

Plant cover and livestock husbandry in Western Darfur-Sudan

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Summary

The study was conducted to evaluate the plant cover values of the pasture in Zalingei Western Sudan. In an extensive survey, pasture plants have been evaluated, quantitatively in which different plants species, forage production and stocking rate had been determined and qualitatively in which nutritive value of the pasture plant had been determined. During the autumn a large numbers of sheep were weighed and their age and sex were expressed. The results showed that the sheep weight substantially increased as the autumn progresses. It was concluded that Zalingei pasture covers maintenance and production requirements of grazing animal during autumn.

Introduction

Western Sudan is considered as main livestock production area from rangeland. Livestock are classified as the major subsector of agriculture and make together with pastoral resource the back bone of rural economy. More over it provides work opportunities partially or fully to about 40% of inhabitants (Abdalla, 1985, Robinson, 1987). Grazing land and pasture are important components in agricultural production system because they do not only provide feed for livestock but also replenish soil organic matter, prevent soil erosion and restore soil fertility (Fageria et al., 1997). This livestock is raised under traditional system of production and managed by illiterate herders. The bulk of the livestock is herded by nomadic tribes and depends exclusively for their subsistence on natural grazing. Fluctuation in feed supply and inadequate grazing as regard quality and quantity constitutes a major problem in production because this will depresses live weight gain and lower the quality of meat.

The nutritive value of the pasture in the tropical areas, among which Zalingei is not an exception, is greatly affected by seasonal change. In the summer-dry period, the moisture content, crude protein, and total soluble sugar decrease and the plants become fibrous, with high ash content and of relatively poor nutritive value (Elhag, 1995). In the rainy season, natural pasture is sufficient for maintenance requirement and production but in the dry season, the natural pastures do not cover the animal maintenance requirements. Pasture productivity and nutritive value are the major factors that determine the pattern of grazing (Bailley et al., 1996).

So there must be developmental revolution to improve the standard of living of pastoralists through provision of service and institutional capacity building for the improvement of the pastoral resources. On the other hand, livestock development is an economic activity focusing on technical change, introduction of new input and the adaptation of the modern production techniques and management system.

Materials and methods:

Area of the study:

The surveys were carried out at Zalingei area in Western Darfur State (latitude 12° 54'N, longitude 23° 29' E altitude 900m above the sea level). during the period from May – October 2003

Climate:

The study area lies within Semi- arid Savanna Zone and is affected by the elevation of Jabel Marra Massif especially rainfall and temperature. The climate is characterized by cold winter and hot rainy summer. The beginning and the end of the rainy season are typically of semi-arid savanna, which is marked by great irregularity. The rainy season usually begins in June and extends to the middle of October, with occasional limited showers in April, May and November. The mean annual rainfall during the last two decades varied from 400 to 600 mm. The bulk of it (> 60%) falls during July and August. The average temperature does not vary significantly between months, especially during the rainy season when the relative humidity is high, with an annual range of 24 - 26%. The hottest month during a year is May (min 17 C ° and max 42 C°) while the coldest month is January (min 7C ° and Max 34 C °) (Ali 2003). The annual rainfall in 2003 was 574.1mm and in 2004 was 552.1mm.

Geomorphology and soil:

Much of the study area is greatly undulating Pedit plain (600-1100 m) in altitude, underlain basement complex rock isolated hills, and hill ranges (1300-1400 m above sea level) and pen plains on weathered basement covers a considerable portion of plain (HTS 1958). The study area is covered with 9 networks of seasonal streams flowing in Wadi Azom and its tributaries from Jebel Marra and other hilly areas. The soils of the area are closely related to geology and the geomorphologic development of various land surface (HTS 1999).

Human survey:

Structural questionnaires was used to evaluate age and level of education of pastoralists.

Botanical Survey:

a. Quantitative evaluation:

Quantitative evaluation of the vegetation cover, number of trees, shrubs and grasses had been determined. Forage production had been determined for estimation of carrying capacity by using the species-area-curve method in which sampling forage yield is done by using the square meter quadrat (Abuswar, 2007). Forage in the quadrat (1 m x 1m) clipped at 2-3 cm above the ground level, all forage were put inside paper bags, then transferred to an oven, and dried at 76C° for 72 hours.

The oven dry weight was then determined thereafter, and the biomass forage production was expressed in ton/ ha.dry matter.

b. Qualitative evaluation:

Structural questionnaires was used to evaluate palatability of pasture plants (trees, shrubs and grasses), in addition to plant abundance, occurrence and plants habits.

Animal survey:

Structural questionnaire and records of Zalingei Taxation Office were used to determine the numbers of different types of animals in the area which include camels, Cattle, sheep, and goats.

Results and discussion

The questionnaire data shows according to age distribution that, 45% of pastoralist belong to the age group 16-30 year (i.e. youth age). Moreover, 28.20% of the herders were in the age group 5-15 year. On the other hand, adults and elderly 31-60/61 year age, represent about 26% of this pastoralist community. However, the data indicated that, about 51% of the herders were illiterates. Those who obtained formal general education were about 23% most probably in the age group 5-15 years.

According to the age distribution, Zalingei people are herders and pastoralism is their way of life. Most of the herders' families ages ranged between 16 to 30 years old which indicates that it is mostly the productive age (youth) that is needed for this type of job. Also for the age group 5-15 years, the percentage is moderately high, which is not strange in the nomadic life, since the boys usually follow their animals at early ages. The least percentage of herders is found among the elder ones in the households, due to their inability to cope with that tedious work.

Education is not important for animals rearing. More than 51% of the community are illiterate herders, because herding needs a lot of time that school attendance may be thought of as time loss. Also khalwa category 22% represents moderately higher percentage compared to other categories due to the importance of the religious education to the people. The least percentage is that of those having university education about 4%, since they may usually migrate to areas of better job opportunities. So pastoralism is regarded as a poor way of life depriving the people from education, health and welfare.

Each tribe has the right of using specific area which was considered to be its own tribal land. The tribal council subdivides or assigns specific areas to different tribal units for their specific use. However a close collaboration exists between the tribes clans who had adjoining the grazing areas. If the rainfall was not adequate on the grazing area of one clan, their neighbors would allow them to share their good pasture and watering points on a reciprocal basis. The tribes had systems of traditional pasture-land management in their own way.

Pastoral flocks are privately owned by families which make up the clans, subtribes and tribes. Although the clan or tribal flocks are communally managed, individual or families own the sheep in these flocks.

The results of survey: The biomass average production is 571 kg dry matter/ha. 4.76 Ha/Au/year. For the carrying capacity calculation has fellows; the average dry matter calculation given above is 571kg. the animal unit (A.U) dry matter requirement per day is 3% of the animal unite live weight $= (3 \times 250) / 100 = 7.5 \text{ kg DM/day}$.

The (AU) DM per year $= 7.5 \times 365 = 2737.5 \text{ kg DM}$

The hectares require to support one (A.U)/year $= 2737 / 571 = 4.79 \text{ Ha/A.U}$

(carrying capacity is the number of Hectares(Ha) necessary to support one animal in a given area for a period of time (day, month or year)).

Thus indicating that an animal unit (250 kg live body weight) requires a grazing area of 4.79 Ha./year of produced forage.

Table 1 shows the classification and the growth habit of the pastoral plants in Zalingei locality. Annual plants represent highest percentage (45%) followed by trees (43%) and shrubs (12%) which represent the least percent. In plant frequency, abundant plants was 49%, which is the highest percent followed by rare 2% common 29% and dominant 4% which represent the least percent. Unpalatable plants were little more than the palatable ones.

Table 1. Pasture plants Species (Tree, Shrubs and annuals) in the study area at Zalengei locality

Latin Name	Family	Name (Furr\Arabic)	Habit	Ab	Use	P
<i>Peristrophe bicalyculata</i>	Acanthaceae	F/Kussumburroh A/Nanabarie	An	XY	Forage	P
<i>Zaleya pentandra</i>	Aizoaceae	F/kusidgul A\Rabaa	An	Y	Forage	P
<i>Amaranthus hybridus</i>	Amaranthaceae	F/AbagangjabilAHomeid	An	Y	Forage	P
<i>Selerocarya birrea</i>	Anacardiaceae	F/Tuwapituana	T	R	Forage	P
<i>Balanites aegyptiaca</i>	Balanitaceae	F/Keingu A\Heglig	T	XY	Forage	P
<i>Stereospermum kunthianum</i>	Bignoniaceae	F/Aurodickko A\Khashkhash	T	R	Forage	P
<i>Boswellia papyrifera</i>	Burseraceae	F/Burro A\Rutrut or Taraktarak	T	Y	Forage	P
<i>Cmmiphora Africana</i>	Burseraceae	F/Birriplbirringa A\Gafal	Sb	R	Forage	P
<i>Anogeissus leiocarpus</i>	Combretaceae	F/DairoA\Sahab	T	Y	Forage	P
<i>Combretum aculeatum</i>	,	F/Zungatar	Sb	R	Forage	NP
<i>Combretum molle</i>	,	F/Doafeydikko Ahabil	T	R	N. Forage	NP
<i>Terminalia brownie</i>	,	F/Diffon A\Amsubagh	T	R	N.Forage	NP
<i>Commelina kotschy</i>	Commelinaceae\	F\Alinja A\ibrigelfaki	An	Y	Forage	P
<i>Ipomea spp</i>	Convolvulaceae	F\Amdud	An	Y	Forage	P
<i>Cucumis prophetarum</i>	Cucurbitaceae	F\Kidingerch	An	Y	Forage	P
<i>Cyperus esculentus</i>	Cyperaceae	F/Dewrang pl Kewra	An	Y	Forage	P
<i>Diospyros mespiliformis</i>	Elonzceae	f\Durri A\Jukhan	An	R	Forage	P
<i>Euphorbia hirta</i>	Euphrbiaceae	F\Tinjtnj	An	XY	Forage	P
<i>Brachiaria brizantha</i>	Gramineae	F\Barla kawil	An	Y	Forage	P
<i>Ctenium</i>	,	F\Murumgdawt	An	XY	Forage	P

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<i>Digitaria ciliaris</i>	,	N.A	An	Y	Forage	P
<i>Eleusine indica</i>	,	F\Darab A\Taleboon	An	Y	Forage	P
<i>Eragrostis gangetica</i>	Cilianensis	N.A	An	Y	Forage	P
<i>Rhynehelytru mvillosum</i>	,	N.A	An	Y	Forage	P
<i>Setaria pallidifusca</i>	,	A\Danabalfalu	An	XY	Forage	P
<i>Leonotis nepetifolia</i>	Laniatae	F\Diankinaoe Tabutur	An	Y	N.Forage	UP
<i>Asparagus africanus</i>	Liliaceae	F\Narog	T	Y	N.Forage	UP
<i>Azanza garckeana</i>	Malvaceae	F\MaraA\Jakjakh	T	R	N.Forage	UP
<i>Azadirachta indica</i>	Meliaceae	A\Neem	T	Y	N.Forage	UP
<i>Melia azedarch</i>	,	N.A	T	Y	N.Forage	UP
<i>Faidherbia albida</i>	Mimosoideae	F\Gurul A\Haraz	T	D	Forage	P
<i>Acacia nilotica</i>	,	F\Feddein A\Sunu	T	Y	Forage	UP
<i>A.nubica</i>	,	f\Aara Alaoat	Sb	Y	Forage	UP
<i>A.polyacantha</i>	,	N.A	T	Y	Forage	UP
<i>A.sieberana</i>	,	F\alda A\Kuk	T	XY	Forage	UP
<i>A.senegal</i>	,	f\Saiyfatta A\Hashab	T	XY	Forage	P
<i>A.seyal</i>	,	F\Taari A\Taleh	T	D	Forage	P
<i>Albizia amara</i>	,	N.A	T	XY	Forage	UP
<i>Dichrostachys cinerea</i>	,	N.A	Sb	Y	Forage	UP
<i>Ficus glumosa</i>	Moraceae	F\Burobuge A\Gumeiz	T	XY	Forage	UP
<i>Nymphaealotus</i>	Nymphaeaceae	N.A	An	XY	N.Forage	UP
<i>Zizphus Abyssinia</i>	Rhamnaceae	F\Numangbougu A\Nubagelfeel	Sb	R	N.Forage	UP
<i>z.spinachristi</i>	,	N.A	T	Y	Forage	UP
<i>Spermacoce chaetocephala</i>	Rubiaceae	N.A	An	XY	N.Forage	NP
<i>Sterculia setigera</i>	Stercutiaceae	F\CuldubarA\rar	T	R	Forage	NP
<i>Typha domingensis</i>	Typhaceae	F\Bogoag	An	Y	Forage	NP
<i>Tribulus terrestris</i>	Zygphlanceae	F\Tamar A\Dreisa	An	XY	Forage	P

N.V; Not available. Ab; Abundance. F; Furr. A; Arabic. T; Tree. SB; Shrub. An; Annual. D; Dominant. XY; common. Y; Frequent. R; Rare. N.F; None forage. UP UN palatable. P; Palatable.

Zalengei pasture has adequate levels of nutrients to meet the growth and production of the grazing stocks in the rainy season. In dry season when grass is inadequate for the animals, stockmen depend on shrubs and fodder tree to feed their animals. The high percentage of the forage and palatable plants indicated high pasture carrying capacity, high fertility of the soil and good land management.

In the dry period from December to July of the next year, when the grasses were dry and not enough fodder, stockmen and their animals move near Wadis (valleys). Sometimes they take their animals for long distances along the Wadi and climb mountains in search for enough feed. Since there are no green forages, in this period they browse shrubs and small branches of trees, in addition to supplemental feed (ground nut cake) that is only given to small, weak and pregnant animals.

During the rainy season, from July to November stockmen stay in Eldamra. At early autumn from 10th of July till the beginning of August, grasses are small and not sufficient for animal need but after that the herbage becomes vigorous and sufficient, in this period no additional feed is introduced neither for small nor pregnant animals. Salt is usually given every day at morning before animals go grazing, which is put on mats for the animals to lick it. Animals are watered every two days interval from water pools and Wadis not far away from Eldamra. In Zalengei area, the pastoralists and sheep farmers make use of the seasonal pasture located in two different areas (Eldamra and Near Wadi), which are separated by a third area through which the migration takes place. Pastoralists and their animals stay at Eldamra from 10th of July till the mid of October, and near Wadi, for rest of the year. Climatic factors such as dry and wet seasons limit the use of the pasture. The animals are taken to graze during the day but are confined at night, often because of fear from wild animals and thieves. Furthermore, animals cannot be supervised so well during darkness, and this increases the danger of crop damage and animal losses. The rainy season is characterized by a very good plant growth which forms an excellent plant cover. It is good feed for sheep, goats and cattle. Pastoralists use to give their animals salt, as they expect that their feed intake will increase, and supplementary feed such as (ground nut cake) only to small and pregnant animals in the dry season as mentioned earlier.

Table 2 shown below. Cattle recorded the highest number (51%) followed by goat (20%), sheep (15%) and camels (14%). These animal heads quantities about a total of 664460 animal units.

Table 2. Animals populations in Zalengei area

Animal Species	Animal number	Animal percentage%	Animal unit	Total animal unit
Cattle	450000	51	1.00	450000
Sheep	133229	15	0.20	26646
Goat	171071	20	0.20	34214
Camel	122880	14	1.25	153600
Total	877180			664460

The area possesses large population of different types of animals (cattle, sheep, goats and camels). This high population must be managed in good way so as to maintain the pasture in good condition and production by different ways like culling the males and unproductive females at the end of rainy season and beginning of the dry season.

Table 3: Animal age (month), weight (kg) and sex during Autumn.

Trait season		Early Autumn (45.4)%	Mid Autumn (21.68)%	Late Autumn (32.91)%
Age	0-6	18.1	8.93	13.6
	7-12	18.9	8.16	4.85
	13<	8.42	4.59	14.8
Weight	0-15	6.12	0.05	2.18
	16-30	25.0	10.5	10.5
	31<	13.27	10.7	19.6
Sex	Male	3.57	1.27	3.57
	Female	41.8	20.4	29.3

The herders sell the male animals for covering the life expenses, and keep only those males which have good characteristics (always phenotypic) for breeding. Females are reproductive units that herders never sell them, because big flock is a sign of strength. In addition to that males had a greater mortality than females (Suliaman et al., 1990) so males always represent very small percentage compared to females. Lambing is all around the year, but high percentage of animals less than six month of age in early and late rainy season indicates that there were two lambing seasons. The first one is between the late dry season, and the early rainy season and the other one in the mid of the rainy season, which means that there are two peak of conception occurring during the year, the first is from January to March and the second one is from May to June. This confirms that the breeding is often controlled in pastoral flock by use of Kunan so that lambs are born at early rainy season (Davendra and McLeroy, 1982; Mukhtar, 1985).

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