

Research article

Assessment on Major Production System and Constraints of Livestock Development in Eastern Zone of Tigray; the case of “Ganta Afeshum Woreda” Northern Ethiopia

Berihu Haftu¹, Aleme Asresie¹ and Mulata Haylom¹

¹Department of Animal sciences, Adigrat University, PO.BOX. 50, Adigrat, Ethiopia

*Corresponding author Email: almasres06@gmail.com, phone +251-912085790

Abstract

A study was conducted to identify the production systems and major constraints of livestock, giving emphasis to cattle, sheep, goats and poultry in Ganta Afeshum district, Eastern Zone of Tigray from March 2013 to June 2013. Questionnaire survey method was carried out for data collection. In the questionnaire survey, 120 livestock owners were interviewed and respondents indicated that the major farming system practiced in the area were mixed crop livestock production in which animals were managed traditionally with respect to feeding, housing, breeding and watering aspects. Respondents view towards the major constraints of livestock production in the locality indicated that lacks of adequate and quality feed were considered to be the dominant production challenges in the area. Overall results indicated that shortage of animal feeds and poor management practices, were the major constraints existing for livestock development in the area and hence there is need to creation of awareness for the livestock producers of the community on the improved management practices and also to introduce alternative and nutritionally better quality animal feed sources to boost the production and productivity of livestock.

Copyright © ASETR, all rights reserved.

Keywords: Constraints, livestock development, production system

1. INTRODUCTION

Animal production has been considered as the main component of agricultural development in most parts of Sub-Saharan Africa. Like in many developing countries, domestic animals play a crucial role in Ethiopia. They provide

food in the form of meat and milk, and non-food items such as draft power, manure and transport services as inputs into food crop production and fuel for cooking. Livestock are also a source of cash income through sales of the above items, animal hides and skins. Furthermore, they act as a store of wealth and determine social status within the community. Ethiopia is known for its high livestock population, being the first in Africa and tenth in the world (Mekonnen *et al.*, 1989; Gebrecherkos *et al.*, 2012). The recent livestock population estimates that the country has about 52.1 million heads of cattle, 24.2 million sheep, 22.6 million goats and 44.9 million poultry (MOA, 2013). The population of these animals in Tigray region is 4,201,501 cattle, 4, 506, 64 shoats and 155,434 chickens of which woreda Ganta Afeshum have the proportion of 51, 514 cattle, 60, 040 sheep, and 30, 050 goats respectively and 67, 769 chickens (Gebrecherkos *et al.*, 2012). Despite the large number of livestock in the region the sector is characterized by low productivity and, hence, income derived from this sector of agriculture could not impart significant role in the development of the region's economy (Mukasa-Mugerwa, 1998). The low productivity is attributed to low genetic potential of indigenous breeds, inadequate management, poor nutrition and reproductive performance. These constraints have numerous influences on productivity and fertility of herds.

The International Livestock Research Institute (ILRI) in collaboration with the Ministry of Agriculture and Rural Development (MoARD) have initiated a 5 year project entitled "Improving Productivity and Market Success" (IPMS) of Ethiopian farmers. The project aims at contributing to a reduction in poverty of the rural poor through market oriented agricultural development (Assegid, 2000). In line with this the Tigray regional state government has set a GTP (growth and transformation plan) on economic development of the region (especially the rural farmer) and one of the sectors that have given due attention in this plan is agriculture focusing on improving the production of livestock's and crops. Livestock productivity of the region is planned to improve by providing research aided extension to increase market oriented livestock in quality and quantity. According to this vision, milk production of the region is planned to increase from 302,108-367503 tones, egg production from 6,132-9,569 tones, honey production from 4,264- 6,132 tones and to aid 30,375 crossbreed calf's every year to the existing number 11, 674 so as to reach 151,875 based on manmade hybrid system (Tigray GTP, 2011).

In tropical high land areas including Tigray, livestock production problems is high due to environmental factors like high temperature, humidity and topography structure of sloppy exposed to various stress factors. Despite the wide spread of different animal production constraints experiences has been shows that information on animal production constraints was never significant focus of research (Coppreck, 2000). However knowing the type and extent of the common and major production problems is very important so that researcher and other responsible governmental and non governmental bodies can assist in the development of herd production strategies and the selection of possible intervention that will ultimately assist in poverty alleviation by improving the productivity of livestock as already set by the regional governments plan. This particular study is therefore, carried with the following objective.

1. To assess the major production system and constraints of livestock development in the study area.

2. Materials and Methods

2.1. Description of the Study area

The study was conducted in 5 selected peasant associations (PAs) locally called “Tabias of Ganta Afeshum, which is one of the 7 woreda of the eastern zone of Tigray (excluding Adigrat and Wukro towns) (Figure 1) from March 2013- June 2013. The area is located at 115km North of Mekelle and 960 North of capital city of Ethiopia, Addis Ababa. The district share boundaries with Hawzen in the south, Enticho in the west, Gulomahda in the north, and Saesi Tsaedaemba in the East parts (Tyhra *et al.*, 2011) and is situated at an elevation of 2457 meters above sea level. It has three agro climatic zones: low lands, mid land and high land with a bimodal rain fall pattern, in which the long rain season starts from end of June to beginning of September and short rain season stays from January to March. The average annual rainfall of the area varies between 300 and 400 mm (Azimachew, 2010) .Livestock are main components as main factors for the livelihood of the community to undertake agricultural activities and also as source of income. The livestock population of the woreda includes 51,514 cattle, 60,040 sheep, 30,050 goats, and 67,769 poultry (chickens) respectively (BARDGA, 2013).



Fig1: Map of Tigray region showing the selected woreda (study site).

2.1. Study design

A semi structured questionnaire of both type (open and close ended type) were prepared for this purpose focusing on animal production systems and 120 heads of house hold were interviewed.

2.1.1. Sample size and sampling procedure

In the present survey, 5 peasant associations (Pas) namely Hagereslam, Mugulat, Adekney, Kita, and Semret were selected purposively based on transport accessibility, degree of livestock production practices and agro ecological differences. From each PAs, 24 households were randomly selected for the interview and hence a total of 120 households were included in the study. All livestock owned by the sample households were considered as study animals which comprise cattle, sheep, goats and poultry. To assess and address the major production system constraints of livestock development in the study area.

2.2. Data collection

A detailed and organized semi structured questionnaire was designed in an attempt to generate base line information related to livestock production with particular emphasis on major livestock production system and problems. The questionnaire was framed in such a way that farmers could give information that are recent and easy to recall and it was filled directly by interviewing randomly selected livestock owners from different villages of the 5 PAs. Informal group discussion with development agent had also been held to generate relevant information about livestock production problems in the study area.

2.3. Data Analysis

The data, obtained in this study were analyzed using descriptive statistics.

3. RESULTS AND DISCUSSION

3.1. Demographic features of Respondents

Majority of the respondents included in the study were male (86%) and the rest female (14%). The maximum and minimum ages were 64 and 25 years respectively. Regarding educational status, 73% of the respondents' were illiterate. Respondents' family size proportion showed that 41% and 59% have family members less or equal to 15 years of age and greater than 15 years of age respectively.

3.2. Livestock herd size and composition

Chickens comprise the largest proportion of the livestock herd in the study site, followed by sheep, cattle and goats respectively. Heifer and cows dominate (54%) the most shares of cattle herd followed by Castrated ox (25.4%). Mean while, small ruminants flock is primarily composed of female animals representing 72% in sheep's and 69 % in goats.

3.3. Farming system and farm size

This study revealed that the livestock production system of the area was mixed crop livestock type which livestock herd is dominated by poultry and sheep. All of the interviewed farmers keeping livestock (N=120) indicated that they practice both crop and livestock production. The present finding were to be in line with the study conducted by (Nibret *et al.*, 2012; Tesfaye, 2009 and Yohanes, 2007) which were conducted in Lay-Armacheho, Metema and Alamata areas respectively. Though relatively larger land as compared with grazing land was allocated for the production of crops, the yield obtained from crops like wheat, barley, Teff, maize, pea and bean is not enough for family income and food source. Therefore additional income was generated from their livestock production. The total cropping land of the study "Tabias" (Semret, Megulat, Hagereselam, Adekney and Keta) were 0.9, 0.83, 0.78, 0.63 and 0.48 hectare respectively (Table 1). There was no private grazing land in the study woreda (Table 1).

Table1: Land holding per hectare (mean \pm SD) and land use pattern in the study area

Variables	Land use	Adekeney	Hagere- Selam	Keta	Megulat	Semret
Own-land	Cropping	0.45 \pm	0.56 \pm	0.33 \pm 0.22	0.51 \pm 0.50	0.65
		0.33	0.43			\pm 0.32
Rented land	Grazing	-	-	-	-	-
	Cropping	0.18 \pm	0.22 \pm	0.15 \pm	0.32	0.25
		0.33	0.30	0.25	\pm 0.45	\pm 0.07
Grazing	-	-	-	-	-	
Total land		0.63	0.78	0.48	0.83	0.90

3.4. Purpose of livestock production

The practice of livestock holding in the district is quite high and they keep livestock for different purposes such as cash income, meat for home consumption, manure for farm use and as draft power, insurance against emergency, skin for home use and sale, different gifts and ceremonies or celebrations (Table 2). Respondents from all sampled “Tabias” ranked income source from sales of live animals and their products as a first purpose of keeping livestock followed by manure for farm use and draft power. On the other hand (Kosgey *et al.*, 2008) reported that, higher rank for regular cash income than milk and meats for the Kenyan pastoral farmers were keeping the livestock in the area. While other categorically stated that keeping animals a prerequisite for deriving operation breeding goals (Jaitner *et al.*, 2001).

Table 2: Purpose of livestock production in the study area

Purpose of livestock production	Frequency (%) N= 120(number of respondents)	Rank
Income source	120 (100 %)	1
Crop production (as source of manure and traction power)	100 (83.3 %)	2
Skin for home use and sale	14 (11.6 %)	5
Home consumption (Meat and milk)	55 (45.8 %)	3
Other purposes	32 (26.6 %)	4

3.5. Livestock feed resources and feeding practice

Majority of the respondents indicated that, crop residues from wheat, Maize, barley, bean, and peas as well as *atella* (33.33%) are important feed sources especially during the dry season when availability of green feed (pasture) is low (Table 3). The provision of salt (mineral supplementation) was a recognized practice in the area and significant number of the respondents (12.5%) responded that they provide salt during the wet season for their animals.

Livestock feeding practice during supplementation of “*atella*” in the study area was at a time for all age groups and sometimes with different species.

It was observed that natural pasture was the major feed resource in the study area followed by crop residues and feed shortages as well as poor animal health services were reported as the major production constraints by the farmers to maintain market oriented livestock development extension. The different feed resources reported in the area were natural pasture, crop residue and crop after math and hay (Table 3). With regard to feeding frequency, 84.16% (N=101) of the respondents responded that twice per day in case of cattle except for oxen (more may be provided especially during involvement of agricultural activity) while in case of poultry, only one time provision of feed is practiced. However in case of sheep and goat, there was no provision of feed according to the respondents’ views except at times of drought especially during the dry period where by there may be provision of feed depending on its availability.

According to (114/120) 95% of the respondents responded that seasonal shortage of feed in the area is severe for a period of five to six months every year (January to June). The present study in agreement with (Abebe, 1999)

Table 3: Major feed resources in the study area

Feed resource	N	%
Natural pasture	120	100.0
Crop residue	70	58.33
Concentrate	20	16.67
Hay	25	20.83
Non-conventional (<i>atella</i>)	40	33.33
Provision of salt (mineral supplementation)	15	12.50

*N= Number of respondents, %= percent of respondents

3.6. Water source and watering frequencies

The major sources of water mentioned by farmers were river (86.34%) followed by temporary wells, stream, natural ponds (13.66%). The amount of these water sources decline in the dry season and hence the distances to watering points varies with seasons. Majority of the respondents (76.67%) trek their animals 1 to 5 km in search of water during the dry season. On the other hand during the wet season distance for (85.11%) of respondents is reduced to < 1 km. The present finding in this study was slightly better than that of (Fekerte, 2008) which was conducted in Shinile and Erer districts of Somali Region of Ethiopia which reported that majority of the respondents of the locality go in search of water up to 10 km for their animals during the dry season. In relation to watering frequency farmers responded that there was variation depending on the season; during the wet season, only 5% of the farmers said they watered their animals freely, while 62.5% watered once a day and 24.16% once in two days. In dry season, however, only 13.33% of the respondents water once in 2 days and about 86.66% watered once a day (Table 4).

Majority (91.67%) of the respondents said that the quality of water they use for their animals and home consumption was clean. The remaining 8.33 percent reported that unclean water for their animal especially during the dry season. This might be related to the availability of water in the study woreda especially in Semret districts more frequent watering their animals.

Table 4: Seasonal watering frequency and availability of water in the study area

Watering frequency	Season			
	DS		WS	
	N	%	N	%
Freely	-	-	6	5
Once a day	104	86.66	75	62.5
Once in two days	16	13.33	29	24.16
Once in three days	-	-	10	8.33

*N= number of respondent, DS= dry season, WS= wet season and %= percent of respondents.

3.7. Livestock housing

The present finding revealed that, most of the farmers (70%) of the area responded that they housed their livestock (small ruminants, cattle and poultry) separately from theirs. On the other category all animal groups (females, males and young animals) were kept in the same house. The exceptional Tabia's were Megulat and Hageres-Selam in which a significant number of farmers (34%) responded that common houses were used. Respondents were also asked how frequent they clean the house of their animals and accordingly the respondent responded that 65 % of them clean their animal house once a week, while 24 % of them said that two or more times a week and the rest responded that one per around two weeks. The present study is in agreement with (Mulata *et al.*, 2013) reported that sheep housing in Southern, Southeastern and Eastern part of Tigray region was not separate with sex and age of the animal.

The respondent responded that small ruminant houses are made up of iron sheet, wood, bushes/grass, stone/bricks and earth/mud and the floor of the houses in all the study Tabias was earthen. For about all of the farmers in Megulat, Adekeney, keta and Hagereslam Tabias the wall of their small ruminant house was made up of stone/bricks and mud. On the other hand, 85% of the wall of the houses in Semret Tabia was made from wood (Table 5). The roof of small ruminant house in the study area was prepared from wood, stone and mud. (Abebe, 1999) reported that Menz sheep in general were housed in corrals (84.4%) throughout the year and a few farmers provide shelter in-houses (15.6%) usually underground floor separately from other species. The present study showed that in the study area farmers are skillful in constructing enclosures which are kept closed with thorny branches during each night to prevent predator attacks.

Table 5: Types and percent of small ruminant housing material in the study area

	Housing material	Migulat	Hageres-Selam	Keta	Semeret	AdeKeney
Roof	Iron sheets	-	40.33	30	40	23.33
	Grass/Bushes	-	20.33	46.67	-	6.67
	Wood	100	43.33	3.33	85	-
Wall	Wood	-	31.67	50	85	-

	Stone/bricks mud	with85	80	90	-	100
Floor	Earth/mud	100	100	100	100	100

3.8. Breeding practice

In the study area, there was no significant practice of controlled mating and hence the breeding practices were highly dominated by natural mating (97.5 %, N= 117) in which the male animals run with females throughout the year (Table 6). The present finding is in agreement with (Mulata *et al.*, 2013 and Galal *et al.*, 1996) reported that uncontrolled mating is the predominance within households flock. Among 120 respondents only 25 (20.83 %) of them responded that they did castration practice. On the other category 95 (79.16%) of the respondents responded did not apply castration practice (Table 6). This might be due to the reason that sold their male animals in the early age for the sources of income.

Table 6: Breeding practice and castration of small ruminant in the study area

Variables	N	%
Castration practice		
Yes	25	20.83
No	95	79.16
Age of castration		
< 3 months	0	0
3-6 months	0	0
>6 months	25	100
Breeding		
Controlled	0	0
Uncontrolled	120	100

*N= Number of respondents, %= percent of respondents

4. ACKNOLOGEMENT

Special thanks to Adigrat University fully support financial expense to conduct and finalize this research.

5. REFERENCES

- [1] Abebe M, 1999. Husbandry practice and productivity of sheep in Lalo-mama Midir woreda of central Ethiopia. An M.Sc Thesis presented to the School of Graduate Studies of Alemaya University of Agriculture, Dire Dawa, Ethiopia. 99p.
- [2] Assegied B, 2000. Epidemiological study of major skin disease of cattle: Southern Range Lands. DVM Thesis. AAU, FVM, Debre Zeit, Ethiopia.
- [3] Azimachew A, 2010. Chromosome study of local farmers'varieties of opuntica ficus-indica (L).Mill (cactae) from Tigray, Northern Ethiopia.MSc thesis, AAU, Ethiopia.
- [4] Fekerte F, 2008. On-farm characterization of blackhead Somali Sheep breed and its production system in Shinile and Erer districts of Shinile zone. A M.Sc. Thesis Presented to the School of Graduate Studies of Alemaya University of Agriculture, Dire Dawa, Ethiopia. 115p.

- [5] Gebrecherkos and Berihun A, 2012. Prevalence of bovine fasciolosis in municipal Abattoir of Adigrat, Tigray, Ethiopia. Mekelle University College of Veterinary Medicine, Mekelle Ethiopia.
- [6] Galal E, Metawi H, Aboul-Naga A, and Abdel-A, 1996. Performance and factors affecting the small-holder sheep production system in Egypt. *Small Rumin. Res.* 19:97- 102.
- [7] Jaitner J, Soweb J, Secka-Njeb E, and Demp L, 2001. Ownership pattern and management practices of small ruminants in The Gambia-implications for a breeding programme. *Small Rumin. Res.* 40:101-108.
- [8] Kosgey IS, Baker RL and Arendonk Var, 2008. Successes and failures of small ruminant breeding programs in the tropics: a review. *Small Rumin. Res.*, 61:13-28.
- [9] Mekonnen G, Forsido, Gebre- Wold T, Dagnachew A and Anteneh A, 1989. The 24 Ethiopian Live stock Industry retrospect and prospect. IAR proceedings, Addis Ababa, Ethiopia Pp. 9-19.
- [10] Ministry of Agriculture and Rural Development, 2013. Major challenges and Achievements in Ethiopian Livestock production.
- [11] Mukasa-Mugerwa E, 1998. Review of reproductive performance in female Bas indicus (Zebu) cattle. ILCA monograph. No.6.ILCA.Addis Ababa.
- [12] Mulata H, Solomon A and Yoseph M, 2013. Management Practice and Constraints of Sheep Production in Southern, South Eastern and Eastern Zones of Tigray, Northern Ethiopia. *World journal of animal sciences and research.*
- [13] Nibret M and Basaznew B, 2012..Assessment of Major Animal Production and Health Problems of Livestock Development in Lay-Armacheho District, Northwestern Ethiopia. *American-Eurasian Journal of Scientific Research* 7 (3): 136-141; IDOSI Publications.
- [14] Tesfaye T, 2009. Characterization of goat production systems and On- farm evaluation of the growth performance of Grazing goats supplemented with different protein Sources in Metema woreda, Amhara region, Ethiopia. M.Sc Thesis presented to the the Department of Animal Science, School of Graduate Studies, Haramaya University, Haramaya, Ethiopia.
- [15] Tigray Regional State five Years plan, 2011.Growth and transformation plan. Bureau of plan and finance, September 2003 E.C., Mekelle.Ethipia.
- [16] Yohanes T, 2007. Major animal health problems of market oriented livestock development in Alamata Woreda. DVM Thesis, Addis Ababa University, Faculty of Veterinary Medicine, Debrezit, Ethiopia.