

Traditional Range Resource Utilization

Experience Gained Among the Pastoralists of Tanzania*

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ABSTRACT Two studies were conducted in two pastoral communities on the traditional reserve grazing areas. These were the "Milaga" and "Alalili" reserve grazing pastures. Results of study I indicated that several household parameters had changed and so affected most of their pastoral production systems. Several factors are responsible; the major ones being cultivation in these marginal areas, and Labour and feed shortages. Investigation made on study II revealed that on average, forage yield was relatively higher in reserve grazing areas in comparison to that reported in similar range conditions. Though traditional range management is blamed for not being environmentally friendly, the results indicated their potential for not and posterity. This paper presents part of the results obtained and suggests that the practice provides renewed impetus for future improvement of these reserve grazing areas.

INTRODUCTION

African pastoral production has been shown to provide good returns relative to other forms of range management in similar environment (de Ridder and Wagenaar, 1986). Evidence indicates that it is an economically viable and ecologically sustainable form of land use in the Arid and Semi-arid areas of Africa (Tadingar, 1994b; Ole-Lengisugi, 1994). A pastoralist is by any standard, an accomplished and disciplined range manager by virtue of detailed knowledge of his environment and his ability to manipulate scarce range resources at his disposal in order to optimize production (Tadingar, 1994a). Tadingar (1994a) argued that, the universally negative view accorded to traditional resource management is rather a misconception than scientifically

proven generalization. There is ample evidence to the complementarity of modern scientific knowledge and traditional natural resource management for sustainable livestock productivity.

Traditional knowledge of natural resource management and utilization has been recognized as an important tool in the improvement and development of land use systems in the world. One of the traditional practices has been the reserve grazing areas. Agropastoralists and Pastoralists in arid and semi-arid lands of Tanzania usually set aside a portion of their grazing land during the wet season so that it is grazed during the period of forage scarcity. Reserve grazing areas have been in use for long but their importance in terms of nutritive value and as source of emergency feed has not been studied. Information on the socio-economic aspects related to the traditional practices of conserving key grazing areas in traditional range resource utilization in the country is scanty. Earlier studies (Otsyina et al., 1994) have indicated that the practice is widespread and is becoming increasingly so with the breakdown of the Ujamaa villagization system.

MATERIALS AND METHODS

The study focused attention on the "Maasai and "Gogo" traditional pastoral tribe communities in the respective districts. Monduli District is situated between longitude 36° and 37° East and latitudes 3° and 4°. The district has an arid to semi-arid climate, with an average annual rainfall of less than 500 mm. The Gogo ethnic group is found in Dodoma region in the central plateau of Tanzania. It extends between latitudes 4° and 7° 30' South and longitudes 35° and 37° East. It has a long dry season (seven months) from May

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to November. The average annual rainfall is 500 mm. Two complementary parts of the study were conducted in each location. These entailed a social study and a vegetation inventory. The first part involved collection of primary and secondary data. Secondary data were collected from key informants in the area. A sample size was chosen such that the sampling fraction was at least equal to five per cent of the total livestock keepers in the selected village. A non-random (purposeful) procedure was used in selecting the districts and villages for this study, while respondents were picked at random. The data were coded and analyzed using SPSS/PC to obtain descriptive statistics. The second study was conducted to estimate forage production. Average dry weight of quadrat samples was used to calculate the production of dry matter per hectare. Chemical composition of forage samples was determined by the methods of Goering and Van Soest (1970) and as described by A.O.A.C. (1980). Dry matter digestibility (DMD) and Organic matter digestibility (OMD) were determined by the two stage in vitro method (Tilley and Terry, 1963). Energy (MEMJ/kgDM) was estimated by the procedures: $\text{MEMJ/kgDM} = 0.15\% \text{OMD}$. (MAFF, 1975).

RESULTS AND DISCUSSION

General Characteristics of the Study Population

The parameters of study in household characteristics were age of household head, education of household head and household size. Table 1 shows the distribution characteristics among the household heads in the two locations studied. It was apparent that all the household heads studied were males. This could possibly be due to traditions and customs that require that heads of households or clans be males. Most of the household heads were old men. The results of age and education status reveals that most of the household heads have long-time traditional experience in livestock keeping. This means that, their traditional knowledge and livestock management practices should not be overlooked. It is clear that since the household heads are the decision makers in the families, any new technology package is given a thorough thought before adoption.

Table 1: Household Characteristics: Age, Education and Household Size in Percentage at Makang'wa and Tingatinga Locations

Characteristics	Location I Makang'wa	Location II Tingatinga	Averages
<i>Age of Household head(HHh)</i>			
< 40	14.3	29.2	22.2
41 - 50	38.1	29.2	33.3
> 50	47.6	41.7	44.4
<i>Education of HHh</i>			
None	52.4	50.0	51.1
Some primary	19.0	37.5	28.9
Primary	19.0	8.3	13.3
Some secondary	9.5	4.2	6.7
<i>Household Size</i>			
< 10	14.3	25.0	20.0
10 - 20	57.1	62.5	60.0
> 20	28.6	12.5	20.0

The household size varied from 5 to 32 members, with an average size of 12 members per household. The average size reflects the predominance of the traditional extended family nature. The number of the dependants was determined by the wealth of the homestead which is again reflected by ownership of relatively large heads of cattle. The young males are a reliable labour source for herding. It was observed that young females were the majority comprising 30 per cent and 32 per cent of the total household size at Makang'wa and Tingatinga locations respectively. Age category on the basis of sex and age was found to influence the family roles and responsibilities.

Range Resource Utilization

Range resource utilization in Tanzania is governed by type of land ownership. Communal land ownership is widely practiced in Tanzania by both agropastoralists and pastoralists. This system has contributed greatly to the deterioration, denudation, and low investment in improvement of this resource. Communal grazing does not favour profitable range resource utilization, particularly the use of forage when production is in excess of the demand by animals during growing season. The uplands were grazed first while the bottom areas were automatically reserved for dry season grazing. The Gogo agropastoralists used to take their herds to the Gogo plains and Maasai pastoralists moved with their herd along the Serengeti plains and areas bordering Kenya. The interview revealed that in both locations, herd movement was practiced between September/October to February/March.

The study indicated that on average, 83 per cent of the respondents (74% of the agropastoralists and 90% of the pastoralists) suggested that every livestock keeper should own his reserve grazing land. This practice was supported by 96 per cent of the respondents. Like in other pastoral systems, pastoralists of Tanzania are under stress in many areas caused mainly by removal of land resources from their reach, changing market structures and environmental change. In this case, available resources are getting more scarce and traditional ties are breaking down. Effects of such a scenario has also been reported by Lane and Scoones (1993) on the breakdown of the rational "Barabaig" system of Natural Resource Management due to wheat cultivation in Hanang plains in Tanzania.

Cultivated Areas and Reserve Grazing Land

Size of land area owned by the interviewed households that is under cultivation, ownership of reserve grazing lands and their mode of acquisition is presented in Table 2. At Makang'wa, agropastoralists had plots which were highly fragmented and scattered in the various parts of the area. The number of plots varied from 1-7 each, with an average size of 0.5ha. So far, land acquisition and ownership for use has been through inheritance where land is passed on from one generation to another. However, land can also be bought or leased. The significant difference observed in size of land under cultivation and reserved grazing between the two locations, implies that pastoralists of Tingatinga attach greater

Table 2: Per cent of Land Under Cultivation, Size of Reserve Grazing and Type of Land Ownership at Makang'wa and Tingatinga

Particulars	Makang'wa	Tingatinga
<i>Size of Land Owned Under Cultivation</i>		
< 1 hectares	—	79.1
2 - 3 hectares	28.6	12.5
4 - 6 hectares	38.1	8.3
> 7 hectares	33.3	—
<i>Reserve Grazing Land</i>		
< 2 hectares	58.1	29.2
3 - 5 hectares	41.9	33.3
> 6 hectares	—	37.5
<i>Mode of acquisition</i>		
Inherited	38.1	33.4
Traditional by law	33.3	50.0
Others	28.6	16.6

importance to reserve grazing lands for dry season grazing while agropastoralists of Makang'wa obtained their own food from cropping rather than from sale of their few stocks.

Livestock Ownership

Table 3 shows the mean, median and range of different classes of livestock at Makang'wa and Tingatinga locations. Other stock like donkeys and chicken were present, but in relatively small numbers. The seemingly large herd size owned by pastoralist households of Tingatinga implies that there is great dependence on livestock as a source of food and income. At Makang'wa, agropastoralists have small herd sizes, implying a change to dependency on agricultural crops as a source of food and income. There was no correlation between ownership of reserve grazing lands and the herd size per household. This could possibly be due to the tendency of some pastoralists to own pieces of land for social purposes even when they do not own large herd sizes.

It was interesting to note that, every household was looking for small ruminants to purchase. This observation is in agreement with that of Dahl and Hjort (1976) and Wienpahl (1985) who reported an increase in number of small ruminants among the pastoral communities. This could probably be attributed to their high survival rates under scarce resources.

Table 3: Mean, Median and Range of Livestock Distribution in the Two Location Studied

Class of stock	Location ¹	Mean	Median	Range
Cattle	I	48	32	10 - 200
	II	90	33	7 - 500
Sheep	I	9	6	0 - 28
	II	28	15	0 - 250
Goats	I	15	10	0 - 50
	II	44	30	0 - 200

1. Location I - Makang'wa
II - Tingatinga

Forage Production in Traditional Reserve Grazing Areas

There was no significant difference ($P > 0.05$) in average dry matter production between the two locations. However significant differences ($P < 0.05$) were detected when different sites were compared. The average yield values obtained for Makang'wa and Tingatinga were 2510 kg DM/ha

and 3680 kgDM/ha respectively and were relatively higher than those reported of 1000kgDM/ha and 1500kgDM/ha from similar range areas and Sudano Sahelian zones respectively (ILCA, 1985/86; Le Houerou, 1980). The high yield obtained results from traditional management practices employed by the owners.

Restriction to free grazing has allowed forage species to regenerate and attain higher yields. Restricted grazing gives greater manure accumulation and hence improvement in soils chemical and physical characteristics. Other practices observed were rain water spreading to reserved grazing areas during wet season, as well as range pitting.

Chemical Composition of Forage Species

As expected, forage samples had generally low crude protein (CP) and relatively high fibre content. Nevertheless, livestock grazed on traditionally reserved areas obtained better quality feed compared to those on other grazing areas. The average chemical composition of range composited samples in the two areas ranged as follows: Dry Matter (DM) 88.7 - 91.5 per cent; Total Ash 8.3 - 9.3 per cent; Crude Protein (CP) 5.1 - 6.5 per cent; Acid Detergent Fibre (ADF) 42.7 - 45.3 per cent; Neutral Detergent Fibre (NDF) 65.4 - 74.4 per cent; Dry matter Digestibility (DMD) 46.3 - 48.7 per cent; Organic Matter Digestibility (OMD) 45.4 - 46.1 per cent; and Estimated energy (ME) 6.81 - 6.92 MJ/kgDM. Earlier studies have indicated that oversowing legume species to pastures could increase forage quality of the sward where controlled grazing is practised (Kusekwa et al., 1992).

CONCLUDING REMARKS

It can be concluded that at Makang'wa location, the Gogo agropastoralists own land mainly for agricultural activities while at Tingatinga location, the Maasai pastoralists own land mainly for reserve grazing pastures, a character that reflects their identity. Since most of the household heads are old people, they still hold to traditions and customs. They have difficulties in perceiving present day technological approaches; they are less agreeable to changes. The herd size per household is on the decline as resources are becoming scarce. Small ruminants are increasingly

being used to meet household requirements. Among the pastoralists and agropastoralists, different age groups and sexes have different roles, and responsibilities. Observation made by Otsyina et al. (1994) is in agreement with this study that, with the disappearance of Ujamaa villagization more people are willing to own reserve grazing lands. The forage species studied cannot sustain livestock productivity throughout the year. A proper mixture of grasses and legumes will result in forage of better quality to supplement enough nutrients for maintenance and production purposes. It appears that innovation aimed at increasing feed resource from the conserved key grazing areas would be best addressed to agropastoralists and pastoralists whose grazing land is being taken away. The existence of reserve grazing pastures along with the underlying ecological and management concepts, provide a valuable opportunity and basis for development of sustainable silvopastoral system in Gogo and Maasai areas.

RECOMMENDATIONS

It is therefore recommended that future research should focus on:

- The improvement of reserve grazing areas through introduction of high yielding forage species and high quality species such as leguminous plants.
- Selective protection and management of naturally occurring trees and shrubs which are of high nutritive value.
- Methods of rain water harvesting as the water harvested has many uses including irrigation of pastures and consumption by livestock.
- It is also recommended that the policy makers review laws relating to land tenure systems to promote individual type of land ownership.

REFERENCES

- A.O.A.C. 1980. Association of Official Agriculture Chemists. *Official Methods of Analysis*. Washington, DC: AOAC.
- Dahl, G. and Hjort, A. 1976. *Having Herds. Pastoral Herd Growth and Household Economy*. Stockholm Studies in Social Anthropology, No.2. Stockholm: University of Stockholm.
- de Ridder, N. and K. Wagenaar, 1986. "Energy and Protein

- Balances in Traditional Livestock Systems and Ranching in Eastern Botswana," *Agricultural Systems* 20: 1-16
- ILCA, 1985/86. *ILCA Annual Report for 1985/86*. Addis Ababa: International Livestock Centre for Africa.
- Kusekwa, M.L., R.S. Kyamanywa and M.D. Ngowi. 1992. "Fitting Forage Legumes into the Cropping Systems of Semiarid Tanzania." (pp 215 - 221) in: *Proceedings of the Joint Feed Resource Networks Workshop* held in Gaborone, Botswana, April 1992.
- Lane, C. and I. Scoones. 1993. "Barabaig Natural Resource Management," (pp 93 - 120) in: M.D. Young and O.T. Solbrig (eds.), *The World's Savanna: Economic Driving Forces, Ecological Constraints and Policy Options for Sustainable Land Use*. Man and the Biosphere Series 12. Paris : UNESCO and Camforth : Parthenon Publishing Company.
- Le Houerou, H. 1980. "The Rangelands of the Sahel," *Journal of Range Management*, 33: 41 - 45
- MAFF. 1975. Ministry of Agriculture, Fisheries and Food. "Energy Allowances and Feeding Systems for Ruminants," *Technical Bulletin*, 33: 62-67
- Maxwell, S.E. and H.D. Delaney. 1990. *Designing Experiments and Analysing Data: A Model Comparison Perspective*. Tanzania : Wadsworth Publishing Company.
- Ole-Lengisugi, O. 1994. "A Survey of MAA Identity and Ancient Ethnoveterinary Animal Husbandry Practices Among the Maasai Pastoralists of Olkaria: Arusha Region," Working Paper No.3 (November). The African Pastoral Information Network Programme.
- Otsyina, R., M.S. Minae and D. Asenga. 1994. "The Potentials of 'Ngitiris' as a Traditional Agroforestry System Among the Sukuma of Tanzania," *Agroforestry Systems*.
- Singh, P. and A.N. Ghosh. 1993. "Forage and Animal Management Systems on Communal Rangelands in Arid and Semi-arid Regions," (pp. 49 - 54) in the *Proceedings of the XVII International Grassland Congress*.
- Tadingar, T. 1994a. "Pastoral Development in Sub-Saharan Africa: The Role and Significance of Indigenous Technical Knowledge," Working Paper Series No. 1. The African Pastoral Forum. Pastoral Information Network Programme (PINEP).
- . 1994b. "Pastoral Development in Sub-Saharan Africa: An Integration of Modern and Indigenous Technical Knowledge," Working Paper Series No.2. The African Pastoral Forum. Pastoral Information Network Programme (PINEP).
- Tilley, J.M.A. and R.A. Terry. 1963. "A Two Stage Technique for the 'In Vitro' Digestion of Forage Crops," *J. Br. Grassland Soc.*, 18 : 104-111
- Vlakoveld, S. and H.R. Scheffer. 1992. *The Situation of Pastoralist Communities in Monduli District*. Report on Collected Data Submitted to Ministry of Agriculture (MoA), Tanzania.
- Wienpahl, J. 1985. "Turkana Herds under Environmental Stress," *Nomadic Peoples*, 17 : 59-87.