		<i>Pennisetum purpureum</i> Schumach	Elephant grass	

Source: Kallah [4]

TABLE 2

Table 2 shows important browse plants common across the agro-ecological zones

Botanical Name	Common Name
<i>Acacia albida</i> Del	Ana tree
<i>Acacia nilotica</i> (L.) Willd ex Del.	Bagaruwa (Hausa)
<i>Acacia polyacantha</i> Willd	African catechu tree
<i>Acacia Senegal</i> (L.) Willd	Gum arabic
<i>Acacia seyal</i> Del	Shitting wood
<i>Acacia sieberiana</i> DC	Paper-back thorn
<i>Azalia Africana</i> Pers	"Kawo" (Hausa)
<i>Azadirachta indica</i> A. Juss	Neem
<i>Baucherua rufescens</i> Lam	Tsatsagi (Hausa)
<i>Butyrospermum paradoxum</i> (Gaertn. f.) Hepper	Shea butter tree
<i>Cajanus cajan</i> (L.) Millsp	Pigeon pea.
<i>Daniellia oliveri</i> (Rolfe) Hutch & Dalz	Copaiba
<i>Desmodium gigantum</i> (L.) DC	-
<i>Dichrostachys cinerea</i> (L.) Wight & Arn	Sickle bush
<i>Erythrina senegalensis</i>	Coral flower
<i>Gliricidia sepium</i>	Almond blossom
<i>Gmelina arborea</i>	Gmelina
<i>Hibiscus rosa-sinensis</i>	Chinese hibiscus
<i>Leucaena leucocephala</i>	Leucaena
<i>Papilionaceae</i>	Legume

Source: Agishi [8]; Ghazanfar [9]; Kallah [4]; Shiawoya [10]

## Technologies to Enhance Forage and Fodder Crop Production

### General Observation

No one individual species of forage and fodder crops can be expected to withstand the various impacting environmental factors of soil mineral deficiencies, bush burning, low rainfall, frequent droughts, overgrazing, and such like factors. Nonetheless, through careful selection and well designed experiments, species can be developed to cope with some of the adverse situations, such as mentioned above, that militate against the provision of nutritious forage and fodder crops for livestock. Hence, for the various agro-ecological zones indicated, investigations through field trials can establish the various types of improved forage and fodder species that are most suited to these zones and best developed for livestock production. To be considered along with the identification of these new species should be the best methods (by seeds or cuttings) of introduction, growing and managing the improved species. In addition, a farming system which integrates forage and fodder crops

into livestock production provides great opportunities for increased yields from both components.

### Specific Recommendations

- Encouraging the **establishment of grass-legume mixtures** for maintaining permanent pastures for maximum utilization by livestock. In this respect, some important herbaceous legumes given in Table 3 have been recommended for the agro-ecological zones [11]. However, there is still need for continuous assessment and selection of both exotic and indigenous species through field trials.
- Greater use of **improved pasture forage species**, such as *Brachiaria brizantha* and *Andropogon gayanus*, which have proven to be more drought tolerant in the Sudano-Sahelian zone, as well as establishment of fodder banks, should be encouraged.
- Similary, **browse plants**, such as *Acacia albida* ("Bagaruwa"), *Dichrostachys cinerea* ("Dundu"), *Leucaena leucocephala* (Leucaena), *Gmelina arborea* (Gmelina), *Tamarindus indica* (Tamarind), *Gliricidia sepium* (Gliricidia), *Acacia nilotica* (Bagaruwa), *Sesbania grandiflora*, *Ficus* spp., etc. occur principally in the drier northern zones of the country [12]. These plants are relatively stable in their nutritive value throughout the year and, therefore, make important contribution to the quality of feed utilized by our ruminants [13].
- Crop residues** are very much relished as feed by livestock. These include sorghum, maize, rice and millet stovers and straws. Others are groundnut, cowpea and cotton haulms. The legume residues, which are particularly high in crude protein content (about 12 to 20 %, with digestibility of about 69 to 80 %) are more readily available during the dry season, when the nutritive value of the other forages are on the decline [14, 15]. Improving the present state of our native forages will require a combination of strategies of which the proper use of these residues is one.
- Agro-industrial by-products**, resulting from the agricultural processing industries, are often utilised as supplementary feeds to enhance the performance of animals. It is a well known fact that livestock suffer, especially during the dry season, not only from inadequate feed supply, but also from the poor quality of available feed. Most of the grazing areas in the sub-humid and dry savannas of the country produce only about one tonne of dry matter per

hectare [16] and crude protein of 8 – 9 % by the end of the dry to early wet season [12, 17]. The feeding of these by-products, which are mainly groundnut, cotton seed, and soyabean cakes, maize and sorghum offals, brewer's dried grains, and molasses, etc, provide rich sources of protein and energy (with protein content being as high as 41 % in some of the cakes) to the animals [5]. These supplements have enhanced animal performance especially with respect to weight gains, improved disease resistance and improved reproductive performance.

- f. The **establishment and development of more grazing reserves** should be intensified. The settlement of the nation's pastoralists, possibly in these reserves, should be given some impetus in order to enhance accelerated development of Nigeria's livestock industry. To encourage settlement, the provision of adequate supplementary feeds, water, veterinary clinics, markets for disposal of livestock and livestock products, health care facilities, etc should be made a deliberate government policy and sustained by honest zeal. The settlement of the pastoralists would enhance the introduction of improved grazing management practices such as rotational grazing through paddocking, and delivery of other necessary livestock production inputs. Ultimately, the pastoralists must be assisted to own land for their own development.
- g. **Forage and fodder conservation** in the form of hay and silage, in particular, should be introduced and encouraged among livestock producers of all categories, in order to extend feed supplies for improved animal performance.
- h. **Other management measures** that could be taken to improve sown pastures and crop lands, in particular, include liberal application of fertilizer, routine pest and weed control, and controlled bush burning. The use of irrigation facilities, wherever available, should also be encouraged in the establishment and production of forage and fodder crops in order to increase feed resources for our livestock.
- i. The **need to seriously revamp the institutional frameworks** that relate to the problem of forage and fodder crop improvement in Nigeria is urgent. One such important framework is the inadequate extension services, resulting from inadequate manpower / subject matter specialists in the area of forage and fodder crops production. Training institutions, for intermediate manpower in agriculture, must intensify their efforts in providing adequate manpower in forage and fodder crops production and management.
- j. **More result-oriented research in the area of forage and fodder crops production** should be intensified by the livestock research institutes and universities. In this respect, governments should provide more resources for the establishment of field stations for research into forage and fodder crop species appropriate to the various agro-ecological zones of the country.
- k. **The use of biotechnology** to improve forage and fodder crop species should also be given serious consideration, with a view to providing adequate feed resources (a very limiting factor) in our quest for accelerated livestock development.

## CONCLUSION

Forage and fodder crops production is a very important component of Nigeria's farming systems, not only from the perspective of cereal and pulses production for human consumption, but also from the perspective of providing adequate feed for the livestock sub-sector of the economy. Improvement is however needed in the production of these crops in order to meet the increasing demands of a growing population. These demands can hardly be met without developing or adopting technologies that will enhance the yield and quality of the various forage and fodder crop species existing in the major agro-ecological zones of the country.

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**ACKNOWLEDGEMENT / SOURCE(S) OF SUPPORT**

Nil

**CONFLICT OF INTEREST**

No conflict of interest was declared by authors

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