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Original Article

Assessment of livestock production and available feed resources in Bedele District

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ABSTRACT

The study was conducted in Bedele district, Bunno Bedele Zone of Oromia regional state from December to February aimed to assess livestock production system and available major livestock feed resource. Single-visit-multiple-subjects formal survey technique was used to collect data with the use of pre-tested, semi-structured questionnaires prepared in the local language. The collected data was managed and organized with MS-Excels (2007) and was analyzed using the Statistical Package for Social Sciences (SPSS) (version 20). The major livestock production constraints in the study area were feed shortage followed by disease, water scarcity and low genetic potential. Natural pasture and crop residue were the main livestock feed resource in Bedele district. An average of 12.44 tons of feed dry matter was produced per household from the major available feed resources, in which 83.58% was obtained from crop residue. The total annual feed dry matter produced in the study area was significantly higher ($P<0.05$) in rural (14.84 tons) than in the peri-urban (5.96 tons) kebeles. Overall livestock feed balance in terms of dry matter yield showed that a total of 1492.4 tons of DM (tDM) per annum was produced for a total TLU value of 796.49 and 1816.8 tDM is required with a negative balance of 324 DM. Hence, the study indicates that the available feed DM satisfy 82.16% of DM requirement for both rural and peri-urban kebeles.

Keywords: Feed resource, livestock, Bedele district, dry matter.

INTRODUCTION

Livestock production is a fundamental part of the agricultural sector in developing countries including Ethiopia. Livestock farming plays a vital role in smallholder farmers and livestock owner economy by providing meat and milk for family

consumption and also serve as a source of additional income (Ehui *et al.*, 2002). In terms of contribution to the national economy, livestock contributes about 13–16% of total Growth Domestic Product (GDP) and the share to total exports is about 16% (Yayneshet, 2010). Despite this, the productivity of livestock is low mainly due to factors such as poor genetic makeup of local animals, poor nutrition, climate and poor veterinary care are the major limiting factors of the industry (Lamy *et al.*, 2012) 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 (Menbere *et al.*, 2008).

Natural pasture and crop residue contribute to the largest feed type in Ethiopia. Improved pasture and forage, agro-industrial by-products, other by-products like food and vegetable refusal and poultry litter are used as animal feed resources in small extent in a different part of the country (Asmare and Mekuriaw, 2017; Miresa *et al.*, 2019). Under the smallholder livestock production system, animals are dependent on a variety of feed resources which vary both in quantity and quality (Assefa *et al.*, 2013). To increases the productivity obtained from livestock sector the available feed resource should satisfy the requirement by the animals. However, there is inadequate documented information regarding the assessment of feed resource in Bedele district. The available livestock feed resource, their nutritional quality, feeding practice and livestock production system in Bedele district are not studied and documented. Therefore, the main objective of this study was to assess the livestock production system and the major available feed resources in Bedele district

MATERIALS AND METHODS

Description of the study area

The study was conducted in Bedele district, Bunno Bedele zone of the Oromia Regional State located 483 km South-West of Addis Ababa. Bedele town has a longitude and latitude of 8°27′N36°21′E with an elevation ranging between 2,012 and 2,162 meters above sea level (BWARDO, 2018). The total land area of Bedele Wereda is 1,678.44 square kilometres. The average annual rainfall is 1000-1500mm and the annual minimum and maximum temperature is 24 ^{0}C and 26 ^{0}C, respectively. The mixed crop-livestock production system was a farming system characterized in Bedele district. The common crops cultivated in the district are teff, sorghum, finger millet, maize, coffee and wheat. The livestock population of Bedele is estimated to be 0.19 million cattle, 0.06 million goats, 0.05 million sheep, 0.03 million Horses, 0.00575 million Mule and 0.0085 million donkeys (BWARDO, 2018).

Data collection methods

Both primary and secondary data source were collected during the study period. Single-visit-multiple-subjects formal survey technique was used to collect data with the use of pre-tested, semi-structured questionnaires prepared in the local language (Afan Oromo). The primary data were collected from the questionnaire survey during the study. Secondary data on climate, soil, topography, agro-ecology, and human population and livestock production constraints were collected from District and Zonal Offices. The primary data was collected using a semi-structured questionnaire from December to February 2018. Focused Group Discussions (FGD) was held with elders, key informants, and development agents and district administrative officers.

Sampling Procedures and Determination of Sample Size

Information was obtained from Bedele Wereda of Agriculture and Rural Development office on the locally developed organizational structure of the

Kebeles (lowest administrative unit). First, rural and peri-urban potential Kebeles were purposively selected base on their livestock population. Consequently, two kebeles each from peri-urban and rural areas were selected for the study. This was followed by a random selection of 30 households from each of the four Kebeles. Thus, a total of 120 households were used to collect both the primary and secondary data on the major feed resource available in the study areas. The sample size of the participating households was determined using the following formula developed by Slovin. n=N/ (1+ (N×e2)). Where: n=Number of samples, N = Total population and e= Error tolerance

Single-visit-multiple-subjects formal survey technique was used to collect data with the use of pre-tested, semi-structured questionnaires prepared in the local language. The primary data collected included the socio-economic characteristics of the respondents, livestock population, herd size and structure and livestock management practices. Data collected also included locally available feed resources (pasture and forage crops, crop residues, other roughage feeds, energy, protein and non-conventional feed resources), feeding practices/system, sources of feed acquisition, the ranking of feed resources, practice of feed supplementation and practice of improved forage production and monthly feed expenses. Secondary data was collected from the district and Zonal Offices special emphasis placed on the quantity of feed resources available in the area and on crop production and land use patterns. Secondary data on annual and perennial crops and the amount of grains produced in the selected area were collected. These were used for the estimation of the amount of crop residues and by-products that could be generated as animal feed.

Study Design

The cross-sectional study design was used and cross-sectional visit of the study area was made for close observation of the overall livestock population and the available feed resource estimation. Focused Group Discussions (FGD) was held with elders, key informants, and development agents and district administrative officers working on the study areas to collect secondary data. Additional information on the potential Kebeles, livestock population and distribution and locally available major livestock feed resources were obtained from Bedele Wereda Office of Agriculture and Rural Development and locally developed organizational structure of the Kebeles (lowest administrative unit).

Annual feed resource production and livestock feed requirement estimation

The quantity of feed dry matter (DM) obtained from crop residues per household farm were estimated from crop yield to crop residue ratio using conversion factors of (FAO, 1987). Therefore, for a ton of maize stover conversion factor 2.0 was used, for a ton of wheat, barley and teff straw, the conversion value of 1.5 was used, while conversion Figures of 1.2, 0.7, 4 and 2.5 were used for the pea/and bean, finger millet, noug and sorghum, respectively. The quantity of feed dry matter obtained annually from different land-use types was calculated by multiplying the hectare of land under each land-use types by its conversion factors (FAO, 1987). Accordingly, the conversion factor of 2.0, 0.5, and 1.8 tDM/ha/year was used for grazing land, aftermath grazing and fallow land, respectively. The total feed dry matter produced was estimated by summation of dry matter from different feed resources. The annual dry matter produced was then compared with annual dry matter requirement of the livestock population (TLU) to estimate the discrepancy. For the standard TLU 250kg dual-purpose tropical

cattle, a dry matter requirement was 2.5% of its body weight (6.25kg/day or 2281kg/year) was considered to calculate feed demand (Jahnke, 1982). Whether this is sufficient for maintenance and production depends on levels of energy, protein and essential elements, digestibility of nutrients and availability of water in the feed consumed (Jahnke 1982).

Data Management and Analysis

All data collected during study time were organized with the use of MS-Exceel (2010) and analyzed using Statistical Package for Social Sciences (SPSS) (version 20). Mean and percentage values of various parameters were compared between the two study sites

RESULTS AND DISCUSSION

Household Characteristics

Mean family size of the respondents was calculated to be 5.53±1.19 person/hh. The result obtained from the current study is lower than 6.54 and 6.7 person/HH reported by (Mogesse, 2006) for Awi zone and by (Kocho, 2007) for Alaba district, respectively. The age of the respondents varied between 17 and 67 years with an overall average age of 37.93±1.13 years. The mean family size of the respondents of rural and peri-urban kebeles was not significantly different (P>0.05). The age and sex of respondents among each kebeles were no significant differences (P>0.05). The study further indicated that 21.64% and 32.22 of the respondents were illiterate and able to read and write respectively. About 13.33% of the respondent in the study area have attended elementary school, while 19.45% and 12.74% of the respondents had secondary and tertiary level education respectively. The study areas with a higher literate population are expected to have an advantage in the acceptance of technologies like training, improved agricultural technologies and exercising better livelihood. Wondatir (2010) reported that about 89% of the respondents of the Highlands and Central Rift Valley of Ethiopia is literate, indicating that literacy rate varies from place to place and associated with various factors such as access to education, and lack of awareness about the importance of education.

Land Cover and Grain Yield of Major Crops

About 32177 ha of Bedele district land is currently covered by food crops (BWARDO, 2018). The overall mean cropland/hh of the current study was 1.64 ha, and rural areas had higher cropland than peri-urban areas ($p<0.05$). The mean cropland per household obtained in this study was lower than that (2.01) reported by Worku (2015) for Sekota district. The most dominant food crop cultivated in the study area was reported to be maize and sorghum followed by teff (*Eragrostis teff)*. This dominancy was due to the favourable environment of the areas for cereal grain production. The result of the current study showed that urban and peri-urban areas had significantly smaller land size allocated for crop cultivation as compared to the rural areas. Crop yield of the households in the study areas was influenced by the size of landholding/hh and the ownership of oxen for ploughing.

Landholding and Land Use Pattern

The overall landholding of the study area was 2.69±0.13 ha per household (Table 1). The average landholding of the peri-urban and rural areas is reported to be 2.08±0.18 and 3.30±0.18 ha per household, respectively. The mean landholding per household in a rural area was significantly higher ($P<0.05$) than that of peri-urban areas. The overall mean landholding per household encountered in the current study was higher than that (0.69 ha/hh) by (Lemma *et al.*, 2016) from Kedida Gamela District, Southern Ethiopia and lower than (3.8 ha/hh) value reported by(Yadessa *et al.*, 2016) for Meta Robi district. The average grazing land in the study area is estimated to

be about 0.72±0.05ha/hh. The average grazing land in the study area was higher than that (0.33ha/hh) reported for Bale highlands (Bogale, 2004). The relatively lower mean grazing land holding recorded from the current study might be attributed to the conversion of grazing land to cropland and the occurrence of grazing land degradation in the study area. In rural and areas, a higher proportion of land is used for crop production, whereas; in peri-urban areas, more than 50% of the household have no grazing land and reported to use different by-product and purchase crop residue and hay to feed their livestock.

Table 1: Average land-use patterns and holding size (ha) per household in peri-urban (N=60) and rural (N=60) Kebeles.

Land use (Ha)	Kebele (PA)		Significance
	Peri-urban ± (SE)	Rural ± (SE)	
Cropland	1.171±0.110	2.116±0.110	**
Fallow land	0.238±0.066	0.221±0.066	**
Grazing land	0.704±0.067	0.734±0.067	**
Total land	2.088±0.185	3.304±0.185	**

** = p< 0.05; SE = standard error; N= number of respondent

Table 2: Livestock holding and herd composition (TLU)

Types of livestock (TLU)	Kebele(PA)		
	Peri-urban N= 60	Rural N= 60	Overall (N=120)
	Mean ± SE	Mean ± SE	Mean ± SE
Cattle	3.498±0.433 [b]	5.202±0.433 [a]	4.350±0.306
Sheep	0.468±0.051 [a]	0.668±0.051 [a]	0.568±0.036
Goat	0.452±0.039 [a]	0.450±0.039 [a]	0.451±0.027
Equine	1.062±0.102 [a]	1.272±0.102 [a]	1.167±0.072
Poultry	0.057±0.008 [a]	0.079±0.008 [a]	0.068±0.005
Total	5.537±0.443 [b]	7.671±0.443 [a]	6.604 ±0.314

Means within the same row with different superscript letters are significantly different (P<0.05); SE = standard error; N= number of respondents

Livestock Management and Husbandry Practices

Livestock Population and Herd Composition

The total populations of livestock in the district were estimated to be 118825 TLU (BWARDO, 2018). The average cattle, sheep, goat, equine and poultry owned per household in the study area was calculated to be 4.350±0.306, 0.568±0.036, 0.451±0.027, 1.167±0.072 and 0.068±0.005 TLU respectively (Table 2). The result obtained from the current study (6.604TLU/hh) was lower than(Yayeh *et al.*, 2014) who reported an average TLU owned by a household of 7.32 for Debre Markos district and (Admassu, 2008) 9.87 TLU per household for Alaba district southern Ethiopia. The result shows that cattle is the dominant livestock species reared in the selected kebeles and rural kebeles farmers had more cattle than peri-urban kebeles (p<0.05). The rest of the livestock types kept in the study are not significantly different (p>0.05) among rural and peri-urban kebeles. The overall livestock population were significantly (*p*<0.05) higher in rural than peri-urban kebeles, which could be due to the presence of a higher area of grazing land and browse tree species in rural areas.

In rural areas, livestock keepers' adopted the strategy of having many animal species and high livestock population to cope with natural disasters. In contrast, peri-urban livestock keepers adopted the strategy of being selective and keep a few numbers of productive animals. The respondents indicated that the dominant species of livestock kept in the study areas was reported to be poultry followed by cattle. Poultry seems to be used as an immediate source of family cash income and easily manageable under the smallholder farming conditions. Preference in cattle keeping might be due to the requirement for oxen to use for traction power. The lower human population density in the rural area might also allow for more grazing land for livestock production which might be an additional reason for more cattle keeping in rural settings.

Reproduction and Production Performance of Livestock.

The data collected showed that there was variation in the reproduction and production performance of cattle and small ruminant in the study areas based on breed type and feed offered for the animals. Improved breeds of cattle (especially Holstein Frisian and jersey breeds) are commonly found in peri-urban areas of Bedele district kept for milk production. Exotic breeds of cattle found in the study area are reported to mature and reach for mating earlier. About 86.7% of peri-urban respondents indicated that the average age at first mating is one year. Contrary a majority of the rural respondent (95%) who kept a local breed of cattle indicated that heifers come to conception after three or more years and have mean lactation length of 4-6 months. Partition interval of the exotic breed of cattle kept in the peri-urban study area was also reported to be one year with lactation length of 9-10 months. Milk yield per cow per day is also reported to be about 8-12 litters on average. In contrast, indigenous cattle are commonly kept in the rural and areas of the study areas. The indigenous cattle are reported to be low in the reproduction and production performances mainly due to their poor genetic performances and lack of balanced ration. The average milk yield of the indigenous cows was estimated at 1- 2 litters/head. In peri-urban areas, farmers use artificial insemination in cattle breeding whereas, natural mating is commonly used in rural areas of the study areas.

Purpose of Livestock Keeping

Cattle are the most important component of the mixed crop-livestock production system of the study area. Oxen are used for traction to cultivate food crops. Cows are used for milking, work (draft power) such as threshing, manure as a source of fertilizer for crop production, saving as bank account and for prestige. Poultry and small ruminant are kept mainly as a source of direct cash income when the need arises and as a source of meat for the household in the study area. Equines are used primarily for the transportation of agricultural inputs from market to home and vice versa, water transportation. Similar results on the purpose of keeping livestock were reported by (Wondatir, 2010) in the Highlands and Central Rift Valley of Ethiopia; (Tassew and Seifu, 2009) in Bahir Dar milk shed area; and (Kebede, 2009) in Bure District. During festivals and religious celebrations, farmers in the study area slaughter sheep/goats for home consumption and additionally they slaughter oxen in a group for sharing the meat.

Livestock Housing condition

The results obtained identified four types of housing; open (simply tethered in house compound), corral (separate livestock fence construction), simple shed (separate house construction adjacent to a family dwelling), family dwelling (keeping in a family dwelling). In both rural and peri-urban study areas, the adult animals of all species

are housed in simple shed house. Calves are mainly kept in family dwellings, which might be due to the special care given for calves in avoiding death. Having separate houses for livestock is rare in the rural kebeles than in urban kebeles.

In peri-urban kebeles poultry is housed in separate shed whereas in rural kebeles it is perched within the family dwelling. The proportion of the respondent households that keep calves and poultry within family dwellings is higher compared to other species of livestock, possibly aimed at reducing vulnerability to predators and negative climatic conditions. Moreover, a greater percentage of rural household respondents reported keeping small ruminants within family dwellings as compared to peri-urban respondents. The results obtained in the current study was in agreement with that of (Wondatir, 2010) from the highland and central rift valley areas, (Anteneh, 2006) from Fogera district and (Tassew and Seifu, 2009) who reported from Bahir Dar and Mecha Districts.

Livestock Management and Labor dynamics

Cow milking is commonly done twice a day in the study area (i.e. in the morning and evening). About 75.8% of respondent indicated that milking is commonly done by female household in both rural and peri-urban areas. Children (29.9% of respondents) also play a minor role in milking in both rural and peri-urban study kebeles. Herd feeding and feed collection activities (collection of hay, crop residue and purchase of feeds) were reported to be the task of male members of the households (67.5%) and children (54.2%) in both rural and peri-urban kebeles. Livestock breeding is not considered as an important task assignment in rural areas due to the existence of the practice of natural mating. When controlled mating is used in the peri-urban kebeles, it is the task assignment of either male member of the households (35.9%). Vaccination and treatment of animals during disease outbreak are done by male members of the households in the study area. Similar results of labour dynamics (a division of labour) were reported by (Wondatir, 2010) from the Highlands and Central Rift Valley of Ethiopia.

Constraint to Livestock Production

According to the results of the survey conducted, the major constraints of livestock production were reported to be feed shortage and disease. This is in line with previous studies in different parts of the Country (Duguma *et al.*, 2012; Gurmessa *et al.*, 2016; Mulu, 2009). The majority (44.16 %) of the respondents in the study area indicated that feed shortage is the major livestock constraint, followed by disease (25.83%). The problem of feed supply was reported by about 53.33% of respondents from peri-urban and 35% of respondents from rural kebeles (Table 3). The major problems associated with animal feeds reported are deforestation, lack of pasture land, human population pressure, claiming more land for cropping and limitations in supplementary feeding. On the other side feed and feed-related problems such as shortage of feed supply, death of cattle due to bloating, less reproductive and productive performance of animals were listed as major constraints. Similar reports of feed-related problems were reported in other parts of Ethiopian highlands(Gizachew, 2002). Low genetic potential is also identified as a constraint of livestock production by respondents in a rural area of Bedele district. Grazing land shortage is also the other livestock production in the study area and the problem is partly associated with the expansion of croplands and land degradation. The results obtained in the current study were in agreement with that of(Assefa *et al.*, 2013) who reported similar

results from Adami Tullu Jiddo Kombolcha district.

Table 3: Constraint of livestock production in Bedele district

Problem	Peri urban(N = 60)		Rural (N = 60)		Overall (N = 120)		Rank
	Number	%	Number	%	Number	%	
Feed shortage	32	53.33	21	35.00	53	44.16	1
Water shortage	8	13.33	7	11.67	15	12.50	3
Disease	14	23.33	17	28.33	31	25.83	2
Genetic Potential	4	6.67	10	16.67	14	11.67	4
Others	2	3.33	5	8.33	7	5.83	5

N = number of the respondent; others = veterinary service, labour and change of grazing land to cropland

Table 4: Types of resources in the study area

No	Types of feed				
	Local name	**Common name (English)**		**Local name**	**Common name (English)**
1	*Kosii Lukkuu*	Poultry Litter	1	*Marga*	Natural Pasture (Hay)
2	*Qola Ruuzii*	Rice Bran	2	*Qola Boqqolloo*	Maize Stover
3	*Atalaa Biiraa*	Brewery Grains	3	*Afaa Margaa*	Grass Hay
4	*Raacitii Biiraa*	Brewery Yeast	4	*Cidii Qamadii*	Wheat Straw
5	*Cidii Xaafii*	Teff Straw	5	*Baala Mukkeenii*	Browse Species
6	*Daakuu Midhaanii*	Mill By-product	6	*Atalaa*	Atella

Feed resource and feed availability

The major livestock feed resources in the study area are presented in Table 4. During field survey farmers and other livestock owners were asked to provide the type of feed resource available in the study area. Accordingly, natural pasture, crop residue, improved forage grass such as Rhodes and elephant grass and fodder trees such as Sesbania, Leucaena and tree Lucerne are predominant in Bedele district. Natural pasture and crop residue are the major livestock feed resource during wet and dry season respectively. The result obtained from the current study agreed with the report of (Assefa *et al.*, 2013) who reported natural pasture and crop residue to be the major feed resources for Adami Tullu Jiddo Kombolcha district. Breweries by-products (brewery grain and spent yeast) are the dominant feed resource in urban areas of Bedele district.

Estimation of feed dry matter production

The average utilizable feed DM yields per household from different feed source were presented in Table 5. The annual dry matter produced from crop residue and the different land type was 10.332 and 21.764 for peri-urban and rural kebeles respectively. The average value of feed dry matter produced per household in a rural area was higher ($p < 0.05$) than that of feed DM produced in peri-urban kebeles. The higher dry matter produced from the rural area may be related to the larger landholding by individual household than peri-urban kebeles. A sizable amount of feed dry matter was annually obtained from crop residue in which maize stover contributes the highest proportion followed by wheat straw (Table 5). During the dry season, after harvesting of food crops, aftermath grazing is used as a potential source of animal feed in the study area.

In general, a total of 16.241 tons of feed dry matter (DM) per household were obtained from the major available feed resources in which 83.54% was obtained from various crop residues and the rest (16.46%) were obtained from different land use. The value of crop residues dry matter contribution obtained in the present study

was comparable to the findings of (Assefa *et al.*, 2013) and (Wondatir, 2010) who found that crop residues contributed to 74.57 and 86.38% of total feed DM production in Adami Tullu Jiddo Kombolcha district and Central Rift Valley of Ethiopia, respectively.

Table 5: Estimated annual feed dry matter obtained per household farm from a different source of feed

Source of feed	Feed production (t/DM)			
	Peri-urban	Rural	Grand mean	%
Maize	1.43±0.190	3.54±0.190	2.49±0.134	20.02
Teff	0.72±0.112	2.01±0.112	1.36±0.079	10.93
Finger millet	0.36±0.081	1.27±0.081	0.82±0.057	6.59
Sorghum	0.71±0.163	1.76±0.163	1.24±0.115	9.97
Pea	0.25±0.077	0.60±0.077	0.42±0.054	3.37
Bean	0.49±0.086	0.67±0.086	0.58±0.061	4.66
Wheat	0.90±0.157	2.49±0.157	1.70±0.111	13.66
Noug	0.51±0.118	1.44±0.118	0.97±0.084	7.79
Barley	0.59±0.094	1.06±0.094	0.82±0.067	6.59
Total crop residue	**5.96**	**14.84**	**10.4**	**83.58**
Grazing land	1.08±0.102	1.22±0.102	1.15±0.072	9.24
Aftermath grazing	0.37±0.066	0.80±0.066	0.59±0.046	4.74
Fallow land	0.31±0.059	0.29±0.059	0.30±0.041	2.41
Total DM	**7.72**	**17.15**	**12.44**	**100**

Table 6. Estimated annual utilizable feed DM produced, DM requirement for maintenance and feed balance per household in rural and peri-urban kebeles

Kebeles	Annual feed DM produced (ton)	Annual DM requirement for maintenance (ton)	Balance of supply vs requirement (ton)
Peri-urban	7.72	12.63	- 4.91(61.12%)
Rural	17.15	17.49	- 0.34 (98)
Grand mean	12.44	15.14	- 2.70 (82.16)
Total/district	1492.8	1816.8	- 324 (82.16)

Estimated annual feed balance

The average annual utilizable feed DM supply was estimated to be 17.15 and 7.72 total dry matter per household farm for rural and peri-urban kebeles, respectively (Table 5). Based on the suggested estimation by (Jahnke, 1982) the annual feed DM requirements for maintenances for rural and peri-urban areas was 17.49 and 12.63 ton DM, respectively (Table 6).

According to the result obtained in this study, about 1029 and 463.2 ton DM/year feed was produced from all feed resources in rural and peri-urban kebeles, respectively, whereas about 1049.4 and 757.8 tDM/year feed was the actual requirement for both locations, respectively.

The annual utilizable feed dry matter satisfied about 98 and 61.12% of the livestock maintenance requirement for rural and peri-urban kebeles respectively. From this study, it is concluded that the feed shortage was more serious in peri-urban than rural areas and it may be due to the shortage of grazing land and low production of food crop in peri-urban kebeles. The negative feed balance observed in this study was comparable with the result observed by(Assefa *et al.*, 2013) in Adami Tullu Jiddo kombucha district and(Admassu, 2008) in

Alaba Wereda and central Rift Valley of Ethiopia.

CONCLUSION AND RECOMMENDATION

The major livestock feed resource in the study area was crop residue and natural pasture. The amount of dry matter produced annually cannot meet the maintenance requirement of total livestock reared in the study area. The imbalance feed demand and supply indicated that feed shortage is the main livestock production constraint in the study area. The current study highlights that the shortage of feed was more serious in rural kebeles than peri-urban kebeles. To increase livestock productivity, the primary focus needs to be improving the existing feed resources through management, utilization practices and applying improvement practices such as treatment of crop residues, and improving the existing management system of grazing land. An effort to improve the productivity of the major feed resources for livestock requires collaborative efforts for the common well-being of the livestock producers in the study area. Therefore, beneficiaries as well as livestock and extension personnel, and agricultural research centres need to work together to formulate a strategy and implement a more productive and sustainable system to alleviate the feed shortage.

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