

Assessment Study on Livestock Feed Resource, Feed Availability and Production Constraints in Maale Woreda in South Omo Zone

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Abstract

The study was carried out in Maale Woreda, in South Western Ethiopia aimed to assess feed resource, feed resource availability and feed production constraints. Six Kebeles per Woreda were selected and one focus group discussion which comprised 12 pastoralists per kebele were identified and interviewed. For the key informants' interview, two livestock production experts from Woreda Livestock and Fisher Resource development Office and six livestock developmental agents from representative kebeles were interviewed. The focus group discussion and key informants interview was used to collect primary data on feed resource, feed resource availability, feed conservation practices and feed resources utilization and major livestock feed constraints. The study results shown that grass from the open grazing land, indigenous browse species and crop residues were major feed resources for the livestock in to study area. The open grazing land had poorly managed and the biomass productivity generated from open grazing land has been retreated. The major livestock feeding system was free grazing and Agro pastoral communities had no trends of conserved feed and provided concentrate supplements to the livestock. There were lack of low quality feed improvement and trends of growing the cultivated fodder species production practices. The 83,783.60 tons of dry matter was produced from different feed resources in the Maale Woreda with deficit of 623,333.40 tons of dry matter per year. The climate change, expansion of cropping land, increments in human populations, lack of inputs and training were identified as livestock feed production constraints in to study area. The migration, supplementations and purchasing available feed were important coping strategies toward feed shortage in to study area. Generally, the results from this study demonstrated that the total dry matter produced from different feed resources in to the study area was not enough to satisfy the dry matter requirement of livestock to support the profitable livestock production in to the study area, which suggest that the primary focus needs to be improving the existing feed resources through rehabilitation of degraded grazing areas, introduction adaptable fodder production, improving feed utilization practices and introduce and promote the crop residue feed improvement technologies.

Keywords: Agro pastoralists; Feed resource; Feed availability, Feed constraints

Introduction

Ethiopia is home, excluding some non-sedentary area of country such as pastoral areas of Afar and Somali regions, to approximately 56.71 million of cattle, 29.33 million of sheep, 29.11 million of goats, 1.16 million of camels, 56.87 million of chickens, and 2.03 million of horses 7.43 million of donkey and 0.40 million of mules [1]. The livestock have served for rural communities as sources of food, traction, manure, raw materials, investment, cash income and social and cultural identity [1]. Despite of these merit functions, the productivity has generated from the livestock is in generally low [2] due to both socio-economic and technical limitations [3]. Among the technical constraints, shortage of feed is the major one that contributed to low productivity performance in Ethiopia [4]. In to the study area, in general, South Omo, livestock production system is entirely having depended on the feed from range forages [5]. However, the productivity generated from these feed resource is under extensive deterioration along with ever-increasing deforestation for agriculture, fuel wood gathering and recurrent drought [5,6]. This is recalls that the research approach may need to focus on those areas due to currently, the information's are lacking mainly on livestock feed resource availability, feed productions, feed utilization and feed production constraints. Furthermore, understanding the existing situation regarding to the feed production status, feed production constraints and opportunities in the study area is one of the appealing strategies in order to call policy makers, pastoralists and other relevant stake holders in order to diagnose the problems and suggests interventional measures to alleviate the

problems. Therefore, this study was designed to assess feed resource, feed resource availability and feed production constraints (Table 1).

The Study Methodologies

Descriptions of the study area

Maale Woreda is one of the eight Woreda located in South Omo Zone which covers an area of 1,432 square kilo meters. The altitude of the Woreda ranges between 600-1500 m above sea level and astronomical located at 5.08N-6.01N attitudinally and 36.30E-37.0E longitudinally. It had comprised 40% mid-altitude which ranging from 1000-1400 m a.s.l and whereas, 60% is low lands which has been ranging from the 605-999 m a.s.l. The mean annual rainfall which ranging from 800-1200 mm with mean annual temperature has lain between 18-35°C. The agro-pastoral production is the farming system has prevailed in the study area for the last four decades. The male Woreda have 363,291 cattle, 82,916 sheep, 462,280 goats, 226,904 poultry, 12,256 equines and 2870 donkeys [7-9].

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Grazing Land	Area covered in (ha)	Productivity t/ha	Total dry matter production (in tons)
Private	4,948.00	3	14,844
Open grazing	15,938	2	31,876
Road Side	2948	2	5,896.00
Fallow Land	1939	1.8	3,490.20
Total Land Covered	25,773.00	-	56,106.20

Table 1: Total grazing land (ha) and estimated tons of dry matter from different grazing land in Maale Woreda.

Crop Species	Area (ha)	Total DM (tons)
Maize	7,840.7	15,681
Sorghum	4,147.60	10,369
Teff	200	300
Haricot Bean	500	600
Finger Millet	193	482.5
Banana leaf	98	245
Total	12,979	27,677.40

Table 2: Total cropped land (ha) and estimated tons of DM from major crops in Maale Woreda.

Study design and data collection methods

The focus group discussion (FGD), key informants interview and field observations were used to collect the primary data on feed resource, feed resource availability, feed and production constraints. Pastoralists, agro-pastoralists, local leaders, administrators, livestock production experts and livestock extension workers were used as source for primary data collection in this study. Moreover, the researchers also had observed the conditions of communal grazing land in to the study area during their field data collection periods in to study area. The secondary data on livestock population, feed resource and feed resource availability were collected from Woreda Livestock and Fisher Resource development Office. Secondary data on annual and perennial crops and the amount of crop residues in the selected area was also collected from which the amount of crop residues that are used as a source of animal feed were estimated using established conversion factors [7]. The quantity of feed DM obtained annually from different land use type was determined by multiplying the hectare under each land use type according to the recommendation of by using the conversion factor of 2.0, 3.0, 1.8 and 0.7 t DM/ha/year were used for communal grazing land, private grazing land, fallow land and indigenous browse respectively. The livestock population per household was converted to tropical livestock unit (TLU) [9] for local breed livestock. The DM requirement was calculated based on daily DM requirement of 250 kg (an equivalent of one TLU) for maintenance [10] recommendations for tropical cattle (Table 2).

Focus group discussion (FGD)

Six kebeles such as Boshikoro, Woyiynsa, Tikiboko, Lemo kalendo, Gudo and Ganto were selected in consultation with Woredas' Livestock and Fisher Resource Office and BRACED project, Farm Africa of Jinka Coordination Office for focus group discussion. One focus group discussions which was consisted twelve pastoralists (8 Men and 4 Women) was held at each study kebele and totally 72 pastoralists who have better experience in livestock and feed production were selected and interviewed. The livestock feed resource, feed resource availability, feed conservation practice, feed conservation methods, livestock feed resources utilization, major livestock feed constraints and opportunities for livestock feed production existed in to the area and feed shortage mitigation strategies were an important issues discussed during the focus group discussions.

Key informant interviews

Pertaining to key informant's interview, 14 key informants (Two livestock production experts from Woreda and 12 livestock developmental agents from interviewed kebeles were identified and interviewed. The livestock feed resource, livestock feed resource availability, major livestock feed constraints, opportunities for livestock feed production existed in to the area, feed shortage mitigation strategies, new livestock feed technologies, adoption and dissemination rate of new feed technologies by pastoral communities, alternative livestock feed and extension services on livestock feed production to pastoral communities were also an important issues that had been discussed during the discussions with key informants in study Woreda.

Field observations

The field observation was made by the researchers to enrich the data about livestock feed available and communal grazing land conditions and management of communal grazing land were monitored and observed during their field data collections.

Methods of Data Analysis

The qualitative information gathered from focus group discussions on livestock feed were triangulated and analyzed. Furthermore, during focus group discussions, proportional pilling method was used by using piles of local materials such as stones and seeds in order to represents the percentage shares of major livestock feed and Bar graphs used to presented the proportional shares.

Result and Discussions

Major livestock feed resource

Agro pastoralists that the natural pasture, crop residues and browsing species are the major livestock feed resource in to the study area reported. The crop residues come from maize stover, sorghum straw; *teff* straw and finger millet stover. Furthermore, agro pastoralists and key informants reported that Banana leaf, Banana stem, Pumpkin and locally produced brewery called atella are also alternative feed resource has used in to area as supplementary feed resource for fattening purpose. Agro pastoralists ranked 45%, 32% and 21% of major livestock feed were come from the open grazing land, crop residues and indigenous browse species respectively. In support to present study, the study [5] in pastoral areas of Bena-Tsemay, had shown that 80-90% major feed resources for livestock feeding was comes from open communal grazing land. Moreover, the crop residues have been used as the second major feed resources in to study area. The study [11] indicated that the crop residues contributed major feed resource next to communal grazing area which similar to idea reported by agro pastoralists from the current study. The indigenous browse species have donated the valuable tons of dry matter in to the study area as being major feed resources during dry seasons. In support with present results, the study made in Dassench Woreda [6] had shown that the most of the Dassech pastoralists have been utilized browse species as important feed resource next to natural pastures during dry seasons (Figure 1).

Feed resource availability

During the focus group discussion and key informants interview, respondents reported that there was occurrence of feed shortage for the last 5 years. According to the respondents frequent climate variability, deterioration in grazing land due to over grazing, expansion of farming land and increments in human and livestock population are a major identified shocks that has laid low availability feed to their livestock.

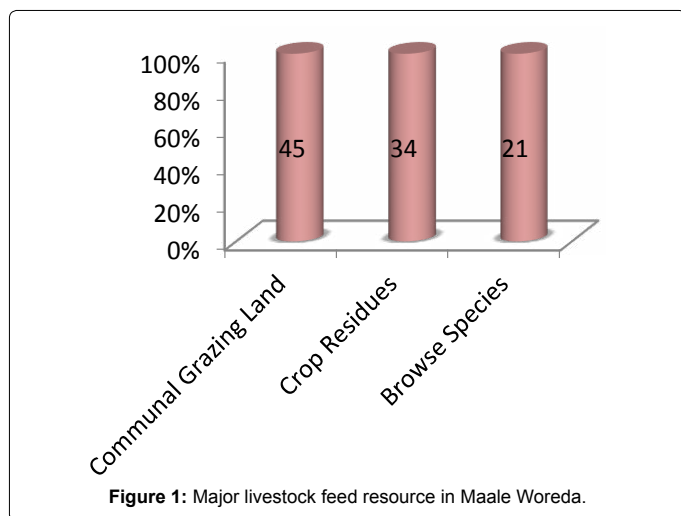


Figure 1: Major livestock feed resource in Maale Woreda.

Furthermore, elders were reported that the shortages of livestock feeds are more serious during the dry seasons which have started from November to end in March. In supports to findings from the current study, the studies made from Ethiopian [5,12] indicated that the quality and quantity of the available livestock feed resources had declined drastically during the dry seasons due to frequent drought occurrences. Furthermore, the conversion of communal grazing area in to cropping farm also another hindering factor that leads the low feed availability to the livestock feed is increments in human populations. Similar research funding [13] confirmed that the conversion of grazing land in to cropping land in Southern Ethiopia rangelands had a major impact on increased forage scarcity during dry seasons.

Feed conservation and feeding practices

According to focus group discussions with elders regards to feed conservation technologies, respondents replied that there are no any feed conservation technologies in to the area when livestock feed production is surplus. However, there is only trend of collection and storages of crop residues after grain harvesting for further use as basal diet. This is due to lack of awareness and shortage of land to produce the sufficient feed to conserve. Regards to the feeding practices, elders revealed that majority of agro pastoral communities had no supplemented their livestock with supplements due to poor awareness and lack of availability of modern inputs like commercial concentrate in to study area. However, in some area the model agro pastoralists have been traditionally fatten their indigenous cattle with locally available feeds such as pumpkin after grazing for six months. The research facts [14-16] have demonstrated that Hamer and Dassench pastoralists do not supply concentrate supplements to livestock which is in line with findings from the current study.

Feed quality improvement practices

With regard to feed quality improvement practices, the elders from group discussions reported that the majority of communities in to the study area have not used low quality feed improvement technologies in order to enhance the low quality feed. However, some elders had reported that some agro pastoralist communities have started quality improvement techniques such as chopping, soaking with water and cooking maize stover for 5 minutes during critical feed shortage seasons. The lack of low quality improvement technologies in to study area is due to having large number of livestock which made them impractical to feed their livestock and lack of awareness toward the technologies. Improvements low quality feed are imperative to improve feed intake

and digestibility of dry matter. As results of this study report had indicated that generally low quality feed improvement practices are not commonly utilized by the small holder farmers in Ethiopia due to lack of awareness, skill gap and lack of inputs [15,16].

Improved forage production practices

During the focus group discussions, the elders reported that majority of agro pastoral communities have no trends of growing improved forage species. This is due to shortages of land, lack of knowledge, lack of forage seeds, cuttings and splitting. However, in to the study area, some agro pastoral communities has been starting growing of improved forage species such as Rhodes, Elephant and Sudan grass species on their backyard, around their boarder area and on their farmland and have provided as supplements. According to them, inputs like forage a seed provision has carried out by the different non-governmental organizations. For example Farm Africa, Jinka Branch had provided Elephant grass cutting, Sudan grass, Rhodes grass and Cowpea seeds for Boshkoro kebele and also the established improved forage development site for demonstration of technologies by organizing agro pastoralists in to cooperatives. Mekoya et al. [17] reported that improved forage species are not well developed under the present Ethiopian conditions which are agreed with present study. Moreover, the contribution of improved forage crops to livestock supply in Ethiopia less than one percent which calls for further efforts from governments, research institutes and non-governmental organization in promotions of developing improved forage species through filling awareness gap and input provisions [1].

Dry Matter Production and Feed Nalance

Dry matter from grazing land

According to Livestock and Fisher Resource Development office (2016) report indicated that around 25,773 ha of the area land is covered by grazing land. From this area of land, the higher tons of dry matter (31,876) are produced from open grazing land and whereas, approximately the lowest tons of dry matter (3,490) feed is produced from fallow land. Adapted from Livestock and Fisher Office of Maale Woreda.

Dry Matter from crop residues

According to the Crop and Natural Resource office of Maale Woreda (2016) reports had demonstrated that 12,979.30 ha of land which covered by the cropping land. The agro pastoral communities in to study area currently has been produced crop residues from maize, *teff*, haricot bean, finger millet and sorghum. The crop residues are the second dominant feed resource in Maale Woreda next to open grazing land with supply of 27,677.40 tons of dry matter to feed livestock. Adapted from Crop and Natural Resource Office of Maale Woreda

Feed balance

The open grazing land, private grazing land, indigenous browse and crop residues were used to calculate feed supply for livestock in to the study area. The total of 83,783.60 tons of dry matter per year was produced (Table 3).

Based on 2015/2016 Fisher Resource office livestock population data Maale Woreda had on average 308,823.30 Tropical Livestock Unit (TLU) which comprised (254,303.70 cattle, 8,291.60 sheep and 46,228 goats) in Table 4. Assuming that dry matter requirement for maintenance of one TLU is 6.25 kg/day (2.28 ton/year/TLU) and the total yearly requirement by the dominant livestock species (cattle, sheep and goats) is about 704,117 tons of dry matter per year per Woreda

Grazing Land	Area (ha)	Productivity t/ha	Total DM (tons)
Private Grazing	4,948	3	14,844
Open Grazing	15,938	2	31,876
Road Side grazing	2,948	2	5,896.00
Fallow Land	1,939	1.8	3,490.20
Crop Residues	12,979	-	27,677.40
Total Land	38,752	-	83,783.60

Table 3: Total feed supply in Maale Woreda.

Livestock Species	Livestock population in TLU	DM requirement/h/year	Total DM (tons/year)
Cattle	2,54,303.70	2.28	579,812.44
Sheep	8,291.60	2.28	18,904.85
Goat	46,228	2.28	105,399.84
Total	308,823.30	-	704,117.10

Table 4: Annual dry matter requirement (tons) per livestock species in Maale Woreda.

Shawn in Table 4. As it had been calculated the total DM produced in the Woreda from different feed resource is 83,783.60 tons in Table 3 which has been showing that a deficit of 623,333.40 tons of dry matter per year per Woreda. In generally, the feed balance data shown that the dry matter produced in to the study area per year is imbalanced with the minimum maintenance requirements of dominant livestock species. This is further recalled that there is need to introduce the feed improvement interventions in to the study area in order to save the livestock.

Livestock feed production constraints

Climate variability: The climate change is one of the non-technical livestock feed production constraints in to the study area which has been affected livestock production through induce decline in pasture availability. Agro pastoralists and experts reported that before last 10 years back there is surplus feed production due to sufficient rainfall with normal distribution and however, in this century, communities have been faced shortage of livestock feed in to study area due to greater variability in rainfall patterns. The pasture availability from the grazing land is currently expected to decline due to climate change an induced effect which corresponds to reports from the current study [18].

Expansion of cropping land: The expansion of the cropping land was another factor that reported by the communities in to the study area. The expansion of cropping land had put pressure on grazing land by facilitating the shrinkage in grazing and damaging water sources. This conversation of grazing area in to cropping land in to study area is due to the increases human populations at alarm rate and this forced to cultivate land to provide food to the family. In support to results from the current study, the study [19] shown that currently shortage of grazing land has occurred small holder communities due to expansion of crop lands.

Lack of inputs: Agro pastoral communities in to the study area reported that absence of any agricultural inputs which will be promoted feed production such as forage seed, cutting and splitting materials are identified as an important livestock feed constraints that increase the livestock feed scarcity in to the area.

Coping Mechanism to Ward Livestock Feed Shortage

Supplementation with locally available feeds: Agro pastoral communities in study area have supplemented cattle such as farm oxen, milking cows and calves with locally available materials such different leaf of indigenous species, Banana stems and leaf, pumpkins and locally produced brewery called atella. study made from the South

Omo demonstrated that pastoralist in different parts of South Omo supplementing their livestock such as lactating cow, sick animals, kids and lambs with grasses, leaves of and pods of browse species as coping strategies toward the feed shortage during dry seasons as coping mechanism to ward feed shortage [5,6,14].

Utilization of crop residues: Agro pastoral communities have developed trends of collecting the crop residues from maize stover, *teff* straw, sorghum straw, haricot bean haulms and finger millet stover and stored for the further used to mitigated critical feed shortage by provided either mixed each other or presented lonely as basal diets to animals.

Migrations: Agro pastoralists' communities have practiced herd mobility as coping strategies toward the feed shortage. The communities had reported that they have trends of moving their cattle to the area where surplus pasture available such as Daramalo in Gamgofa zone and Maze Park and back to their home when the pasture conditions will be secured. The study [5] indicated the Hamer and Bena pastoralist have mobilized their cattle toward the Mago Park during the recurrent drought and deterioration of grazing lands Moreover, Worku and Nigatu report indicated that pastoralists from Dassench communities mobilized their livestock toward the Island (Dasset) as coping mechanism toward the feed shortage to the area during the frequent drought occurrences.

Purchasing livestock feeds: Agro pastoralists and experts had reported that in to the study area, the communities purchased livestock feeds such as grass hay, straws and maize grain in order to save their cattle populations during critical feed shortage from the local market. For example they reported that during the 2015/20016 drought occurrence due to Elino effect, agro pastoralists had purchased one bale of grass hay and *Teff* straw by the 80-160 ETB from the Senegal kebele of South Ari Woreda. The study [16] demonstrated that small holder farmers in Lemo and Soro woreda have trends of purchasing the locally available supplementary feeds during the dry seasons as coping strategies toward the feed shortage which corresponds to findings from the current study.

Conclusions and Recommendations

The open communal grazing land, indigenous browse species and crop residues are major feed resources in to the study area. The productivity generated from this open communal grazing area has been retreated. There were lack of low quality feed improvement and trends of growing the cultivated fodder production strategies in to the study area. The total dry matter produced from different feed resources in to the study area was not enough to satisfy the dry matter requirement of livestock. The climate change, expansion of cropping land, lack of inputs were identified as livestock feed production constraints in to study areas and whereas, migration, supplementations and stored the crop residues were important coping strategies toward feed shortage. Based results from the current study the following recommendation were made.

A) The study described that the contribution of the open grazing area is retreating from time to time and livestock may not fulfill the dry matter requirements. Therefore, this is calls interventions that improve the productivity of retreating grazing areas such as rehabilitations of retreated grazing area through the introduction and promoting area closures, over sown with locally adaptable legume forages and fertilization with livestock dungs and droppings.

B) In this study it was indicated that there is no trends of growing cultivated fodder species in to study area. Therefore, it is recommended

that the development and promotions of adaptable cultivated fodder species is one appealing strategies.

C) To improve livestock feed supply by using different interventions; it is also imperative in upgrading pastoralists' skill through the provisions of training on proper feed resource management, feed conservation techniques and feed quality improvements techniques.

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