ASSESSMENT OF FORAGE STOCKING RATE UTILIZATION FOR LIVESTOCK PRODUCTION IN GAMAWA AREA OF BAUCHI STATE.

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ABSTRACT
This study was carried out to assess the forage stocking rate and utilization by livestock in Gamawa area of Bauchi. Descriptive statistics as the analytical techniques use to achieve the objectives of the study. A grazing monitoring stick (GMS) was a user-friendly tool for measuring and monitoring the utilization of pastureland and rangelands. Thirty measurements for each key species across pasture were measured. The findings of the study revealed that, Urochloamosambicensis has 48 percent of height removed and 27 percent used by weight. For the Zornia glochidiata60 percent of height removed and 57 percent used by weight. Alysicapusveginalishas 55 percent of height removed and 40 percent used by weight and Cenchrusbiflorus has 40 percent of height removed and 28 percent used by weight.Orochloamosambicensis, Alysicarpusveginalis and cenchrusbiflorus has lower percent by weight which is normal while Zornia glochidiatahas higher percent by weight which is an indication of danger. The research recommends that improve variety need to be provided such as stylo varieties to overcome loss of valuable species.
Key words: Forage, Stocking, Livestock, Species, Gamawa

INTRODUCTION
Throughout history, livestock have been kept for a variety of purposes, with almost exclusive focus on food use livestock in modern agricultural system being a relatively recent development. But, in many developing countries, livestock are still a critical support to the livelihood of people who live in or near poverty, and it is here that the non-food uses of livestock, such as source of fertilizer (manure), draught power and assets for natural and other emergencies, remain predominant. Livestock or symbols of them, also play an important role in religious and cultural lives (Steinfeld 2010). An increase in livestock production comes from increases in animal numbers (in developing countries, small mixed farming system) and in yields per animal (in industrialized countries) (Steinfeld 2010).

Livestock productions are determine by the physical (climate, soil and infrastructure) and the biological environment, (plant biomass production and livestock species composition) economic and social conditions, (price, population pressure and markets, human skills and access to technology and other services) by policies (on land tenure, trade and subsidies) (Cees da Haan, 2010). These conditions, together, generate the so-called production system, that is, production unit (herds, farms) with similar structure and environment that can be expected to produce similar production functions (Cees da Haan, 2010).

Constraints to livestock production system are interdependent. One's stability or accessibility afford another development while degradation or changes increase others vulnerability Kallah (2004). And this is what give for the researcher to determine the stocking rate of the grazing system in Udubo grazing reserve and also to assess and estimated percentage utilization of forage in Udubo grazing reserve

According to Federal Ministry of Agriculture and Rural Development (FMARD 2017) report, the number of livestock animals produced in Nigeria was as follows; 180 million poultry birds, 76 million goat, 43.4 million sheep, 18.4 million cattle, 7.5 million pigs, 1.4 million Equids (horse, donkeys etc.) of these numbers, the majority of the animals were reportedly raised in free range production system which comprise of smallholders and nomadic herders.

While basic livestock distribution practices have changed little in the last 50 years, new research suggests ways to fine tune and combine these practices that will improve their effectiveness. The practices are based on basic and applied research in animal behavior and landscape ecology and involve changes in pasture management or changes in livestock management. George *et al.* (2007); George *et. al*,2011) have reviewed practices that attract livestock to underused areas and away from riparian habitats. George *et al.* (2011) concluded that stocking rate reductions were not the universal solution to riparian grazing impacts. Instead they found that the key to reducing livestock density in the riparian zone is to implement distribution practices (e.g. drinking water developments, herding and strategic placement of supplement feeds) that attract livestock away from critical areas and reduce grazing use and the time spent grazing in a riparian area (George *et al.*2011).

MATERIALS AND METHOD

Study Area

Location and Extent

This research was carried out in Udubo of Bauchi state. The Grazing Reserve was gazetted in 1962. Udubo grazing reserve lies between Latitude 11^0 52' and 11º 58' North of the Equator and Longitude 10^030' and 10^0 44' east of the Green which Meridian and is located in Gamawa local government area occupying a total land area of 111 km² and covers 11,100 hectares of land (BauchiState of Nigeria Gazette No:6 1986)(Figure 1).

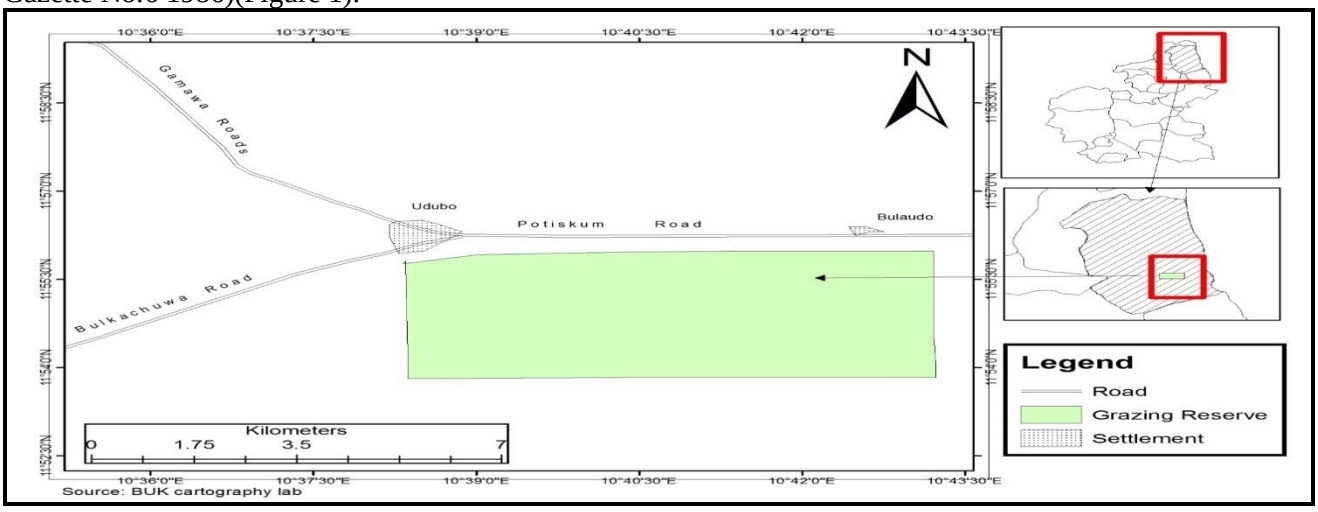


Figure 1: Map of Udubo Grazing Reserve.

Method of Data Collection

Primary data were obtained from the field which includes data on stocking rate and forage type for animal utilization. It also involves collecting information from local land users (pastoralist) for the inventory of the identify forage for quantitative estimation. Secondary data includes satellite images, herbarium as well as books on botanical names of forages.

Methods of Data Analysis

Descriptive statistics is the analytical techniques used to achieve the objectives of the study. Excel (2013) was used for statistical display of result on variables investigated upon which is presented based on George *et. al*, (2016) calculation method. The procedure consists of setting up carrying capacity in terms of the animal unit (AU) concept:

Concept	Abbreviation	Definition
Animal unit	AU	1,000lb. cow with calf
Animal unit day	AUD	26lbs of dry forage
Animal unit month	AUM	780 lbs. of dry forage
Animal unit year	AUY	9,360lbs. of dry forage

Calculation of stocking rate:

Total Land Area ÷ [(AUs) x (grazing season)] = Stocking Rate

Whereas:

Land Area = per acre

Animal Unit = number of head
Grazing season = period of grazing

Number of livestock is an important component to determine stocking rate. The numbers were gotten through water points, livestock unit and entrance of the reserve. There were 9 water points and 9 boreholes.

RESULT AND DISCUSSION

Stocking Rate

Stocking rate is generally expressed as animal unit (AU) per unit of land area. Because cattle and other grazing animals are not of the same size, it is often necessary to convert to animal unit equivalents. The term animal unit equivalent (AUE) is useful for estimating the potential forage demand for different kinds of animals.

Cattle were the predominant livestock of the total sum of the herd composition in the grazing reserve. Sheep and goats ranked values of second and third respectively, the remaining animals are also included (Table 1).

Table 1: Livestock Population in Udubo Grazing reserve

S/N	Livestock Species	Population
1	Cattle	10872
2	Sheep	6681
3	Goats	3418
4	Donkeys	222
5	Horse	21
6	Camels	11
	Total	21,225

Source: Fieldwork 2019

The study found that 0.30 acres per animal unit, and 3.6 acres per Animal unit year, this result was higher than the findings of National Resource Conservation Service (2009) 0.16 acres per animal unit, and 2 acres per animal unit year. Therefore the findings held up pretty good, that there is enough forage to feed animals for the whole year in the grazing reserve, (plate 1).



Plate 1: Category of cows grazing

Estimated Percentage of Utilization in Udubo Grazing Reserve

According to North Dakota State University (2015) is to target 50 percent utilization of forage by weight during a grazing period as well as at the end of the grazing season. If greater than 50 percent utilization occurs during a grazing period, plant recovery will be slower, requiring a longer recovery period between grazing events to maintain plant health. Over time grazing beyond 50 percent removal of a plant community's weight each year results in a diminished grass growth, resulting in reduced stocking rates and animal performance. Use the percent of height removed that calculated and correlate it to the appropriate grass community classifications scale to find the percent in weight utilization of forage (Figure 2).

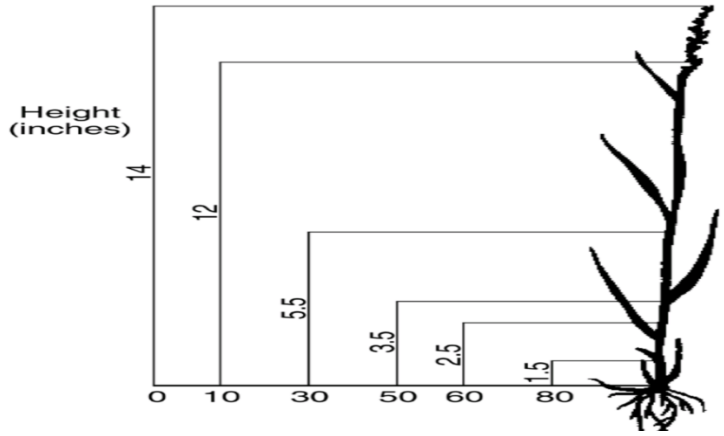


Figure 2: Appropriate grass community classifications
Source: North Dakota State University (2015).

The findings of the study revealed that, *Urochloamosambicensis* has 48 percent of height removed and 27 percent used by weight. For the *Zornia glochidiata* 60 percent of height removed and 57 percent used by weight. *Alysicapusveginali*shas 55 percent of height removed and 40 percent used by weight and *Cenchrusbiflorus* has 40 percent of height removed and 28 percent used by weight.*Orochloamosambicensis, Alysicarpusveginalis* and *cenchrusbiflorus* has lower percent by weight which is normal while *Zornia glochidiata*has higher percent by weight which is an indication of danger, this is similar with the findings of NDSU (2015).

CONCLUSION

A constraint faced by pastoralists concerns animal feeds and water supplies which complain of inadequate pasture especially in the dry season. Even during the rainy season, many of the valued forages are no longer available on the grazing reserve and they were at the reserve in the past, but have been virtually eradicated as a result of overgrazing.

RECOMMENDATIONS

It is recommended that livestock officers to understand the forage resource under their control and stock livestock appropriately for a proper stocking rate.

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