

Assessment of Major Livestock Feed Resources and Constraints in Guji Zone, Southern Oromia

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Abstract

The study was conducted with objective of assessing and rank the major livestock feed resources and its constraints in Guji Zone, Southern Oromia. Data was collected by group discussions and structured questionnaire in six districts. Data was collected from both secondary and primary data. A total of two hundred eighty eight (288) respondents were randomly selected and interviewed from districts based upon pre-tested structured questionnaire. Native pastures, crop residues, grazing of crop stubbles and browse trees were the major feed resources in the study area. Natural pasture and crop residues were produced in large amounts in the study area. The main cause of grazing land deterioration was drought 69.1% lowland, over grazing 58.2% highland and bush encroachment 21.9%. The major traditional range land management practice of the study area was conservation enclosure (kalo). The main source income of stakeholders depends upon sale of livestock and livestock product, and sale of crop. In the lowland area livestock cover long distance (>6 km) to reach water compared to the mid and highland parts. Further research and development work should be encouraged to improve dry season feed scarcity through different options such as utilization of non-convention feeds, forages development program, use of alternative means of crop residue utilization and adaptation, demonstration of improved forage varieties.

Keywords: Assessment; Communal; Enclosure; Feed; Native pasture; Stubbles

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1. INTRODUCTION

Feed is the most important input in livestock production and its adequate supply throughout the year is an essential prerequisite for any substantial and sustained expansion in livestock production [1]. Animal feeds including; natural pasture, fodder crops, fodder trees, crop residues and non-conventional feeds are used in different parts of Ethiopia [2]. Feed in terms of both quantity and quality is bottleneck to livestock production in Ethiopia [3]. The natural-pasture and crop-residues have been contributing about 56.23% and 30.06% of shares respectively as the main livestock feeds available nationally [4], which have been affecting by the different agro-ecologies, the type and accessibility of crop-produced and production-system [5]. Despite of the importance of livestock, inadequate livestock nutrition is a common problem in the developing countries, and a major factor affecting the development of viable livestock industries in poor countries [6]. The common problem with natural pasture and crop residues are marked variation in seasonal based-feed availability and quality issues, which have been consistently reported as major constraints to livestock production in the developing countries like Ethiopia [7]. This is due to the poor natural-pasture management practices, serious degradation in grazing-areas and the most palatable forage species of natural-pasture have converted and dominated by unpalatable species [8].

The problem of feed shortage is more aggravated during the dry season [9], Even during years of good rainy season, forage is not sufficient to feed livestock in the highlands [10]. Our country Ethiopia is leading of livestock populations in Africa, the yields obtained from livestock production is very low and is limited to contribute to the national economy only about 11.48% to the total GDP [11], which is very low as compared to its potential due to inadequate feed supplies and low quality of available feeds [12]. The results of our study may contribute to identifying the existing practices of utilization of feed and to find ways and means to improve these practices and helps to define the prospects for future interventions in developing livestock feeding systems to enhance productivity and viable integration of the crop and livestock sectors in the study area. Similarly, in Guji zone which this study was conducted, there are lacks of comprehensive information on feed resources availability, nutritional values of major feeds, current status and opportunities for of livestock feed production. Hence, the understanding of the existing feed resources and their nutritional quality of feeds used by livestock will imperative for improving livestock feed production and utilization practices. Accordingly, this study was conducted to assess and evaluate major livestock feed resource utilization practices and rank feeding constraints in the Guji zone, southern Oromia.

2. MATERIAL AND METHODS

2.1. Description of the study area

Guji zone is found in Southern part of the Oromia Regional State and south eastern part of the country occupying

a total land area of about 35,454 km². The capital town of the zone is Negelle, which is far away 604 km from Addis Ababa. This zone is located between 380-400 East longitude and latitude 40-50 on the North, and the altitude ranges from 500 m up to 3500 m above sea level (Guji Zone land and environment protection office, 2012). Rainfall delivery is bimodal and cultivates two times in mid- lowland and highland were cultivated once in a year. The climate conditions of the zone are Dega, Woina dega and Kolla climate conditions and accounts 13 %, 19 % and 68 % of the total districts, respectively. The total rainfall falling between March and August and the short rains of the total rainfall between September and November with an average annual rainfall varying from 420 to 1400 mm per annual in the Zone (zonal report, 2002/03).

2.2. Sampling size and technique

Information was obtained from zonal office of livestock development and health (LDH) bureau on locally developed organizational structure of the District. From the zone six (6) districts were selected based on the potential of livestock production. Based on agro-ecology of the zone two (2) potential districts from highland, two (2) districts from midland and two (2) districts from lowland were selected. From each district four (4) kebeles were purposively selected. The criteria for selection of districts, kebeles and farmers were multifold versus livestock population, accessibility and experience of farmers keeping livestock for not less than two years and twelve (12) respondents from each kebele was randomly selected for the study. Thus, the total number of respondents for this study was two hundred eighty eight (280).

2.3. Methods of data Collections and Analysis

Questionnaire was prepared for household respondents. Before interviewing the questionnaires pre-test was done in order to see the construction questions and their validations. Questionnaires were translated to local language (Afaan Oromo) for respondents. The collected household data were summarized and analyzed using statistical package for the social sciences (SPSS version 16). Descriptive statistics such as mean and percentage were used to present the results.

3. RESULTS AND DISCUSSION

3.1. Socio-economic Characteristics of the Households

Cattle production practices of the study area were characterized based up on different aspects (Table 1). One of the tools used was socio-economic features of the households such as sex, age, and family size of households (HHs), educational level, livestock holding, and land holding together with other management practices. In the highland parts, about 84.4 % of the respondents were male, while 15.6 % were females. In the mid-altitude 95.8 % and 4.2 % of the respondents were male and females respectively. From the lowland areas 79.8 % of respondents were male and 18.2 % were female. Family members of HHs from the highland and the midland ranges between 6-10 were from 44.8 % and 46.9 % respectively. The educational aspect of the HHs interviewed from the highland secondary school 40.6 % and from midland part, majority of HHs were primary school 36.1 %. Ethnic group of the HHs interviewed was 93.8 %, 84.4 % and 88.7% from the highland, midland and lowland parts respectively were Oromo. Religion of respondents investigated from studied areas 89.6 % and 70.8 % from the highland and midland were Protestants respectively. 39.2 % of the HHS was Muslim from lowland parts of studied areas.

Table 1. Household's sex, age, family size and educational level

Agro-ecology (N= 288)					
Characteristics	Highland	Midland	Lowland	Ava.	
Sex of HHs	M %	84.4	95.8	79.4	86.5
	F %	15.6	4.2	19.8	3.2
Education level	Non educated	16.7	22.9	29.9	23.1
	Basic education	9.4	10.4	18.6	12.8
	Primary	31.2	44.8	36.1	37.6
	Secondary	40.6	21.9	12.4	24.9
	Above secondary	2.1	21.9	2.1	8.76
Family members	1-5	25	24	27.8	25.6
	6-10	44.8	46.9	43.3	45
	11-15	24	18.8	18.6	0.5
	Above- 15	5.2	8.3	9.3	7.6
Ethnic group H/Hs	Oromo	93.8	84.4	88.7	88.9
	Somale	3.1	1	7.2	3.8
	Others	3.1	14.6	3.1	6.9
Religion of H/Hs	Orthodox	4.2	18.8	12.4	11.4
	Muslim	2.1	8.3	39.2	16.5
	Protestant	89.6	70.8	38.1	66
	Others	3.1	2.1	7.2	4.2

3.2. Livestock holding and their role

The average of sheep holding in numbers from the highland parts which was reared at subsistence level was higher than that in the other midland and lowland agro-ecology and most of them were of indigenous types. Sheep and goat were mainly kept for meat and cash income. Goats are very important to farmers in the lowland areas because, they could serve as a major source of animal protein in the form of meat and milk (Table 2).

Table 2. Livestock herd structure of the study areas

Livestock herd structure	Highland	Midland	Lowland	Ave.
Calve male less 1 year (TLU)	87	66	92	81.7
Calve female less 1year (TLU)	65	57	85	69
Heifers (TLU)	63	33	93	63
Bull (TLU)	55	39	89	61
Oxen (TLU)	53	60	85	66
Dry cow (TLU)	67	34	88	63
Lactating) cows (TLU)	82	66	90	79.3
Sheep (TLU)	74	31	60	55
Goat (TLU)	19	39	86	85.7
Camel (TLU)	-	-	4	24.7
Donkey	7	52	65	41.3
Mule (TLU)	31	11	9	16.3
Poultry (TLU)	65	68	61	64.7
Number of boney bee (Hives)	62	63	43	56

3.3. Major livestock feed resources

The main feed resources to livestock in the district are natural pasture, crop residues, stubble, grazing from fallow lands, forest and shrub lands Table 6). Among the feed resources, natural pasture and crop residues contribute to the largest source of feed to livestock in the study area which was the case in most developing countries [6].

Natural pasture

3.3.1. Ownership and management practices

In the study areas there are different types of grazing lands private and communal land. Furthermore, there are a few browse tresses, stubble grazing and river side grazing lands animals (Table 3). Above 50 % of the feed to animals came from natural pasture, which conforms to the general indication that natural pasture is one of the

major sources of animal feed [13]. From the sampled households, 52 % in the highland, 56.4 % in the midland, and 71 % in the lowland ranked natural pasture as the primary source of feed to their livestock.

Table 3. Percentage of respondents using enclosure (private grazing lands) as an animal feed in the different Agro-ecology of the study areas.

Availability of enclosure (private)	Midland %	Lowland %	Highland %
Yes	56.4	71	52
No	53.6	29	48

Grazing on both private grazing and communal grazing land was common practices following the onset of rain in the most parts of the study area (Table 3). From the sampled households, midland part was owned privately (56.4 %). The remaining was located along the riverside and browse trees. The management and utilization practices of natural pasture, animals were not allowed to graze in the private grazing land during the wet season rather animals were allowed to graze on meager herbage found along roadside and in the communal grazing land. 70.8% of respondents from highland part close their private grazing land in July month. After it rejuvenated and had more coverage and biomass started utilize from late August to October, 68 % and 22 % of respondents from lowland areas close their own private grazing land starting from April and September and utilize their grazing land from the beginning of June - August.

There was no restriction to the utilization communal grazing land by their animals of farmers living in the same peasant association at any time, but access to private grazing land utilization of owner of animals of other farmers was restricted to a certain period of the year from (July to late August) from group discussion. Thus, the permission for the use of the private grazing land by animals of other farmers is only possible after ample of the herbage is grazed by the animals of the owner of the private grazing land. Accordingly more than 40.2 % from the lowland and 41.2 % from the midland and 47.2 % from the highland part of the sampled households gave priority to calf and dairy in feeding private grazing land (enclosure) and crop residues plus other feed. Pregnant animals and oxen were also given priority in feeding of crop residues and other feed (Table 4).

Table 4. Livestock feeding priority

Priority of livestock type given	Lowland (%)	Midland (%)	Highland (%)
Calves	41.2	17.7	20.8
Pregnant cow	9.3	5.2	5.2
Lactating cow	40.2	22.9	42.7
Bull	9.3		2.1
Oxen	-	54.2	19.2

3.3.2. The causes of grazing land deterioration

The causes of animal feed shortage in the study area vary from one agro-ecology to the other agro-ecology (Table 5). The respondents showed differences in opinion as to the cause of feed shortage of rainfall 69.1 % from the lowland, over grazing 47.9 % from the midland and 58.2 % from the highland and insufficient grass is common throughout the agro- ecology

Table 5. Cause of grazing land deteriorations

Cause of grazing land deteriorations	Lowland (%)	Midland (%)	Highland (%)
Shortage of rainfall	69.1	17.7	20.45
Over grazing	7.2	47.9	58.2
Bush encroachment	21.9	1.0	12.95
Insufficient grass	5.2	17.7	4.2
Distance from water point	7.3	39.6	4.2

3.4. Crop residues

Crop residues were used during the rainy season to supplement the limited nutrients obtained from communal grazing land (Table 6). As information obtained from group discussions crop residues feeding begins from February and extending up to July quickly after threshing the crops especially in the high land area mostly. Crop producers 40.6 % of the sampled households in the study areas, about 40.6 % the highland 39.9 % from the midland and 15.5 % from the lowland areas feed their animals come from crop residue as the second (2nd) rank source of livestock feed. As crop producers 40.6 % and 39.6 % in the highland and midland respondents used crop residue of different crops (tef, maize, wheat, barley) feed their livestock.

Table 6. The major Livestock feed resource of the study area

Feed recourses available	Lowland (%)	Midland (%)	Highland (%)
Natural pasture (grass from grassland)	79.5	55.3	52.0
Crop residue (maize stove, wheat/barley straw)	15.5	39.6	40.6
Fodder tree	3.1	3.1	4.2
Stubble grazing	-	2.1	2.1
Improved forage varieties	-	-	-

According to HHs interviewed from the study area 52 %, 14 % and 44 % of from the lowland, midland and highland parts of the area utilizes natural pasture in Ganna season respectively (Table 7). 100 % of households in the highland of the study area utilize natural pasture throughout the year. Dry season was the critical feed shortage in the study area agro-ecologically the lowland and midland districts faced critical feed shortage during dry season.

Table 7. Season of natural pasture utilization

Season	Lowland %	Midland %	Highland %
Ganna	52	14	44
Bona	35.1	44.8	56.3
All the year	41.2	53.1	100.0
Season of critical feed shortage			
Ganna	9.3	5.2	10.4
Bira	3.1	9.4	7.3
Badhessa	1	22.9	6.3
Dry	85.6	57.3	50.0

The main sources income of respondents from the study area depends up on sale of livestock and livestock product 58.7 % from the lowland, sale of livestock and livestock product and sale of crops 62.5 % from the midland, sales of livestock and livestock product and sale of crops 49 % from the highland of the study area.

Table 8. The main source income of respondents

Source income	Lowland %	Midland %	Highland %
Sale of livestock and livestock product	57.7	26.0	21.9
Sale of crop	7.2	9.4	28.1
Sale of livestock and livestock product and Sale of crop	34.0	60.4	41.7

The major traditional range land management practices (Table. 9) of the current study was conservation of grazing area (kalo) 38.1 % from the lowland and 37.5 % conservation of grazing area (kalo) from the highland, conservation of hay, straw and others 49 % from the midland areas.

Table 9. Rangeland traditional management practice of respondents

Major activity performed of traditional rangeland management practice	Lowland (%)	Midland (%)	Highland (%)
Conservation of grazing area (kalo)	38.1	14.5	27.1
Conservation of crop residues (hay, straw and others)	18.6	49.0	34.4
Moving animals to abundant feed during dry season (rotational grazing)	36.1	34.4	37.5
Migration to other relatives	35.4	2.1	-
Burning of grazing lands (bush and tick control)	-	-	1.0

3.5. Improved forage development and their utilization

The utilization of improved forages to livestock in the form of cut and carry 18.8 % and 10.4 % the midland and the highland of the sampled households have improved forages during the dry seasons. The main reasons why low forage used by farmers could be due to shortage of land, lack of forage seeds and awareness about the importance of the improved forage species.

Table10. Utilization of improved forage

Forage species	Lowland (%)	Midland (%)	Highland (%)
Vetch	-	6.3	5
Oat	3.1	10.4	18.8
Alfalfa	1.0	3	5
Elephant grass	2.1	5.5	11.5

3.6. Feed related animal health problem

Feed-related animal health problems also occurred in the high and medium altitude zones. During the wet season

grazing lands contain a significant proportion of *Trifolium* species which was grazed prior to full blooming may causes bloating of animal rumen. This study is in line with the study of [14]. The incidence of bloating was quite high and affected animals often died within a short period of time especially in the mid wet season. Locally available poisonous plants that affect animals were Bati, Qobboo, Furfura, Abbayi and Quru were observed from the study area (Table 11).

Table11. Frequency of occurrence of bloating in different seasons in the study areas

Agro-ecology	Categories	Percentage (%)
Highland	Beginning of wet season	19
	Mid of wet season	45.5
	End of wet season	35.5
Midland	Beginning of wet season	42.0
	Mid of wet season	35.0
	End of wet season	33.0
Lowland	Beginning of wet season	30
	Mid of wet season	70.0
	End of wet season	-

Most farmers interviewed when bloating occurred to animals they use traditional methods of treatments such as giving *Araki* (local beverages) and food oil. One method for preventing and controlling the problems toward to bloating they keep grazing animals away from *Trifolium* pasture during the vegetative growth stages. In addition to this, feeding animals with hay and straws before animals start grazing is also indicated to reduce the risk of bloating is validated with the study of [14].

3.7. Watering management

Watering frequency of different animal species (Table 12), most of the farmers interviewed in all agro-ecology animals watered once in a day whereas 31 %, 57.1 % and 39.8 % of the farmers offered water two times a day in the highland, midland and lowland areas, respectively during the dry season. Among the owners of livestock keepers 43 % of the farmers were able to provide water adequately in the highland.

Table 12. Percentage of respondents using different frequencies of watering to their animals during dry season in the study area

Categories	Watering frequency	Highland (%)	Midland (%)	Lowland (%)
Cattles	Adequately	43	23.7	32.4
	Once in a day	31	57.1	39.8
	Twice in a day	15	10	27.8
	>Twice in a day	11	9.2	-
Small ruminants	Adequately	56.5	7.3	29.2
	Once in a day	25	64.6	70.8
	Twice in a day	11.5	18.8	-
	>Twice in a day	7	9.3	-
Equines	Adequately	87.5	42	15.5
	Once in a day	8.4	26.7	56.7
	Twice in a day	1.0	23	27.8
	>Twice in a day	3.1	8.3	-

Furthermore, in the lowland area, livestock traveled long distance (> 6 km) to reach water points compared to the midland and highland areas (Table 12).

Table 13. Percentage of respondents traveling different length of distance to watering points in the dry season

Distance traveled	Highland (%)	Midland (%)	Lowland (%)
< 1 km %	56.8	38	12
1-5 km %	29.4	26.4	36.9
> 6 km %	4.80	35.6	51.1

The main sources of water in all agro-ecology during the dry season were pond followed by springs. However, during the wet season, rivers were the main source of water in the highland while ponds were the major source of water in both the midland and lowland areas.

CONCLUSION AND RECOMMENDATIONS

In this study, assessment of major livestock feed recourse utilization and constraints practices were conducted in livestock production systems of highland and mid agro-ecology of mixed-crop livestock and livestock production systems of lowland area. In mixed farming system of the highlands and mid agro-ecology crop production is common and day to day activities of the people and cattle rearing were the major activities of the

lowland pastoralist. Cattle are the most important livestock species of households for their day to day activities such as cultivation, threshing, transporting and income source. Communal and private grazing lands were the main source of livestock feed with poor management of the resources. Natural pasture, crop residues, crop stubbles, browse trees were the feed resources of the study area. Overall, the main constraints of livestock production and productivity can be summed up as feed shortage, drought, overgrazing and unwise utilization of feed and feed resources due to high number of livestock was added to further deterioration. Therefore, to sustain the production system in the study area the following points are recommended,

- Improve the current condition of communal rangelands through management of degraded areas by awareness creation
- Further research and development work should be encouraged to alleviate dry season feed shortage through different options such as utilization of non-convention feeds, forages development program, use of irrigation, alternative means of crop residue utilization and conservation practices
- Provision of strong extension services to farmers for feed resource development and training in basic principles of collection, storage of harvested feed resources and crop residues should be sought.

4. REFERENCES

1. Legesse G, Siegmund-Schultze M, Abebe G. (2010). Economic performance of small ruminants in mixed-farming systems of Southern Ethiopia. *Tropical Animal Health Production World Journal of Dairy and Food Science* 4(2):185-192.
2. Sefa S. (2017). Estimation of feeds and fodders for livestock population of Ethiopia and mitigation of feed shortage. *Journal of Natural Science and Research* 7(11):45-49.
3. Alemayehu M, Gezahagn K, Fekede F, Getnet A. (2017). Review on major feed resources in Ethiopia: conditions, challenges and opportunities. *Agricultural Science and Research* 5(3):176-185.
4. CSA (Central Statistical Authority). (2015). Agriculture Sample Survey. Report on Livestock and Livestock characteristics, Addis Ababa, Ethiopia.
5. Ahmed H, Abule E, Mohammed K, Tredate A.C. (2010). Livestock feed resources utilization and management as influenced by altitude in the central high lands of Ethiopia. Ethiopia.
6. Sere C, Ayantunde A, Duncan A, Freeman A, Herero M, Tarawali S, and Wright, I. (2008). Livestock production and poverty alleviation-challenges and opportunities in arid and semi-arid tropical rangeland based systems.
7. Teferi A, Erbo A, Zewudu, T. (2010). Livestock-rangeland management practices and community perceptions towards rangeland degradation in Southern omo zone of Southern Ethiopia. *Livestock Res Rural Dev.* 22.
8. SNNPRS (Southern nation Nationalities and Peoples Regional state). 2008. The southern nation Nationalities and peoples regional state resource potential and investment opportunities, Hawassa, Ethiopia.
9. Zewdie W. (2010). Livestock production systems in relation with feed availability in the highlands and central rift valley of Ethiopia. An MSc thesis presented to Haramaya University. 160p.
10. Melese G, Berhan T, Mengistu U. (2014). Effect of supplementation with non-conventional feeds on feed intake and body weight change of Washera sheep fed urea treated finger millet straw. *Greener Journal of Agricultural Science* 4(2):067-074.
11. MoFED (Ethiopia Ministry of Finance and Economic Development). 2010. National Accounts statistics (GDP) Estimates, Addis Ababa, Ethiopia.
12. CSA (Central Statistical Agency). 2010. Agricultural sample survey report on livestock and livestock characteristics. Statistical Bulletin 532. Addis Ababa, Ethiopia.
13. Lemma G. (2002). Crude protein and mineral status of Forages grown on pelvic vertisol of Ginchi, central highlands of Ethiopia. PhD dissertation Presented to the University of the Free State, Bloemfontein