



FORAGE SPECIES USED BY LIVESTOCK IN THE KUMBUNGU DISTRICT OF THE NORTHERN REGION, GHANA.

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Abstract

*Livestock production in the Northern Region is a major activity in the livelihoods of the population and contributes greatly to income generation in the region. The annual growth rate of free ranging ruminants is limited by forage quality and quantity especially during the dry season. This study was carried out to identify the grass/forbs and browse species used to feed livestock, rank the identified grasses/forbs and browse species in order of preference by livestock and to identify the parts of the browse mostly eaten by the animals. Ten communities were randomly selected from the study area for the research. Personal observation and questionnaire administration were employed to collect the data. In all, one hundred respondents were interviewed. Twenty-seven (27) grasses/forbs and thirty-two (32) browse species were identified. *Setaria pallide fusca* was the most preferred grass species while *Securinega virosa* was the most preferred browse species by the livestock in the study area. The study also revealed that livestock farmers currently travel longer distances (over 4km) to harvest these species. The large number of forage species being used indicate that the study area is rich in grasses/forbs and browse species. However, there is a threat to these species due to annual bush fires. Therefore, livestock farmers should incorporate forage cultivation into their annual crop farming systems to supplement the feeding of their animals.*

Keywords: Forage, Livestock production, Livestock farmers, Guinea Savannah, Meat supply

Introduction

The total land mass of Ghana is guinea savannah. This savannah vegetation is a grassland ecosystem characterized by small trees or widely spaced trees whose canopy do not close (Cook, 1972). The Northern and Coastal savannah constitute the major livestock production areas in Ghana. These areas are characterized by a dry season of about 4-5 months every year when there is a drastic decline in both quality and quantity of forages (Otchere *et al.*, 2002). According to Komwihangilo *et al.* (1995), trees and shrubs are of value in agriculture as they have been used to feed as well as to meet the health needs of animals.

Winrock International (1992) reported that livestock production contributes up to 35% to the agricultural Gross Domestic Product (GDP) of sub-saharan Africa. The livestock population in this zone is estimated to be 176.8 million sheep, 210.5 million goats and 216.6 million cattle (FAO, 2006).

The benefits of livestock production in the Northern region and Ghana as a whole cannot be over emphasized. It contributes immensely to food security through direct production of food and non-food functions (Sanon, 1999). It is also a major activity in the livelihoods of the population and contributes greatly to income generation in the region. Livestock production is an important feature of Ghana's agriculture and constitutes a major

national resource. Livestock contributes 7-9% of the National Agricultural GDP and provides 30% of domestic meat supply (Awuni, 2003). Livestock is an important source of food and income for millions of people. For many, animals are a source of income, food, clothing and labour. For example in Northern Region of Ghana, livestock serve as a buffer against food shortages, provide cash security and play an important role in the socio-cultural activities of the people (Awuni, 2003). Northern Ghana is said to carry about 75% and 45% of the national herds of cattle and small ruminants respectively (Koney, 1992).

The Government of Ghana through the Ministry of Food and Agriculture has designed a livestock production development project especially in Northern Ghana for the supply of improved breeds of animals to rural communities as a way of alleviating poverty in the region. Despite the numerous benefits gained from livestock production in the region, scarcity of animal feed at certain times of the year seems to adversely affect the continuous supply of these benefits. The annual growth rate of free ranging ruminants is limited by forage quality and quantity especially during the dry season (Hofmann, 1989). The use of grass, forbs and browse as supplementary feed is therefore seen as a solution to a major problem of livestock production in the region.

Studies have been carried out by Asante *et al.* (2002) on the identification of browse species. However, little knowledge or information exist regarding the indigenous grasses/forbs and browse species used by livestock in the study area. As a result, this research is aimed at taking an inventory on the grass/forbs and browse species used by livestock in the Kumbungu District, rank the identified grass/forbs and browse species in order of preference by the animals and identify the parts of the plant species mostly eaten by the animals in the study area.

Materials and methods

Study area

This study was conducted in the Kumbungu District. The district shares boundaries with the Mampurugu-Mogduri District to the North, Tolon District to the West, Savelugu Municipal to the East and the Sagnarigu District to the South.

The indigenous people of the study area are mostly Dagombas who constitute about 80% of the district population. Agriculture is the major activity of the inhabitants as they rear animals alongside crop production. Most of the farmers are subsistence in nature and they cultivate to feed their families. Ruminants and non-ruminants including cattle, sheep, goats, pigs and poultry are the animals reared in the area.

The area experiences a single rainfall season which starts from May and ends in October with the heaviest rains occurring in August. Daily temperatures are generally high except in the harmattan season (November to February) when temperatures can get very low, especially during the night. Relative humidity is high during the rainy season but may fall to a very low level during the dry season.

The land is generally undulating with a number of scattered depressions. The soils of the area are generally of the sandy-loam type except in the lowlands where alluvial deposits are found. The vegetation cover is basically the Guinea Savanna grassland with the grass interspersed with short drought resistant trees. Major economic tree species include the sheanut (*Vitellaria paradoxa*), dawadawa (*Parkia biglobosa*) and mango (*Mangifera indica*).

Data collection

Questionnaire administration and personal observation were the two forms of data collection methods employed. Ten communities were randomly selected from the study area. Five houses were randomly selected from each community and the questionnaires were administered to the livestock farmers in these houses. Two livestock farmers in each house were selected as respondents. Observation involved watching what the animals were feeding on. The activity was done within three weeks. Animals were followed every morning at around 10am with one of the members in the community to see what the animals were feeding on. The remains of the plants fed on were collected and taken for identification. On the field, the plants collected were identified in the local language (Dagbani) and subsequently identified with the field guide for their botanical names. This activity was

done to establish the relationship between the plants fed to the animals by the farmers and what actually the animals themselves fed on during grazing.

Statistical data analysis

Results

Basic information about respondents

A total of hundred (100) respondents (livestock farmers) were interviewed in the course of the study . Out of the 100 respondents, 89% were males and

The Statistical Package for Social Sciences (SPSS) software was used for the data analysis. Frequencies and percentages were computed from the data gathered and the results presented in charts and tables.

11% were females. The study further revealed that majority (56%) of the respondents were between 25-30 years of age as illustrated in figure 1 below .

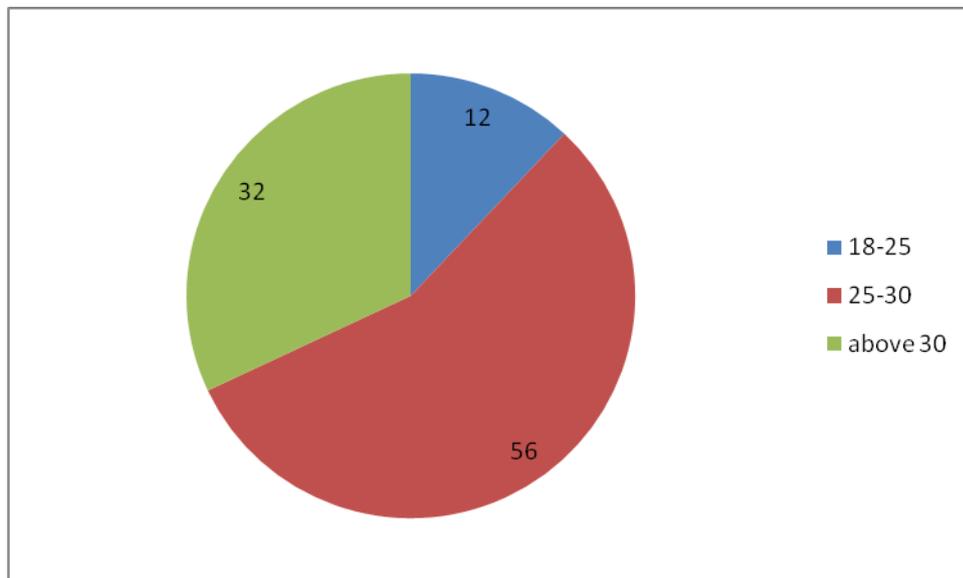


Figure 1 Age distribution of respondents (%)

Categories of livestock and years of engagement by respondents

Respondents were asked the category of livestock they keep and the result showed that cattle, sheep and goats are the kind of livestock mostly kept by the respondents. Also 94% of the respondents were engaged in livestock rearing for more than 4years while the remaining 6% have been engaged in livestock rearing for less than 4years.

Types and parts of plants fed to animals

All the respondents indicated that they feed their animals with grasses, forbs and browse species. Figure 2 below gives the percentages of the various parts of the plants fed to the animals by the respondents.

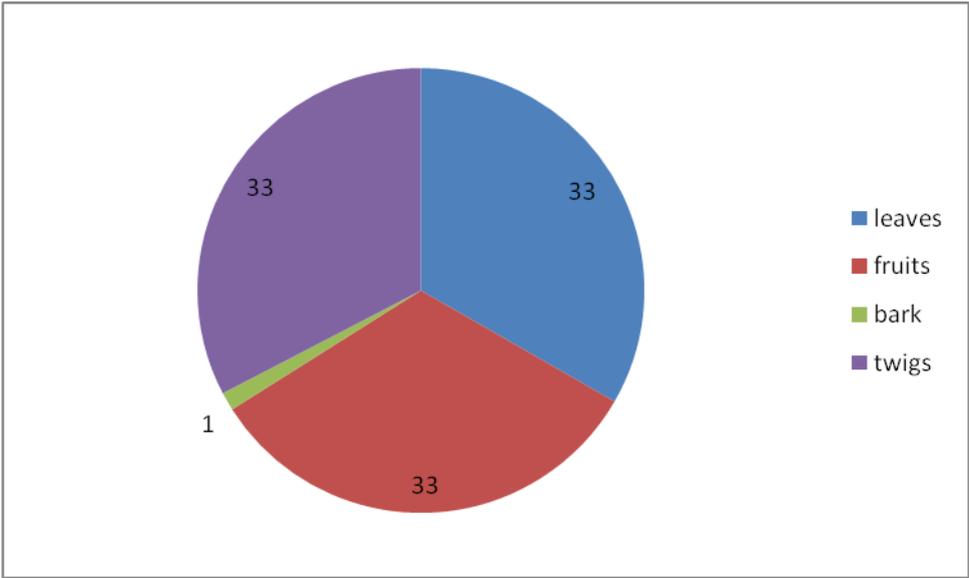


Figure 2 Parts of plants fed to livestock

Distances covered by respondents and availability of forage species

The results revealed that forage species were readily available within short distances

(about 1-2km) ten years ago. However, during the research period forage species could be available at longer distances (above 4km). Figures 3 and 4 below illustrate the distances traveled by respondents to harvest forage species to feed livestock ten years ago and at the time of the research respectively.

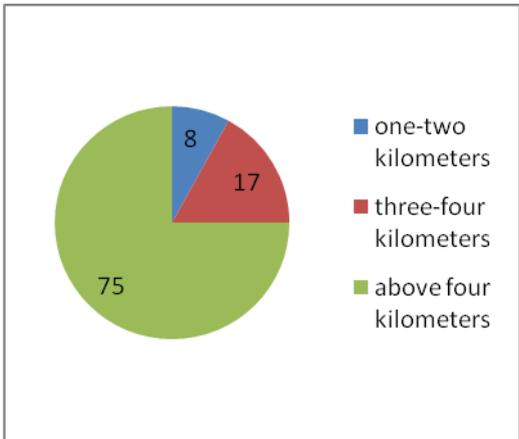
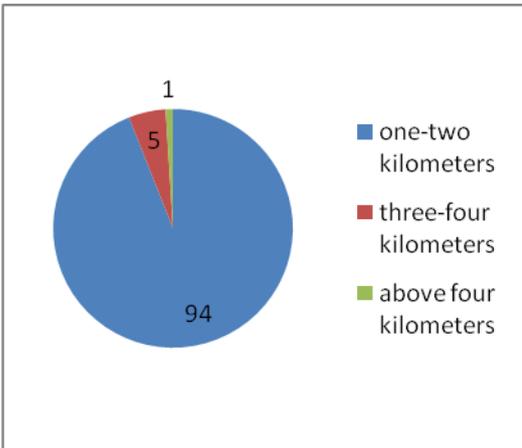


Figure 3: Distance covered by livestock farmers to harvest forage 10 years ago

Figure 4: Distance covered by livestock farmers to harvest forage during the time of the research

Efforts to ensure Availability and sustainability of forage species by livestock farmers

The study revealed that majority (97%) of the respondents do not incorporate the cultivation of the

grass, forb and browse species into their cropping activities. Figure 5 below represents the practices indicated by the livestock farmers to ensure the availability and sustainability of forage species.

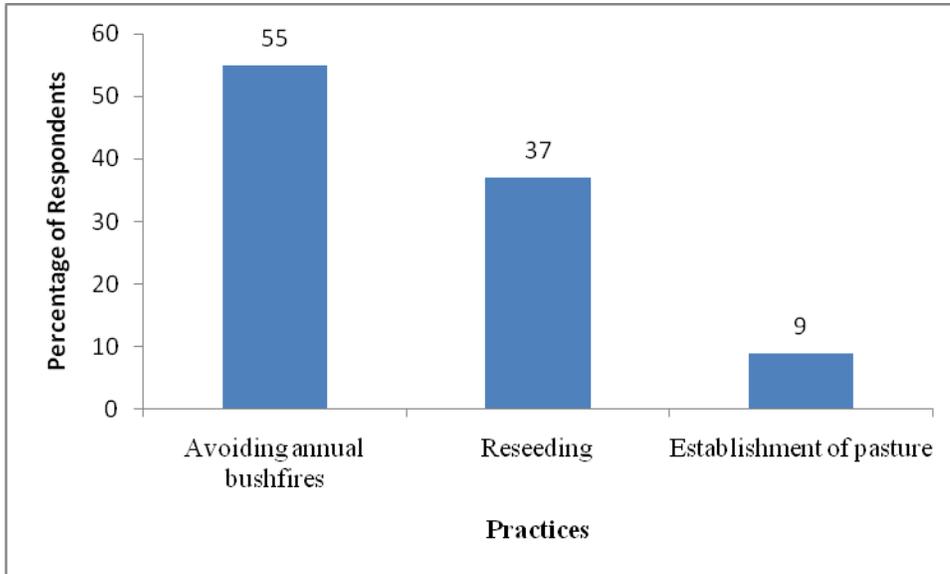


Figure 5: Practices to ensure the availability and sustainability of forage species

Grass and forb species used by farmers in feeding their animals

A total of twenty seven (27) grass and forb species were identified as being used and preferred by

livestock in the study area. Table 1 indicates the grass and forb species identified

Table1: Grass and forb species used by livestock farmers

Local Name (Dagbani)	Common Names	Scientific names	Family
Alepele bindi	Tridax	<i>Tridax procumbens</i>	Asteraceae
Banglari	Tephrosia	<i>Tephrosia purpurea</i>	Fabaceae
Bulasam	Broom weed	<i>Sida acuta</i>	Malvaceae
Chima	Nigeria grass	<i>Pennisetum pedicellatum</i>	Poaceae/gramineae
Daziemam	Thatch grass	<i>Andropogon pseudapricus</i>	Poaceae/gramineae
Dabolari		-	-
Gozie	Spiny amaranth	<i>Amarantus spinosus</i>	Fabaceae
Fulunfugu	Commelina	<i>Commelina sp</i>	Commelinaceae
Jankuno nyuli	Pig weed	<i>Boerhavia diffusa</i>	Nyctaginaceae

Kagli	Elephant grass	<i>Pennisetum purpureum</i>	Poaceae/gramineae
Kpinkpangong	Kodo millet	<i>Paspalum scrobiculatum</i>	Poaceae/gramineae
Kpanvogu		<i>Isobertinia tomentosa</i>	Fabaceae
Kulkara	Black vetiver grass	<i>Vetiveria nigritana</i>	Poaceae/gramineae
Kundung piem	Guinea grass	<i>Panicum maximum</i>	Poaceae/gramineae
Mopilimogu		<i>Cymbopogon giganteus</i>	Poaceae/gramineae
Pirima	Gamba grass	<i>Andropogon gayanus</i>	Poaceae/gramineae
Pirinkpang	Speargrass	<i>Imperata cylindrica</i>	Poaceae/gramineae
Saa	Giant rat's tail grass	<i>Sporobolus pyramidalis</i>	Poaceae/gramineae
Tantee		<i>Ellinsia guinensis</i>	Poaceae/gramineae
Gbirigu	Velvet bushwillow	<i>Combretum molle</i>	Combretaceae
Worisima		<i>Zornia glochidiata</i>	Fabaceae/leguminoceae
Yihim	Cattail grass	<i>Setaria pallide-fusca</i>	Poaceae/gramineae
Yinyang	Itch grass	<i>Rottboellia cochinchinensis</i>	Poaceae/gramineae
Biyolisima	Alyce clover	<i>Allysicarpus ovalifolius</i>	Fabaceae/leguminoceae
Zalinzaa		<i>Indigofera sp</i>	Fabaceae/leguminoceae
Nansagtikpira	Sedge	<i>Cyperus rotundus</i>	Cyperaceae
Mamongma kpm	Stylo	<i>Stylosanthes mucronata</i>	Fabaceae/leguminoceae

Browse species used by livestock farmers

The research revealed thirty two (32) browse species are being used and are preferred by

livestock in the study area. The identified browse species and their parts eaten by the animals are presented in table 2 below.

Table 2: Browse species used by livestock farmers.

Local Name (Dagbani)	Common Name	Scientific name	Family Name	Parts of Plant Eaten
Albizia	Albizia	<i>Albizia lebeck</i>	Leguminosae/fabaceae	Leaves
Bulumbuğu	African custard-apple	<i>Annona senegalensis</i>	Annonaceae	Leaves, twigs and fruits
Busapirigu		<i>Feretia apodanthera</i>	Rubiaceae	Leaves
Gampiriga	Gutta percha tree	<i>Ficus platyphalla</i>	Moraceae	Leaves and twigs
Gingagoo	Green monkey orange	<i>Strychos spinosa</i>	Loganiaceae	Leaves
Gung	Kapok	<i>Ceiba pentandra</i>	Bombacaceae	Leaves
Kambang		<i>Hanoa undulate</i>	Simarubaceae	Leaves

Kpagla	Sweet detar	<i>Detarium microcarpum</i>	Leguminosae/fabaceae	Leaves
Kugu	Mahogany	<i>Khaya senegalensis</i>	Meliaceae	Leaves
Korli		<i>Terminalia avicennioides</i>	Combretaceae	Leaves
Leauceana	Leaucaena	<i>Leaucaena lecocephala</i>	Leguminosae/fabaceae	Leaves, twigs and fruits
Moongu	Mango	<i>Mangifera indica</i>	Anacardiaceae	Leaves and fruits
Nagnyoontia		<i>Entada Africana</i>	Leguminosae/fabaceae	Leaves
Palga		<i>Boswellia dalzellii</i>	Burseraceae	Leaves
Pulunpung		<i>Sterculia setigera</i>	Sterculiaceae	Leaves
Shiia	Anogeissus	<i>Anogeissus leiocarpus</i>	Combretaceae	Leaves
Susugra	Common bush weed	<i>Securinega virosa</i>	Phyllanthaceae/Euphorbiaceae	Leaves and twigs
Taanga	Shea	<i>Vitallaria paradoxa</i>	Sapotaceae	Leaves and fruits
Tua	Baobab	<i>Adansonia digitata</i>	Bombacaceae	Leaves
Nei	African rosewood	<i>Pterocarpus erinaceus</i>	Leguminosae/Fabaceae	Leaves
Vabga	Silk cotton tree	<i>Bombax buonopozense</i>	Bombacaceae	Leaves
Yolga		<i>Grewia mollis</i>	Tillaceae/sparmanniaceae	Leaves
Kinkang	Ficus	<i>Ficus gnaphalacarpa</i>	Moraceae	Leaves
Zugubetia		<i>Stereospermum kunthianum</i>	Bignoniaceae	Leaves
Kpalga	Afzelia	<i>Afzelia africana</i>	Leguminosae/fabaceae	Leaves
Buduni	wild mustard	<i>Cleome viscosa</i>	Sterculiaceae	Leaves
Shegu	False abura	<i>Mitragyna inermis</i>	Rubiaceae	Leaves
Sinsabga		<i>Lannea acida</i>	Combretaceae	Leaves
Nansang	Tiger nut	<i>Cyperus esculentus</i>	Cyperaceae	Leaves
Zungulkukua	Common jujube	<i>Ziziphus mauritiana</i>	Rhamnaceae	Leaves
Zaankunga	Ficus	<i>Ficus sp</i>	Moraceae	Leaves
Moringa	Moringa	<i>Moringa oleifera</i>	Moringaceae	Leaves and twigs

Top 10: Grass/forb species frequently fed to livestock by farmers

Figure 6 below illustrates the top ten grass/forb species frequently used to feed livestock by farmers.

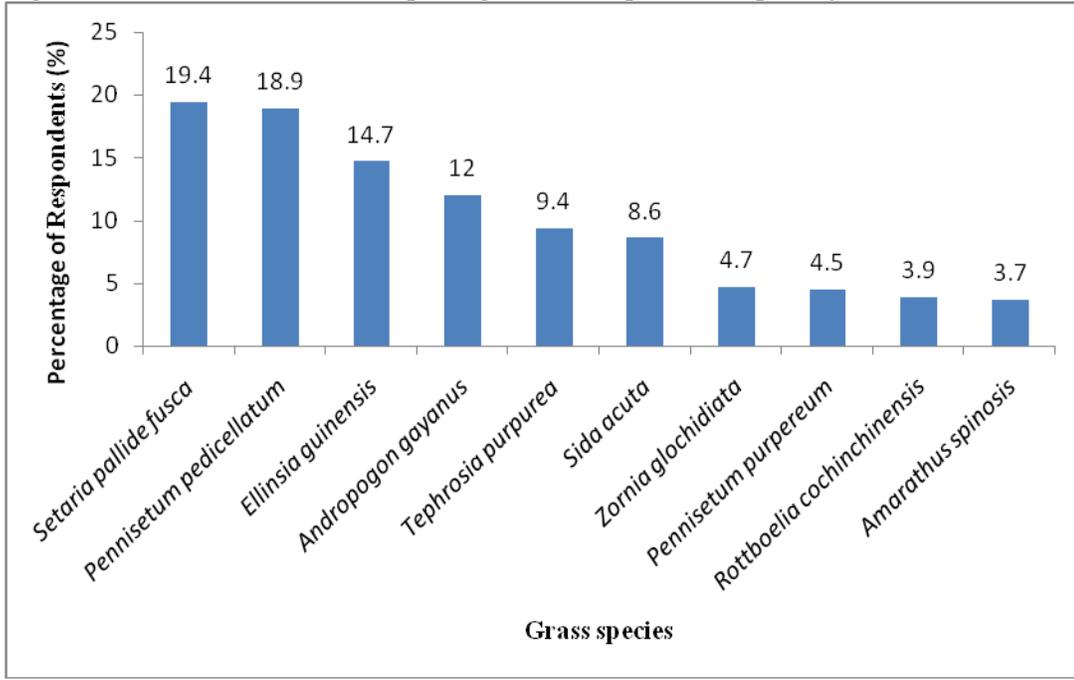


Figure 6: Top ten (10) grass/forb species frequently used by farmers to feed their livestock

Top ten grass/forbs species preferred by livestock

to the preference of the animals. Figure 7 below shows the top ten grass/forb species preferred by the animals.

The twenty-seven (27) species of grasses/forbs identified were ranked by the respondents according

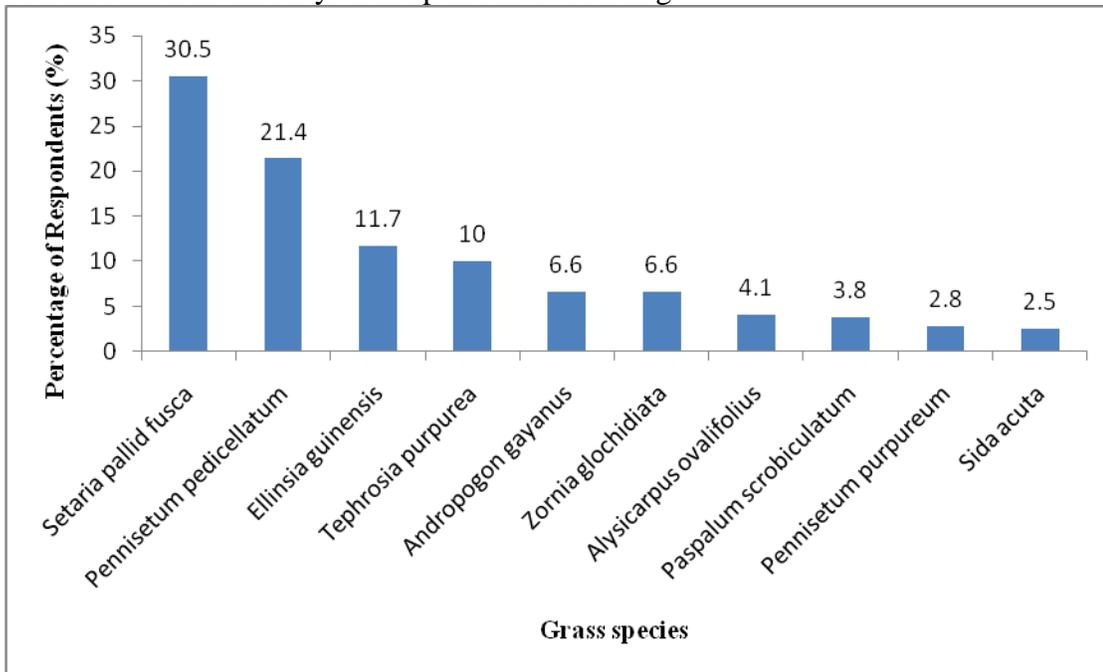


Figure 7: Top ten (10) grass/forb species preferred by livestock in the study area

Top 10 browse species frequently fed to livestock by the farmers

Figure 8 below shows the top ten browse species frequently used by the livestock farmers to feed their animals.

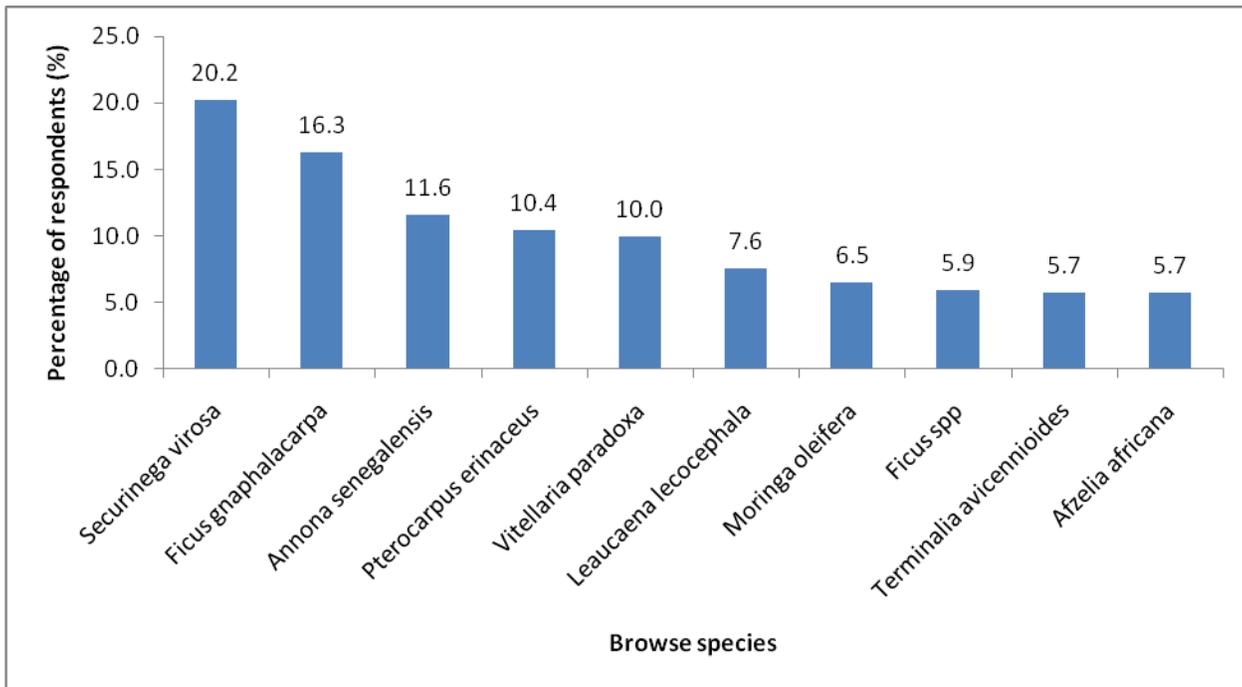


Figure 8: Top ten (10) browse species frequently used by farmers to feed their livestock

Top 10 browse species preferred by livestock in the study area

Figure 9 below indicates the top ten (10) browse species preferred by livestock.

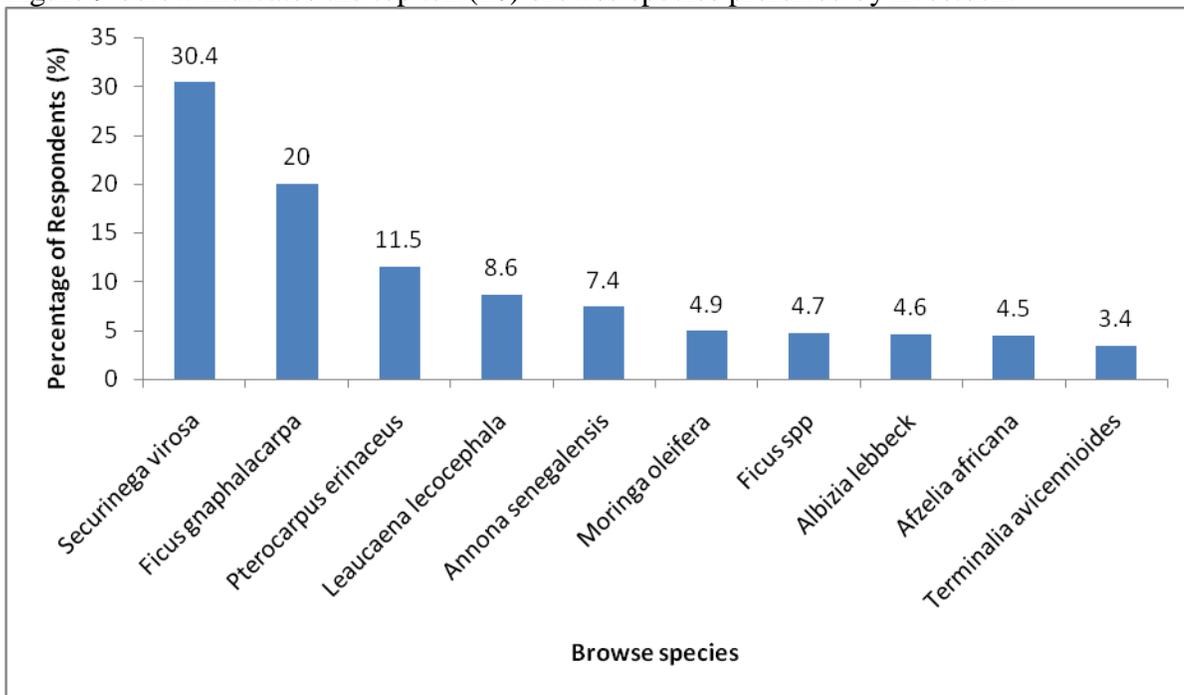


Figure 9: Top ten (10) browse species preferred by livestock in the study area.

Discussion

Categories of livestock reared and years of engagement by respondents.

All the respondents were mainly engaged in cattle, sheep and goat rearing. These animals are mainly kept in the study area because they provide alternative sources of income for them in case of crop failure. Since majority of the respondents (94%) have been involved in the rearing of animals for more than four years, it could mean that they know much about the forage species that are mostly preferred by livestock.

Types and parts of browse species fed to livestock by respondents

Apart from other feed (grains) given to livestock as food, it was revealed from the study that farmers feed their livestock heavily on grasses, forbs and browse species from nearby rangelands through the system of “cut and carry”. This is due to the fact that, rangelands in the study area provide animals with high quality forage and nutrients (Knapp *et al.*, 2002). The research also revealed that, browse parts such as leaves, twigs, barks and fruits are fed to animals. The leaves, twigs and fruits are mostly used as they are essential for nutrients needed by livestock for their growth and development. These, according to the respondents, are usually given to animals where grass/forbs species are scarce (Atta-Krah, 1989 ; Le Houerou, 1978).

Distances covered by livestock farmers to harvest forages

Majority of the respondents revealed from the study that, forage species were highly available and abundant within short distances (1-2 kilometers) ten years ago. However, forage species presently are readily abundant at longer distances (above 4km). This gives an indication that the trend of forage availability and abundance is gradually reducing with respect to distances. Hence, the longer distances one has to travel for forages that used to be readily available and in abundance within short distances. This could be due to higher population growth, demand for land for infrastructural development and crop cultivation and overexploitation of forage species by farmers.

Efforts to ensure availability and sustainability of forage species by livestock farmers

In ensuring availability and sustainability of forage species, majority of the livestock farmers recommended that avoiding the annual bushfires will be very helpful. Indiscriminate burning of bushes during the dry season is a major problem to livestock farmers in northern Ghana. Early burning or controlled burning could help ensure the availability of forage species as compared to late and indiscriminate burning. The farmers also recommended reseeding of some forage crops by incorporating them into their cropping activities or already growing forage areas. Establishment of communals or individual ranches is also another option recommended by the farmers to ensure availability and sustainability of the forage species. According to Ditsch & Bitzer (2005), interest in inter-seeding small grains into established pastures to extend the fall and spring grazing seasons has increased in the USA. This practice has proven to be quite successful in the southern U.S.A where inter-seeding small grains into warm season perennial forage crops like bermuda grass and bahia grass can provide an additional 60 to 90 days of high quality forage grazing”.

Grass, forb and browse species used by farmers in feeding livestock

It was indicated from the study that grass species are largely used during the rainy season and browse species are used during the dry season Malechek (1981) reported that when grasses are plentiful, goats do not graze all the parts of shrubs but select some parts with more nutritional value and also prefer a combined diet. However, browse species are used mostly when grasses are low in quality and quantity and mostly during the dry season (Saleem *et al.*,1979). According to Saleem *et al.*(1979), browse species are generally richer in protein and mineral than tropical grasses especially during the dry season. Le Houerou (1980) also stated that browse species contain double the amount of energy than grasses/forbs during the dry season.

The study also revealed that forage species used as feed to fed livestock was more abundant in the rainy season as compared to the dry season. This agrees with the findings of Otchere *et al.* (2002) that animals normally put on weight during the rainy season because, during the dry season, they only have straw from grass which are poor in quality and may result in avitaminoses, mineral deficiency and severe debilitation.

Forage species preferred by and fed to livestock

From the study, *Setaria pallid fusca* was the most preferred grass species by the animals and this species is also the species mostly fed to the animals by the livestock farmers. This means that the livestock farmers do not feed their animals only with what is available but they feed them with what the animals prefer. This would lead to high productivity as the animals would eat more. It was realised from the study that farmers feed their animals with what the animals prefer as indicated in figures 6 and 7 above. Also the farmers feed their animals with their preferred browse species as indicated in figures 8 and 9 above. *Securinega virosa* was the most preferred browse species and that was also the species mostly fed to the animals by the farmers.

Conclusion and recommendations

The study area is rich in forage species as different species belonging to different families were identified. Browse species were noted to be used mostly in the dry season when grasses/forbs are dried up. The parts of the browse plants mostly eaten by livestock are the leaves, fruits and twigs. From the study, it can be concluded that, livestock farmers have indepth knowledge of the forage species mostly required by livestock in the study area. However there is a threat to these species as farmers would have to travel longer distances to harvest these species. It is therefore recommended that livestock farmers should incorporate forage cultivation into their crop farming to ensure availability and sustainability of forage supply.

References

Asante, W.J., Opong, S.K., Sam, O. (2002). Survey of Browse Plants in Peri-urban Kumasi. Journal of the Ghana Science Association. Vol. 4 No. 1. pp.49-50.

Atta-Krah, A.N. (1989). Availability and use of fodder shrubs and trees in tropical Africa. In: Shrubs and tree fodder for farm animals. Dovendra, C. (ed.). IDRC-276e, Ottawa, Canada, pp.140-162.

Awuni, A. (2003). Contribution of livestock to household food and cash security, the case of the Bolgatanga Municipality in U. E. R. a B.Sc dissertation submitted to Agriculture Economics Extension Department U.D.S, Tamale, pp 23 (Unpublished)

Cheplick, G.P. (1998). Population biology of grasses. Cambridge university press, Cambridge.

Cook, C.W. (1972). Comparative nutritive values of forbs, grasses and shrubs. Cambridge university press, London.

Ditsch, D.C., Bitzer M. J. (2005). Managing small grains for livestock forage. AGR-160 Issued: 3-95—3M. Cooperative Extension Service University of Kentucky, College Of Agriculture, Department of Agronomy.

FAO. (2006). FAOSTAT, Statistic database. FAO, Rome, Italy,

Grutteridge, R.C., Shelton, H.M. (2001). Forage tree legume as in Tropical Agriculture. CAB International Wallingford Oxon OX108DE. UK. Pp 6-7.

Hofmann, R.R (1989) Evolutionary steps of ecophysiological adaptation and diversification of ruminants: a comparative view of their digestive system. Oecologia 78:443.

Knapp, A.K., Fay, P.A., Blair, J.M., Collins, S.L., Smith, M.D., Carlisle, J.D., Harper, C.W., Danner, B.T., Lett, M.S., McCarron, J.K., (2002). Rainfall variability, carbon cycling, and plant species diversity in a mesic grassland. Science 298:2202-2205.

Koney, E. B. M. (1992). Population and distribution, livestock production and health in Ghana, Advent press, Osu, Ghana, ISBN 9964-91-296 Pp21-28.

Le Houerou, H.N. (1978). The role of shrubs and trees in the management of natural grazinglands (with particular reference to protein). Paper presented at the 8th World Forestry Congress held in Jakarta, Indonesia, 16-28 october 1978.

Le Houerou, H.N. (1980). Browse in Africa, the current state of knowledge. H. N. Le Houerou(ed.), *ILCA*, Addis Ababa, Ethiopia, pp 83-100.

Malechek, J.C., Provenza, F.D., (1981). Feeding behavior and nutrition of goats on rangelands.

Otchere, E.O., Abebrese, A., Karbo N., Dei H.K., Djang-Fordjour, K.T. (2002) Productivity of small ruminants in Tolon-Kumbugu district of Northern region of Ghana, *Development Spectrum. An inter-faculty Journal of UDS, Tamale, Ghana*, volume 2, December 2002 pp9.

Paterson, R.T., Karanja, G.M., Roothaert, R.L., Nyaata, O.Z., Kariuki, I.W. (1998). A review of tree fodder production and utilization within smallholder agroforestry systems in Kenya. *Agroforestry Systems* 41, 181-199.

Saleem, M.A., Oyatogun O. O., Chheda M. (1979). Nutritive value of browse plants in the Sudan Savanna of Northern Nigeria, 1 preliminary survey of Bin Yauri Grazing reserve. *Nigerian Journal of Animal production* 6:3-7.

Sanon, H.O. (1999). Livestock and world food security MSc thesis (Animal Science / Department of Animal Production Systems). Wageningen Agricultural University, Wageningen, 79 pp. species for camel in southwest of Birjand desert area, *Rangeland*, 3(3):428-443. (In persian).

Winrock International (1992). Assessment of animal agriculture in Sub-Saharan Africa. Available at: <http://hdl.handle.net/10947/186>. Retrived 10/06/2013.