



Original Article

Assessment of Livestock Feed Resources, Feeding Practices and Coping Strategies to Feed Scarcity in Agro Pastoral Production System in Itang District, Gambella, Ethiopia

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Abstracts

The study was conducted in Itang district of Gambella, south-western Ethiopia with the objective to identify the available feed resources, feeding systems and coping strategies to feed scarcity under Agro pastoral system and pave the way suitable for research interventions for the improvement of livestock production and productivity in the area. Using random sampling technique, three kebeles each with 30 respondents were selected. A total of 90 respondents were interviewed to generate the data. Descriptive statistics such as mean, percentages, standard error and standard deviation were used to present the results. The result showed that the livestock feed resources was natural pasture (48.89%), browse trees (23.33%), crop residue (17.78%) and standing hay (10%). the use of improved forage as livestock feed was not practiced. the feeding system practiced was free and full-time grazing system (93.3%) and cut and carry system (6.7). The seasonal feed shortage and feed variability in quantity and quality are the major challenges affecting livestock productivity. The cause of feed resource shortage was shortage of rain (40%) followed by overgrazing (27%), flood (15%), over population (10%) and settlement of falata nomad tribe (8%). The coping mechanism to feed scarcity was herd mobility, burning of range land and use of fodder trees. Feed conservation in the form of hay as a coping mechanism for feed scarcity was not practiced. The study recommends that Government and research institutions should create Awareness on conservation of feed resource as hay at the time feed of abundance and encourage agro pastoralist to practice proper utilization of available crop residue, Introduction of improved forage technologies could help agro pastoralist to cope up with feed scarcity, Agro pastoralists should be encouraged to adopt the best coping strategies that can deal with the challenge of feed scarcity, and regional government with the concerned body shall adopt a policy that could limit or stop the influx of falata nomads from north Sudan in to Gambella region.

Keywords: Coping Strategies, Feeding Practices, Feed Resources, Feed Scarcity

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Cite this Article: Pathot, Y.D. (2020). Assessment of Livestock Feed Resources, Feeding Practices and Coping Strategies to Feed Scarcity in Agro Pastoral Production System in Itang District, Gambella, Ethiopia. *The Journal of Agriculture and Natural Resources Sciences*, 7(1),10-21.

Retrieved from <http://www.journals.wsrpublishing.com/index.php/tjanrs/article/view/484>

Article History: Received: 2020-02-30 Accepted: 2020-04-30

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INTRODUCTION

Livestock sector plays a significant economic role in most developing countries being an essential for the food security of human population. It occupies about 30% of the planet's ice-free terrestrial surface area and is a significant global asset (Steinfeld *et al.*, 2006). It is evolving in response to rapidly increasing demand for livestock products. Keeping livestock is an important risk reduction strategy for vulnerable communities. They are important providers of nutrients and traction for growing crops in smallholder systems (Rosegrant *et al.*, 2009). Currently, livestock is one of the fastest growing agricultural sectors in developing countries. This growth is driven by the rapidly increasing demand for livestock products, this demand being driven by population growth, urbanization and increasing incomes in developing countries (Delgado, 2005).

Ethiopia has a large livestock population and diverse agro-ecological zones suitable for livestock production and for growing diverse types of food and fodder crops (Adugna T., 2008). Livestock contributes to the livelihoods of approximately 70% of Ethiopians and accounts for 15-17% of the total national GDP and 35-49% of the agricultural GDP (Biratu K. and Haile S. 2017). Irrespective of their number with high potential for meat and milk production, however, it was not possible to bridge the gap between the ever-increasing demand for animal products and the level of production. Because livestock production has mostly been subsistence oriented and characterized by very low reproductive and production performance (Adugna T., 2008). Pastoral and agro-pastoral communities in Ethiopia constitute 10 to 12 % of the total population and About 30~40 % of the country's livestock population is found in pastoral and agro-pastoral areas (Belay k.*et al.*, 2005). 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 (Yadessa *et al.*, 2016). Livestock feed resources in Ethiopia are mainly obtained from natural and improved pastures, crop residues, forage crops, agro-industrial by-products and non conventional feeds (CSA, 2012).

These feed resources can be classified as natural pasture, crop residue, improved pasture and forage and agro industrial by-products of which the first two contribute the largest share (Tolera *et al.*, 2012). These natural pastures comprise the largest feed resources, the contribution of which is estimated at 80-85 % in Ethiopia (Emana M. M.*et al.*, 2017). However, its productivity in most parts of Ethiopia is extremely low due to seasonal fluctuation of rainfall and poor grazing land management and conversion of grazing land in to crop lands because of increased human population (Kebede G., 2016; Nigus A., 2017). Understanding the various feed resources and coping strategies used by farmers to overcome feed shortage is important in order to identify appropriate research and development interventions to enhance health and performance of dairy cattle (Duguma and Janssens 2016). Gambella region is endowed with diverse species of grasses and browses yet there is feed problems for livestock (Hailemariam B., *et al* 2011). Therefore, the aim of this study was to identify the available feed resources year-round, feeding systems and coping strategies with feed scarcity under Agro pastoral livestock production system in Itang district, Gambella Regional State, Ethiopia.

MATERIALS AND METHODS

Description of the Study Area

The study was conducted at the Itang special district which is located in Gambella People National Regional State of Ethiopia. It is in the western part of Ethiopia between 8° 2' 00" to 8° 11' 00" N and 34° 12' 00" to 34° 18' 15" E. Itang is situated at about 45 km from Gambella town in the West direction and at about 823 km West of Addis Ababa, the capital city of Ethiopia and at an altitude ranging from 425 to 470 meters above sea level. The agro-ecology

of Itang district falls within the hot to warm humid low land plain sub- agro ecological zone. The area is characterized by unimodal rainfall pattern with the annual average of 1054mm. The rainy season starts at the end of April and lasts in the end of October with maximum rainfall in the months of July and August. The mean annual maximum and minimum temperatures are 38.90C and 15.80C, respectively.

Sampling procedure

The sampling procedure used was purposive type by considering the population of cows, accessibility, feed resources availability and availability of research fund obtained from AGPII (agricultural growth project phase two) project during planning stage. Based on the obtained information from rapid exploratory field visit together with available secondary information, three kebeles (Baziel, Wathgach and Pulkhot) was selected out of the total 23 kebeles. Then, a random sampling technique was employed to select the respondents that have at least one livestock for the survey data collection. A total of 30 households per Kebele was identified and interviewed.

Data collection

Data was collected from both primary and secondary sources. Primary data was collected using semi structured questionnaire; focus group discussion and direct observation. Secondary data was collected from Woreda office of agriculture and natural resource, literatures, annual reports. The data collected included: socio-economic characteristics of the respondents, major livestock feed resources, feeding practices/system, livestock production constraints, farmers' perception of feed shortage and coping strategies to feed scarcity.

Statistical analysis

The computer software Excel was used for data management and entry. All the collected survey data were coded and entered into the computer with Excel. The collected data were summarized and analyzed using appropriate statistical package for the social science (SPSS, version 20) for the survey part. Descriptive statistics such as mean, percentages, standard error and standard deviation were used to present the results.

Result and Discussion

Household Characteristics

Sex of HH head, age, educational status, marital status, religion and family size are presented in table (1). Majority (95.6%) of the responded HH heads were male. According to Teshager *et al.*, (2013) about 95.6 % households in Illu Aba Bora zone, south west Ethiopia are male headed. This result is also like report by Yisehak *et al.*, (2016) who reported that Out of the overall responded household heads, 94.04% of them were males in Gilgel Gibe Catchments of Jimma Zone, Southwestern Ethiopia. The study indicated that the average age of household heads were 44.5 years and ranged from 30-75years. The study further indicated that majority 77.8% of the respondents were illiterate, while the rest (5.6, 13.3 and 3.3%) had educational background for primary education, basic education and secondary education which indicated that the study level of the respondents is low (Yisehak *et al.*, 2016). In respect to family size, the family size of the households of respondents was high within range of 11-20(46.7%) followed by 0-10(41.1%) and 21-20(12.2%) respectively. The average value of the total family size of the respondents was 5.13 which is similar to report by (Emana M.M. *et al.*, 2017; Yien Deng *et al.*, 2015).

Table1: Household characteristics of the respondents

Variable	frequency(N=90)	%
Gender of HH head		
Male	86	95.6
Female	4	4.4
Age of HH head (year)		
30-39	13	14.4
40-49	40	44.4
50-59	28	31.1
>60	9	10.0
Education of HH head		
Primary education	5	5.6
Basic education	12	13.3
Illiterate	70	77.8
Secondary education	3	3.3
Family size		
0-10	37	41.1
11-20	42	46.7
21-30	11	12.2

Livestock Holding

Livestock species kept in the study area were mainly cattle, sheep and goats table (2). The cattle herd structure comprised mostly cows followed by calve and heifers (8.66 ± 0.515 , 5.34 ± 0.376 and 4.01 ± 0.230) respectively. Goats and sheep productions are second and third to cattle production in the study districts. This finding is like report of Adebabay, (2009) who reported that Cattle are the dominant livestock type at bure district, Ethiopia. The reason of holding majority cows may be attributed to use of milk as the main source of livelihood in the study area. This finding is higher than the finding of (Biratu K. and Haile S., 2017; Samuel *et al*, 2016) and is lower than the finding of Ftiwi, M., (2015).

Table 2: herd structure and composition per household in Itang district

Livestock type	N	Mean±(SE)
Cattle		
Cows	779	8.66± (0.515)
Oxen	189	2.10± (0.177)
Heifers	361	4.01± (0.230)
Steer	165	1.83± (0.123)
Calve	481	5.34± (0.376)
Sheep	438	4.87± (0.595)
Goats	611	6.79± (0.734)

SE=Standard Error of Mean; N= number of livestock type

Purpose of Keeping Cattle

The purpose of keeping cattle in the study areas is shown in figure 1. In the study area, the survey result indicated that agro pastoralist kept cattle mostly for milk (48%), ritual ceremony (marriage) (34%) and income earning (18%) by selling live animals and their products and/or both respectively (Emana M. M. *et al.*, 2017). Based on the key informants during the group discussion meat, draught power and manure were not important in the study area as a purpose for keeping cattle. This finding is not in line with Zinash (2015), who reported that cattle is

primarily kept for traction followed by threshing, for milk production, as source of income from direct selling of animals or from sale of animal products, as source of manure and source of meat in that order both in the rural and peri-urban areas in Waghimra Zone Sekota District, Ethiopia

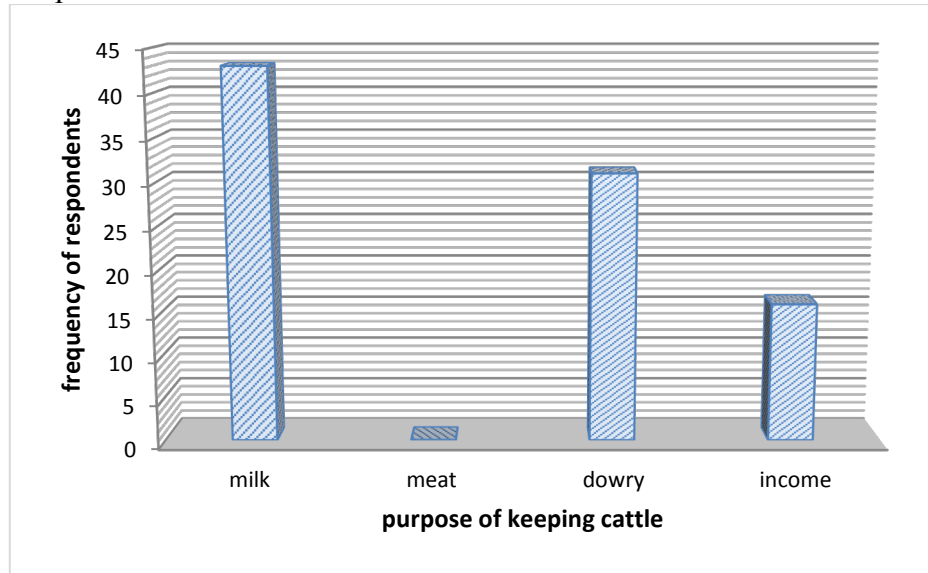


Figure1: Purpose of keeping cattle in the study district

Livestock Feed Resources

The major livestock feed resources in the study area are shown in fig. 2. The major source of livestock feed in the study area was natural pasture, browse trees, crop residue and standing hay respectively as ranked by respondents (TegegneA., 2013; FtiwiM., 2015; Eman M. M. *et al.*, 2017). During group discussion respondents agreed that browse trees are second to natural pasture during wet season when agro pastoralist move to upward stream of Baro river where the grazing land is dominated by woody grass land where as crop residue is second to natural pasture during dry season when agro pastoralist move to down ward stream of Baro river where the grazing land is mostly dominated by open grass land. This finding disagrees with the report of Tesfaye Y. *et al.*, (2016); Abdirahin S. *et al.*, (2015) who conducted different studies in different region of the country. The current study further indicates that the use of improved forage as livestock feed was not practiced in the study area. According to the result from group discussion, the reason for lack of use of improved forage as livestock feed was the failure of regional livestock and fishery resource bureau and research institute to create awareness and participatory establishment and evaluation of improved forage at agro pastoralist level.

Feeding and Grazing System

The survey result indicates that the feeding system practiced by agro pastoralist in the study area was commonly free and full-time grazing system (93.3%) and cut and carry system (6.7) which is in line with the report by Tegegne A., (2013) which stated that the feeding system in the rural (highland and lowland) dairy production system of the study areas is mainly free grazing. This finding also agrees with the report of FtiwiM., (2015). according to the result from group discussion, Cut and carry system is practiced only for feeding sick animal, weak animal, and new stalled animal (Muleta D.*et al.*, (2017). the Present study is not in line with Duguma and Janssens, (2016) who reported the three types of dairy feeding systems practiced in Jimma town as zero-grazing/stall feeding (79.6 %), zero- and partial-grazing (7.4 %) and

full time-grazing (11.1 %) respectively. On the other hand, all the respondents indicate that the grazing system practiced was continues grazing system in the communal grazing land.

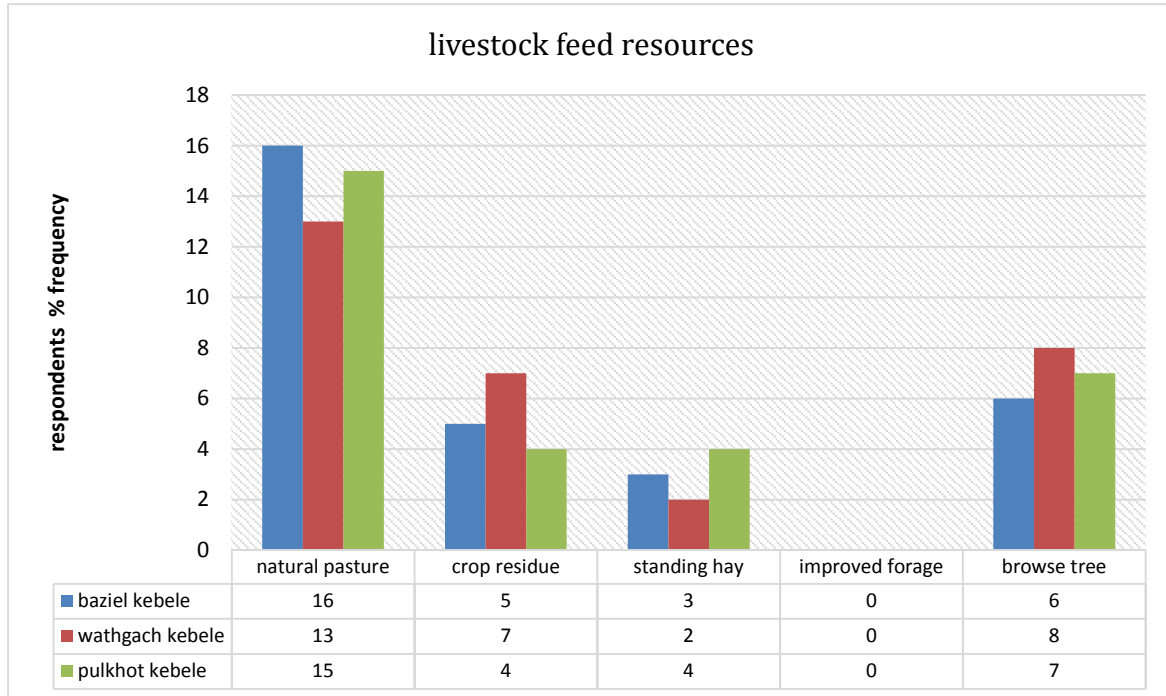


Figure 2: livestock feed resources in the study district

Livestock Production Constraints in the Study District

The constraints influencing the overall productivity of the livestock in the studied area are shown in fig 3. The survey results indicated that the major livestock production constraint identified by most of the respondents in the study areas was feed shortage (46%) followed by disease prevalence (32%), recurrent drought (8%), water shortage (6%), predator (4%) and animal raid or theft (4%) (FtiwiM., 2015; Eman M.M. *et al.*, 2017; Muleta D.*et al.*, 2017). The seasonal feed variability in quantity and quality and lack of feed conservation practices as hay are the major feed related constraints affecting livestock productivity in the study area (Harinder P.S. *et al.*, 2018). In addition, high prevalence of livestock diseases and limited veterinary infrastructure was also a factor limiting livestock productivity in the study area. This finding agrees with Tibeziinda *et al.*, (2016). Based on result from group discussion, the occurrence of drought is repeated every year in which there is limited and irregular rain fall resulting in loss of herbage quality and quantity in some part of the season. In other hand, water shortage is a problem only during dry season when people move away from river site and move to upland areas due to fear of Murle tribe from south Sudan who cross border in search for cattle to raid. Cattle raid or thefts happen in two ways; internally among locality in neighborhoods and externally by Murle tribe from south Sudan. The finding also indicates that, the constraint related to predator is most common in summer and winter seasons and the most common predators are lion and hyena.

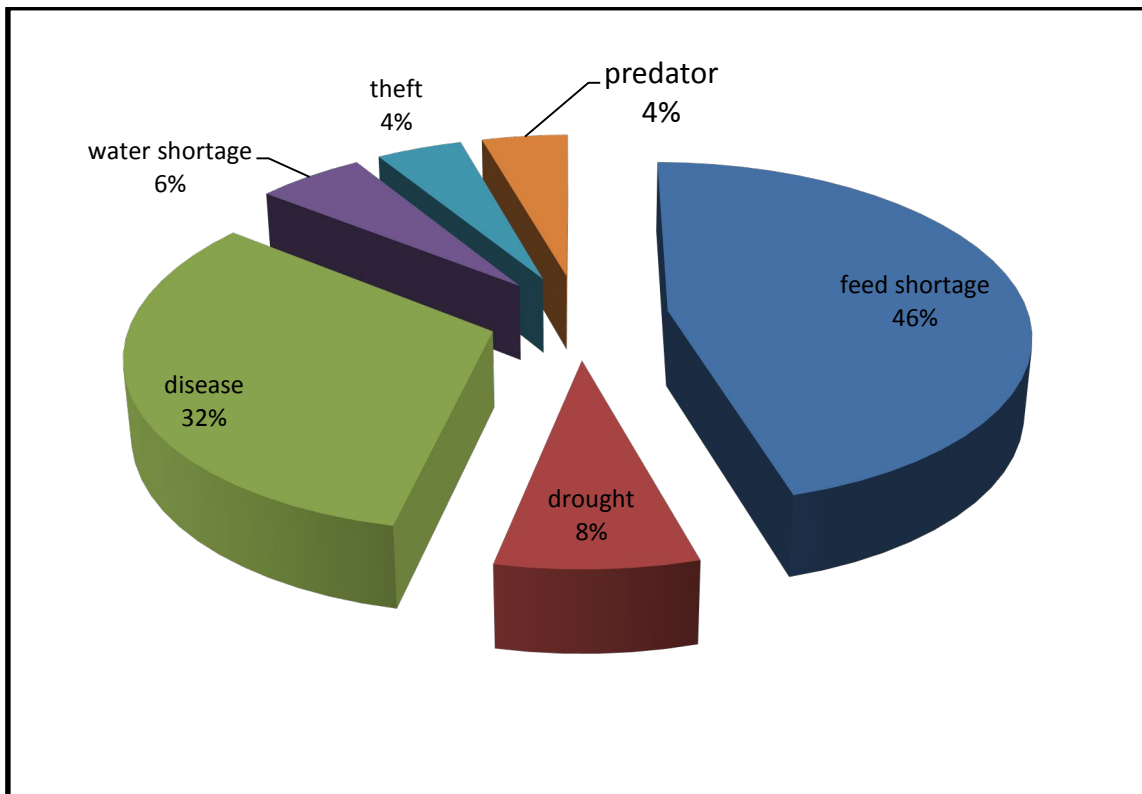


Figure 3: Livestock production constraints as ranked by the respondents in percentage in Itang district

The Causes of Feed Resource Decline in the Study District

The causes of feed deterioration in the study district are shown in figure 4. According to the respondents, the major causes of feed resource deterioration was shortage of rain 36(40%) followed by overgrazing 24(27%), flood 14(15%), over population 9(10%) and settlement of Falata tribe 7(8%) respectively. According to result from group discussion, lack of rain falls during dry season resulted in feed deficit since most of the herbage becomes dried up and forced livestock to feed on dried feed as standing hay or others feed with poor nutrients (GPNRS, 2012). In addition, the poor dry season rangelands coupled with recurrent drought usually resulted in depletion of range resources, and cause suffering of livestock from nutritional stress and often lead to low productivity of the animals (Ketema T. G., 2015). The cause of feed resources deterioration due to overgrazing and over population was observed during the wet season due to water logging and frequently occurring flood hazards that start from June to October as Agro pastoralists with their herds and flocks are forced to move to and concentrated in the dry places with limited grazing land (GPNRS, 2012). In addition, the influx of falatal nomads from north Sudan occupy most of the Gambella range land during winter season and deteriorate the range vegetation because of overgrazing.

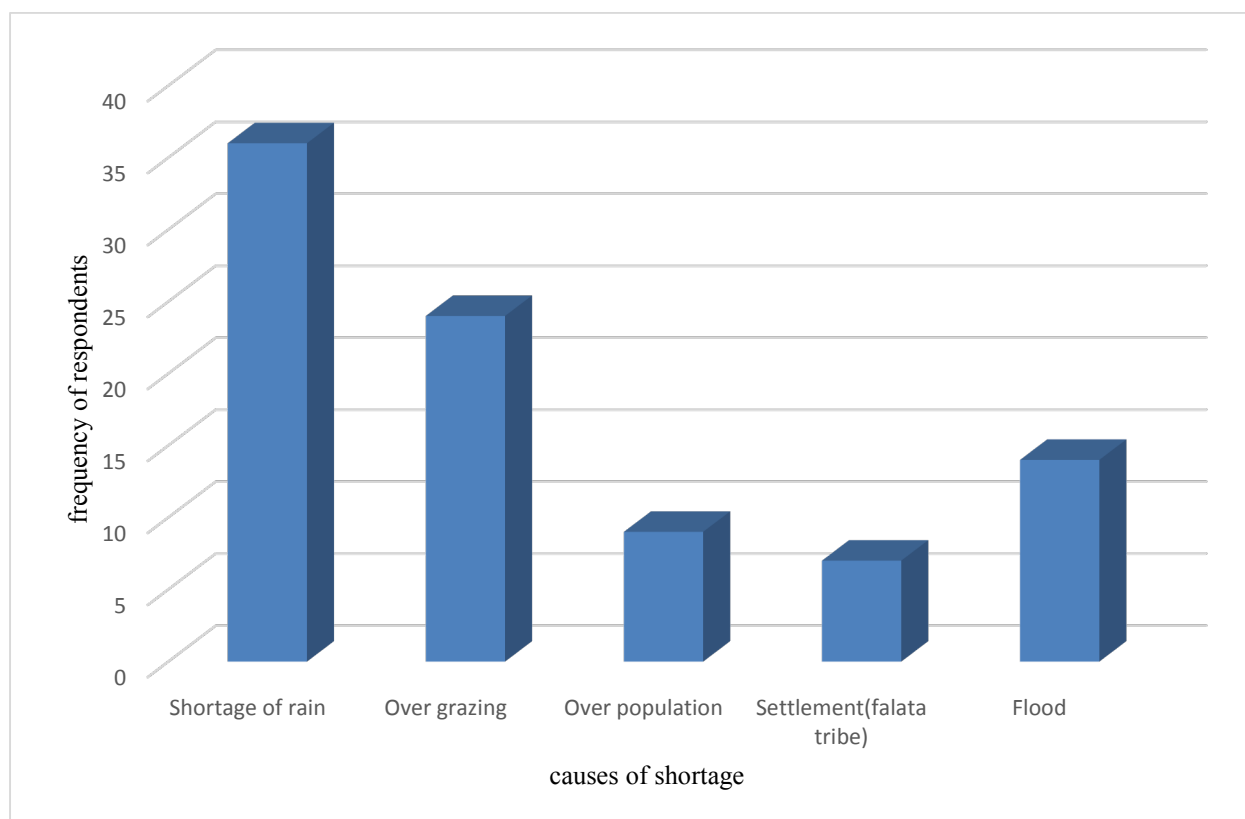


Figure 4: Percentage responses on causes of feed deterioration in Itang district

Coping mechanism of feed scarcity

The coping strategies for feed scarcity used by agro pastoralist in the study area are shown in the figure 5. According to the respondents, the first option preferred by agro pastoralist when feed is not available were mobility and searching for the place where feed is available (67.78%), the second option were burning of range land (27.78%), with the intention of range vegetation to re growth quickly and third option were the use of fodder trees (4.44%), and this is possible only when the grazing areas is composed of pasture and browse trees than open grass land. The result further indicated that all the respondents did not practice feed conservation in the form of hay as a coping mechanism for feed scarcity, and this might result from lack of awareness due to weak linkage and extension services in the study area. Herd mobility was one of the coping mechanisms to manage and utilize range resources and escape from seasonal flood and drought prone areas (Belay k., et al 2005; Ketema T. G., 2015). Burning of range vegetation has been widely practiced in the agro pastoral community as a means of the traditional range management strategy. This result is similar to finding of Ketema (2007), who reported that the main purpose of grassland burning in Nuer agro pastoral areas are to get good livestock feed following rainy season, and to eradicate some livestock diseases like Tsetse fly and ticks. It also disagrees with the finding of C. B. Katongole *et al.*, (2012) and Duguma and Janssens (2016).

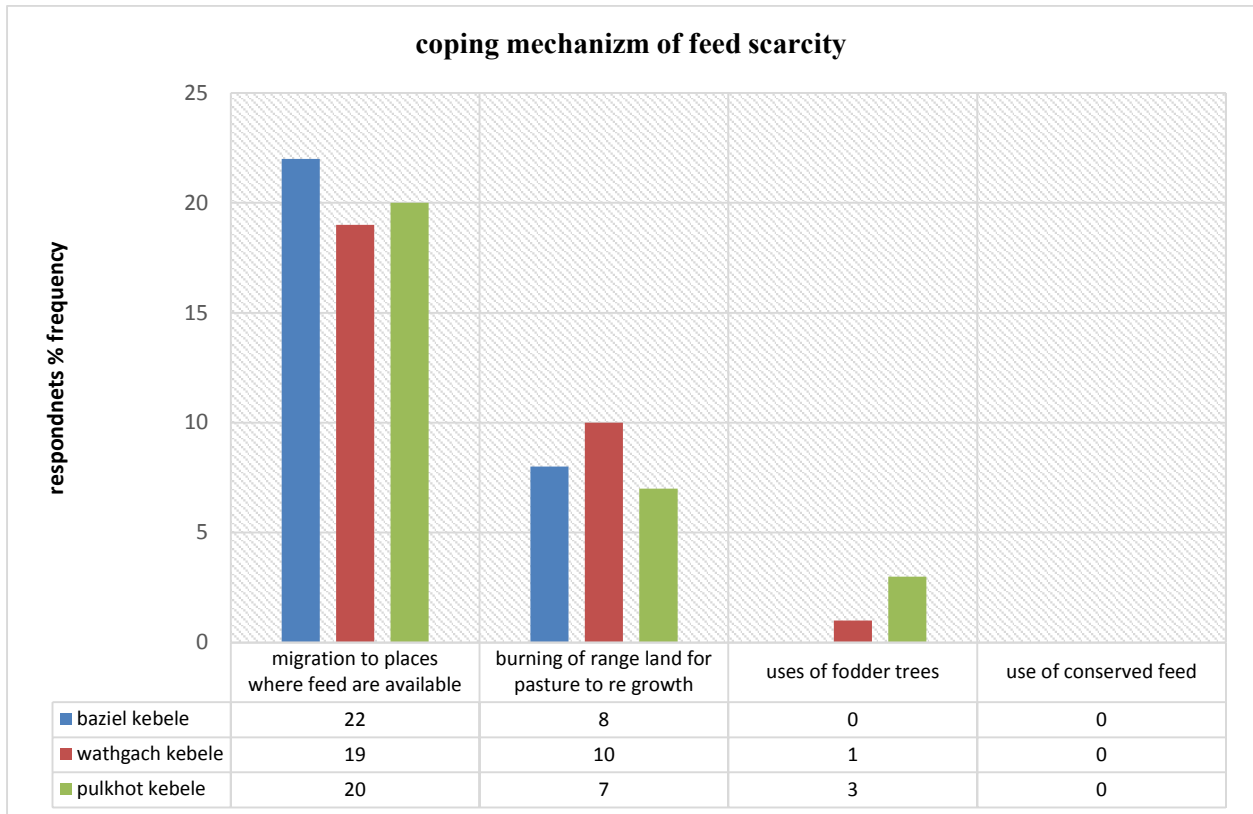


Figure 5: Percentage responses on feed shortage coping mechanism undertaken in Itang district

Conclusion and Recommendation

The current study has shown that the major source of livestock feed in the study area were natural pasture, browse trees, crop residue and standing hay but the most dominant feed resource was natural pasture. it was further indicated that the use of improved forage as livestock feed was not practiced in the study area. The feeding and grazing system practiced by agro pastoralist in the study area was commonly free and full-time and continues grazing system in the communal grazing land. Cut and carry system were practiced for feeding sick animal, weak animal, and new stalled animal. The seasonal feed shortage and variability, disease prevalence, recurrent drought, water shortage, predator and animal raid or theft were identified as the major problem and constraints affecting livestock production and productivity. the major causes of feed resources deterioration or depletion during wet and dry season in the study district were shortage of rain, overgrazing, flood, over population and settlement of falata tribe. Agro pastoralist have experienced some strategies for coping with feed scarcity with changing of range resources like herd mobility, burning of range land with the intention of range vegetation to re growth at the onset of rainy season and use of fodder trees.

Based on the above conclusion, the study recommends that;

- Government and research institutions should create Awareness on conservation of feed resource as hay at the time of feed abundance and encourage agro pastoralist to practice proper utilization of available crop residue;
- Introduction of improved forage technologies could help agro pastoralist to cope up with feed scarcity;
- Agro pastoralists should be encouraged to adopt the best coping strategies that can deal with the challenge of feed scarcity

- Regional government with the concerned bodies should adopt a policy that could prevent or stop the influx of falata nomads from north Sudan in to Gambella region.

ACKNOWLEDGEMENT

The author gratefully acknowledges the financial support from Agricultural Growth Project Phase Two (AGPII) for funding the study. I would also like to thank the selected agro pastoralist in selected kebeles for their time and willingness to participate in this study.

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