World Journal of Pharmaceutical and Life Sciences
WJPLS

CHARACTERIZATION OF CATTLE PRODUCTION SYSTEM IN METEKEL ZONE, NORTHWESTERN ETHIOPIA

Oumer Sheriff Mohammed[*] and Wendimu Bireda

Assosa University, Faculty of Agriculture and Natural Resources, P O Box 18, Assosa, Ethiopia.

*Corresponding Author
Oumer Sheriff
Mohammed
Assosa University, Faculty of Agriculture and Natural Resources, P O Box 18, Assosa, Ethiopia.

ABSTRACT

A cross-sectional survey was conducted in Metekel Zone, Benishangul Gumuz Region, Northwestern Ethiopia to characterize cattle production system, herd size and structure, trait preference of cattle owners and constraints of cattle production in three districts of Wombera, Bullen and Dibate between December, 2014 and May, 2015. From the three districts, 180 representative farming households were selected using purposive random sampling and administered pre-tested and semi-structured questionnaires. Focus group discussions with key informants were held in six different sites. The results of the study revealed that mixed crop-livestock farming was the dominant farming system in the study area. The average livestock size per household was 12.35 ± 0.66 cattle, 7.20 ± 0.25 goats, 6.34 ± 0.30 sheep, 5.04 ± 0.23 chicken and 1.58 ± 0.78 donkeys. Cattle were the dominant species reared by the respondents and they are used for different purposes like milk production, income generation from sell of live animals and animal products and draft power (traction purpose). Traits like large body size, good fertility, fast growth rate, disease resistance and color were the most preferred traits in the study area. Natural pasture, crop byproducts, improved pasture, household residue and grain were the major feed resources. Feed shortage (Index=0.40), disease incidence mostly trypanosomiasis (Index=0.19), drought (Index=0.17), water scarcity (Index=0.13), predator attack (Index=0.05), lack of market access (Index=0.04) and land scarcity (Index=0.02), in that order of importance, were the major livestock constraints in the study area. From the results of the study, it is recommended to enhance the cattle production system by injecting small

amounts of resources into its production, improve cattle feed conservation mechanisms like hay making, reduce wild fire and enable to utilize the pasture efficiently. Intervention options should also be designed to alleviate the major constraints of the livestock production system in the study area.

KEYWORDS: Characterization, Cattle Production, Metekel Zone, Benishangul Gumuz, Ethiopia.

INTRODUCTION

Naturally endowed with different agro-ecological zones and suitable environmental conditions, Ethiopia is a home for many livestock species and suitable for livestock production. Ethiopia is believed to have the largest livestock population in Africa (CSA 2013; Solomon *et al.,* 2003; Tilahun and Schmidt 2012). An estimate indicates that the country is a home for about 54 million cattle, 25.5 million sheep and 24.06 million goats. From the total cattle population 98.95% are local breeds and the remaining are hybrid and exotic breeds. Moreover, 99.8% of the sheep and nearly all goat population of the country are local breeds (CSA 2013).

Though the country ranks first in Africa and tenth in the world (FAO, 2002) in its livestock population, the current livestock output of the country is little. This is associated with a number of complex and inter-related factors such as: inadequate feed and nutrition, prevalent diseases, poor genetic potential of local breeds, market problem, inefficiency of livestock development services with respect to credit, extension, marketing and infrastructure (Benin *et al.,* 2003; *Jabbar et al.,* 2007; Negassa *et al.,* 2011; Solomon *et al.,* 2003).

In spite of its small output, the livestock sub-sector in Ethiopia has an enormous contribution to the national economy and livelihoods of many Ethiopians, and still promising to rally round the economic development of the country. Livestock plays crucial role in generating income to farmers, creating job opportunities, ensuring food security, providing services, contributing to asset, social, cultural and environmental values, and sustain livelihoods. The subsector contributes about 16.5% of the national Gross Domestic Product (GDP) (Metaferia *et al.,* 2011) and 45% of the agricultural GDP (IGAD, 2010). It also contributes 15% of export earnings and 30% of agricultural employment (Behnke, 2010). Currently the subsector supports and sustains livelihoods for 80% of all rural population.

Furthermore, recognition is increasing of the importance to the poor of domestic animals as assets and livestock keeping as livelihood activities. For example, millions of the Ethiopia's poor rely on livestock for their living in such a way that their cattle, sheep, goats, chickens and camels produce milk, meat and eggs - a vital source of protein and income for poor farmers and pastoralists in Ethiopia. Many important functions of livestock are also embedded in non-tradable traits that are neither captured in economic analysis nor considered in livestock improvement programs (Ouma *et al.,* 2002) and also provide wool and leather, and pull ploughs and carts (Koehler-Rollefson and Wanyama, 2003).

In the livestock subsector, cattle play a pivotal role in prevailing traditional mixed livestock production system to the rural population. For instance, the indigenous cattle breeds in Ethiopia, which accounts 98.95% of the total cattle population, are a valuable source of genetic material because of their adaptation to harsh climatic conditions, their ability to better utilize the limited and poor quality feed resources and their tolerance to a range of diseases found in the country. Moreover, input from cattle is irreplaceable for domestic consumption and foreign exchange to national economy; providing food, drought power, manure and other social and cultural necessities (MoA, 2000).

As in the other parts of the country, the farming system in Benishangul Gumuz region is dominated by mixed crop-livestock system. Compared to other regions, the number of livestock is very low and the contribution of the sector is negligible due to killer livestock diseases of all types (especially trypanosomaisis), shortage of water and feed during peak dry seasons, poor livestock husbandry practices and other related factors (BGRSDGA, 2010).

Nearly 79.6% of the cattle population in the region exists in Metekel zone. Even though the zone is known for its highest cattle population, there is limited information on cattle production system, feed resources and availability, trait preference of cattle owners and constraints of cattle production.

Characterization of the cattle production system of the area, understanding the socio-economic implications and updating the previous results is vital and would help to design appropriate development intervention mechanisms. Thus, the objectives of this study were to characterize cattle production system and identify the trait preference of the cattle owners and constraints of cattle production in in Metekel Zone, Northwestern Ethiopia.

MATERIALS AND METHODS

Study area and sampling procedure

The study was conducted in Metekel zone, Benishangul Gumuz region, Northwestern Ethiopia, comprising an area of 26, 560 Km^2. The topography of the zone presents undulating hills, reaching up to 2000 meter above sea level (masl), slightly sloping down to low land plateaus having an altitude ranging from 600-2800 masl (Engda, 2000). The zone has a wide climatic range contrasting very wet and very dry seasons (MoA, 1998). Meteorological data of Pawe Agricultural Research Center indicated that the zone receives an annual rainfall ranging from 900 to 1450 mm with annual minimum and maximum temperature of 20 and 35°C respectively (Isaias *et al.,* 2015). The total count of livestock reaches 444,595 cattle, 160,879 goats, 54,168 sheep, 1,207 horses, 2,375 mules, 29,766 donkeys, 547,136 chicken and 81,128 bee hives (CSA, 2013).

The sampling procedure followed in this survey was purposive random sampling. In selecting the representative districts, the cattle population of each district was considered. Out of 7 districts in Metekel zone, 3 districts (Wombera, Bullen and Dibate) that have the highest concentration of cattle population in the zone were selected purposively. In each of the selected districts, two kebeles having the highest cattle population were selected. Then, thirty households (in each of the selected kebeles) possessing cattle were selected at random. Hence, a total of 180 households in the three districts were employed for this study.

Data collection and analysis procedures

Using multiple subject formal survey, data were collected on cattle production system through pre-tested and well-structured questionnaire. The questionnaire was administered to (60) randomly selected households' heads (cattle owners) or representatives in each of the three districts. To substantiate the information collected from individual interviewee, focus group discussions with key informants were held in 6 different sites. The data was analyzed statistically and described by descriptive statistics using Statistical Package for Social Sciences (SPSS for window, version 16.0, 2006).

Indices were calculated for all ranking data according to a formula: Index = sum of (3 for rank 1 + 2 for rank 2 + 1 for rank 3) given for an individual characteristic divided by the sum of (3 for rank 1 + 2 for rank 2 + 1 for rank 3) for overall characteristics. Where, 1 was for the highest and 3 for the lowest.

RESULTS AND DISCUSSION

Socio-economic characteristics of the households

From a total of 180 interviewed households, results showed that 75% were males and 25% were females. In contrast to this report, higher proportion of households headed by males were reported in West Shewa (Jiregna, 2007), Southern Ethiopia (Tsedeke, 2007) and Jimma zone (Oumer *et al.,* 2013). Female headed households in this study would indicate either the husband has died or they are divorced. The average age of the respondents was 48.54±0.93 years. The educational status of the respondents in the present study was higher for illiterate (82.2%) followed by those respondents who can read and write (9.5%) and elementary school (9.3%). Those who can read and write accustomed the skill of reading and writing from village informal trainings. The higher proportion of illiteracy can have its negative impact in relation to acceptance of new technology regarding animal husbandry practices. Majority of respondents in the study districts were married which accounted for 96.7%.

The overall average livestock possession per household was 12.35±0.66 cattle, 7.20± 0.25 goats, 6.34±0.30 sheep, 5.04±0.23 chicken and 1.58±0.78 donkey. Cattle are owned by all the respondents and its proportion was higher compared to other livestock species and this would indicate the potential of the study area for cattle production. High proportion of cattle in the livestock species of Benishangul Gumuz region was also reported (CSA, 2013). The mean livestock holding was significantly different (P<0.05) among the three districts for cattle, sheep, goat and chicken. The livestock composition of the households by districts is presented in Table 1.

Among the livestock possession, cattle were the dominant species reared by the respondents and they are used for different purposes like milk production, income generation from sell of live animals and animal products and for draft power (traction purpose). Sheep, goats and chicken possession takes the second, third and fourth position, respectively and they are used as immediate source of family income and meat production for household consumption. Farmers in the study area also reared donkey to transport water from watering point to their house and to transport materials from market to the house, from the house to the farm and vice versa. Donkeys are also used as alternative source of draught power to cope with negative effects of trypanosomiasis on oxen.

Table 1: Average (Mean±SE) number of livestock holdings per household in the three districts of Metekel zone, Ethiopia (Over all N=180)

Livestock	District			Overall
	Wombera	**Bullen**	**Dibate**	
Cattle	16.12±1.21[a]	11.86±1.24[b]	9.05±0.71[c]	12.35±0.66
Goat	6.70±0.39[a]	6.91±0.36[a]	8.02±0.52[b]	7.20± 0.25
Sheep	8.82±0.28[a]	4.46±0.28[b]	6.17±0.85[b]	6.34±0.30
Chicken	5.07±0.42[a]	4.68±0.35[b]	4.47±0.45[b]	5.04±0.23
Donkey	1.13±0.08[a]	1.47±0.12[a]	2.0±0.17[a]	1.58±0.78

Means within the same row with different subscripts are significantly different ($p<0.05$), SE=Standard Error; N=number of households

Feed resources and feeding practices

The different feed resources reported in the study area were natural pasture, crop byproducts, improved pasture, household residues and grain. Irrespective of districts, grazing on natural pasture was by far the most common source of feed during dry and wet season. Hence, in the study area, most (50%) of the feed requirements of all types of livestock species were met by grazing on natural pasture. Crop by-products and improved pasture were the second and third feed resources of the households, respectively (Table 2).

During the secondary data collection, livestock experts stated that milking cows, draft oxen and young calves were supplemented with non-conventional feeds such as home left over, crop tillers of maize and sorghum and local brewer's recipes called "Attella". Supplementing cattle wirh non-conventional feeds is also reported in different parts of the Ethiopia (Takele, 2005; Belete, 2009; Yeshitila, 2007; Oumer *et al.,* 2013 and Sisay, 2006).

Farmers in the study area also justified the reasons of preferential feeding to productive and vulnerable category of livestock Draft oxen were supplemented to increase draft power performances during traction, milking cows to increase milk and butter yield and very young calves to increase growth rate. The study revealed farmers' preference to supplement draft oxen, milking cows and young calves indicated the importance of traction, milk and growth performance of calves in this production system. The practice of preferential feeding to different category of livestock could create the opportunity to introduce strategic feeding in the study area.

During the focus group discussion sessions, most of the discussants stated a decrease in grazing land due to an ever increasing human population and expanded use of communal grazing lands for crop production. According to Firew and Getnet (2010) cited in Solomon *et al.* (2014), the feed supply of the natural pasture in the Amhara National Regional State of Ethiopia is decreasing for similar reasons.

Table 2: Cattle feed sources in Metekel Zone, Ethiopia (N=60/district)

Feed resources	Districts											
	Wombera				Bullen				Dibate			
	R 1	R 2	R3	Index	R 1	R 2	R3	Index	R 1	R 2	R3	Index
Natural pasture	60	-	-	0.5	60	-	-	0.5	60	-	-	0.5
Grain	-	9	9	0.07	-	17	4	0.11	-	18	3	0.11
Improved pasture	-	21	4	0.13	-	14	23	0.14	-	16	17	0.13
House residue	-	14	23	0.14	-	10	20	0.11	-	9	22	0.12
Crop by products	-	16	24	0.16	-	19	13	0.14	-	17	18	0.14

Index = sum of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] for particular purpose divided by sum of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] for all purpose. R1=number of respondents who select the variable as rank one; R2=number of respondents who select the variable as rank two and R3=number of respondents who select the variable as rank three, N=number of households

Cattle breeding and other management practices

Cattle owners in the study area have limited control over breeding practices of their cattle and most often mating is natural and uncontrolled and this would result in non-descript herd structure. Natural and uncontrolled breeding practice of cattle was reported by 67.8% of the households. The result is in line with what has been reported by Workneh and Rowlands (2004) in Oromia region and Oumer *et al. (*2013) in Jimma zone. As reported by the sampled households across the districts, the sources of bull/s used for breeding within the previous 12 months were neighbor's bull (55.6%), own bull breed at home (35.6%), unknown bull (8.9%).

Making a house or shelter for cattle is not a usual practice in the study area. Hence, 87.2% of farmers housed their cattle in yard during the night and early hours of the morning. However, young calves (1-3 years) were provided day and night shelters and separated from the herd to protect them from suckling their dams, trampling and bad weather and joined their dams only during the morning and evening hours soon after milking. Housing cattle alone was practiced

by 82.8% of the farmers where as 11.7% of the farmers housed their cattle with sheep and 5.5% with goats.

Culling of undesired male and female cattle was practiced by 36.1% of the farmers. Culling of male cattle in the study area was usually practiced at an average age of ten years, after using the animal for both draught and breeding purpose for six years. However, female cattle were culled, after eight years of service in the farm, at an average age of thirteen years. The reasons for culling cattle were old age (56.9%), health problem (29.2%), need for some cash for the family (10.8%) and need for meat (3.1%). Selling, castration and slaughter accounted for 73.8%, 16.9% and 9.3% of culling methods, respectively.

Constraints of cattle production

The assessment at community level has identified seven major constraints related to cattle production in the three districts (Table 3). Feed shortage (Index=0.40) was the major constraint followed by disease (Index=0.19) mainly trypanosomaisis (local name: gendi) and drought (Index=0.17). Other constraints included water shortage (Index=0.13), predator attack (Index=0.05), lack of market access (Index=0.04) and land shortage (Index=0.02). These constraints would result in poor productive and reproductive performance of cattle in the study area.

During the secondary data collection, livestock experts in the study area reported that forest/bush fire, overgrazing, shortage of grazing land due to expansion of crop production practices, shortage of livestock feed especially during the dry season, deforestation, low level of awareness on improved livestock feed management practices and lack of land use policy and guidelines were included among others in the constraints of cattle feed and grazing lands.

According to the ethno-veterinary survey of June 2004 in Benishangul Gumuz region, the relative mean herd incidence of trypanosomaisis in the year 2003 was 33% and mean herd mortality due to the same disease during the same year was 22% (BGRSDGA, 2010). In most of the cases, cattle health related constraints have affected the cattle development sector in the study area.

The cattle owners in the study area also highlighted a shortage of safe water for cattle. It was reported that water constraints were more critical during dry season. Shortage and

intermittent rainfall has exacerbated the situation. Similarly, a lack of animal troughs and remoteness of water sources for animals was noted.

During the focus group discussion sessions, the discussants mentioned the following major constraints related to cattle marketing: (a) lack of cattle market infrastructure and facilities; (b) lack of cattle market information system; (c) predominance of traditional cattle production and management practice which affect the quality of animals supplied to the market; (d) unavailability of formal cattle actors including cooperatives and licensed cattle traders; (e) existence of illegal cattle trade including illegal cross border cattle trade; (f) instability of cattle prices; and lack of cattle quarantine centers.

Table 3: Major Constraints of cattle production in as reported by farmers in three districts of Metekel Zone, Ethiopia (N=180)

| Constraints | Districts | | | | | | | | | | | | Overall (N=180) | | | |
| | Wombera (N=60) | | | | Bullen (N=60) | | | | Dibate (N=60) | | | | | | | |
	R1	R2	R3	Index	R1	R2	R3	Index	R1	R2	R3	Index	R1	R2	R3	Index
Disease	2	27	18	0.22	-	24	21	0.20	-	21	18	0.17	2	72	57	0.19
Feed shortage	46	2	7	0.42	43	3	10	0.41	39	5	9	0.38	128	10	26	0.40
Water shortage	4	13	1	0.11	4	13	1	0.11	8	15	4	0.16	16	41	6	0.13
Drought	7	12	12	0.16	9	14	9	0.15	10	14	6	0.18	26	40	27	0.17
Predator	-	4	13	0.06	-	1	12	0.04	-	2	12	0.04	-	7	37	0.05
Land shortage	-	-	5	0.01	-	3	5	0.03	-	-	8	0.02	-	3	18	0.02
Market access	1	2	4	0.03	4	2	2	0.05	3	3	3	0.05	8	7	9	0.04

Index = sum of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] for particular purpose divided by sum of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] for all purpose. R1=number of respondents who select the variable as rank one; R2=number of respondents who select the variable as rank two and R3=number of respondents who select the variable as rank three, N=Number of respondents

Trait preference of cattle owners

Cattle owners in the study area had their own trait preference. Traits like large body size, good fertility, fast growth rate, disease resistance and color, in favor of black and white with black dominant, were all considered as desirable traits across the study area and given due emphasis in selecting cattle (Table 4). The present result is in line with the results of studies conducted in different parts of Ethiopia like western Wollega (ICRA, 1998; Laval and Assegid, 2002), west Shewa (Jiregna, 2007) and Jimma zone (Oumer *et al.,* 2013).

Farmers' trait preference in the current study revealed the cattle production objectives, in mixed crop-livestock production system, were not only focusing on marketable products such as milk and generation of income from sale of live animals and animal products but also non-marketable functions such as fertility, growth rate and disease resistance. The use of indigenous cattle as multipurpose animals in Ethiopia was also reported by Mukasa-Mugerwa (1981) and Van Dorland *et al.* (2004), also in Kenya (Mosi *et al.,* 1996; Rege *et al.,* 2001) and in Sudan (Musa *et al.,* 2005).

Table 4: Trait preference of cattle in three districts of Metekel Zone, Ethiopia (N=180).

Traits	Districts											
	Wombera				Bullen				Dibate			
	R 1	R 2	R3	Index	R 1	R 2	R3	Index	R 1	R 2	R3	Index
Body size	29	13	5	0.33	28	15	6	0.33	21	16	4	0.28
Fertility	-	5	20	0.08	-	6	20	0.09	-	4	15	0.06
Growth rate	15	15	4	0.22	12	15	5	0.20	16	14	9	0.24
Disease resistance	-	7	18	0.09	-	6	14	0.07	6	13	15	0.16
Color	16	20	13	0.28	20	18	15	0.31	17	13	17	0.26

Index = sum of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] for particular purpose divided by sum of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] for all purpose. R1=number of respondents who select the variable as rank one; R2=number of respondents who select the variable as rank two and R3=number of respondents who select the variable as rank three, N=Number of respondents

CONCLUSION AND RECOMMENDATION

In the light of the findings of this survey, it can be concluded that livestock particularly cattle plays a significant role in the livelihood of the farming community of Metekel zone. In the study area, most of the feed requirements of all types of livestock species were met by grazing on natural pasture. Mating of cattle is predominantly natural and uncontrolled, making a house/shelter for cattle is not a common practice and culling of undesired male and female cattle was practiced by farmers. Traits like large body size, good fertility, fast growth rate, disease resistance and color, in favor of black and white with black dominant, were all considered as desirable traits in the study area and were given due emphasis in selecting cattle. Feed shortage followed by disease, particularly trypanosomiasis and drought was the major constraint of cattle production. Other constraints included water scarcity, predator attack, lack of market access and land scarcity, in that order. These constraints would result in poor productive and reproductive performance of cattle in the study area and decreased the direct benefit of the farmers.

Enhancement of grazing land, cattle feed development and conservation mechanisms like hay making can improve feed availability in dry season and reduce wild fire after rainy season and enable to utilize the pasture efficiently.

To obtain a suitable performance of cattle, breed improvement programs should not be focused only on few traits such as lactation yield but on overall performance including reproduction efficiency, growth rate, disease resistance and color.

To alleviate the prevailing constraints of cattle production and bring a sustainable development to the local farmers, intervention options need to be based on the production systems and identified and prioritized constraints in the study area.

ACKNOWLEDGMENTS

REFERENCE

1. Behnke R. The Contribution of Livestock to the Economies of IGAD Member States: Study Findings, Application of the Methodology in Ethiopia and Recommendations for Further Work. UK: Odessa Centre, IGAD Livestock Policy Initiative, Great Wolford; 2010. IGAD LPI Working Paper 02-10.

2. Belete Shenkute, 2009. Production and marketing systems of small ruminants in Goma district of Jimma zone, western Ethiopia. M Sc Thesis. School of Graduate Studies, Hawasa University of Agriculture.

3. Benin S, Ehui S, Pender J. Policies for livestock development in the Ethiopian highlands. Environ Dev Sustain., 2003; 5: 491–510. doi: 10.1023/A:1025737315629.

4. BGRSDGA (Benishangul Gumuz Regional State Development Gap Assessment), 2010.

5. CSA, 2013. Agricultural Sample Survey, 2012/13 (2005 E.C.), Volume II: Report on Livestock and livestock characteristics (Private peasant holdings). Statistical Bulletin 570. Addis Ababa: Central Statistical Agency (CSA), Federal Democratic Republic of Ethiopia., 2013.

6. Engda, M. Agro-climatic classification of Ethiopia. Ethiop. J. Nat. Resour., 2000; 2(2): 115-135.

7. FAO, 2002. (Food and Agricultural Research Organization) www.faostat.org

8. Firew, T., Getnet, A. (2010). Feed resource assessment in Amhara regional state. Ethiopian Sanitary and Phytosanitary Standards and Livestock Meat Marketing Program (SPS-LMM), Texas A&M University System.

9. ICRA (International Centre for Development Oriented Research in Agriculture), 1998. A participatory Systems Analysis of the Termite Situation in west Wollega, Oromia Region, Ethiopia. A joint publication by International Centre for Development Oriented Research in Agriculture, Ethiopian agricultural research Organization and Oromia Agricultural Development Bureau. Bako Research Centre. Working Document Series 68, Ethiopia.

10. Isaias Nega Gudina, Seyoum M. Tsegaye and Berhanu M. N, 2015. A study of forage yield and nutritive value of natural pastures at varying levels of maturity in North West Lowlands of Ethiopia. Department of Animal Science Research, Addis Ababa University, Addis Ababa, Ethiopia.

11. Jabbar M, Negassa A, Gidyelew T. Geographic distribution of cattle and shoats populations and their market supply sheds in Ethiopia. Kenya: ILRI (International Livestock Research Institute), Nairobi; 2007. Discussion Paper No. 2. Improving Market Opportunities., 54.

12. Jiregna, (2007) Characterization of cattle genetic resources in their production system context in danno district, west showa, oromia, Ethiopia. M Sc Thesis. School of Graduate Studies, Alemaya University of Agriculture.

13. Koehler-Rollefson, I. and J. Wanyama, 2003. The Karen Commitment. Proceedings of a Conference of Indigenous Livestock Breeding Communities on Animal Genetic Resources. Karen, Kenya, 27–30 October 2003.

14. Laval, G. and Assegid Workalemahu, 2002. Traditional Horro cattle production in Boji district, west Wollega, Ethiopia. Ethiopian Journal of Animal Production., 2002; 2(2): 97-114.

15. MoA. MoA, National Livestock Development Project (NLDP) Working Paper., 1998; 1-4, Addis Ababa. Ethiopia.

16. MOA. Agro ecological Zones of Ethiopia. Natural Resources Management and Regulatory Department, Ministry of Agriculture (MOA), Addis Ababa., 2000.

17. Metaferia F, Cherenet T, Gelan A, Abnet F, Tesfay A, Ali JA, Gulilat W. AReview to Improve Estimation of Livestock Contribution to the National GDP. Ministry of Finance and Economic Development and Ministry of Agriculture. Ethiopia: Addia Ababa., 2011.

18. Mosi R.O., A. M. Okeyo, C. O. Ahuya and M. A. Okomo. Phenotypic characterization of zebu cattle in Kenya. Department of Animal Production, University of Nairobi, Nairobi, Kenya., 1996.

19. Mukasa-Mugerwa, E. A study of traditional livestock production in Ada District of Ethiopia. Animal Reproduction and Health Unit, ILCA (International Livestock Centre for Africa), Addis Ababa, Ethiopia., 1981; 153.

20. Musa, L.M-A., M-K. A. Ahmed, K. J. Peters, B. Zumbach and K. A. E. Gubartalla. The reproductive and milk performance merit of Butana cattle in Sudan. Archives of Animal Breeding., 1981; 48: 445-459.

21. Negassa A, Rashid S, Gebremedhin B. Livestock Production and Marketing. ESSP II Working Paper 26. Addis Ababa, Ethiopia: International Food Policy Research Institute/Ethiopia Strategy Support Program II; 2011.

22. Ouma, E., Obare, G. and Staal, S. Cattle as Assets: Assessment of non-Market Benefits of Cattle in Smallholder Crop – Livestock Systems, Contributed paper at the 25th International Conference of Agricultural Economists, August 16 – 22nd 2003, Durban, South Africa., 2002.

23. Oumer Sheriff, Berhanu Belay and Aynalem Haile. On-farm Phenotypic Characterization of Indigenous Cattle Types in Jimma Zone, Southwestern Ethiopia. Ethiopian Journal of Animal Production., 2013; 13(1): 1607-3835.

24. Rege, J.E.O., A. Kahi, M. Okomo-Adhiambo, J. Mwacharo and O. Hanotte, 2001. Zebu cattle of Kenya: Uses, performance, farmers preference, measures of genetic diversity and options for improved use. Animal genetic resources research 1. ILRI (International Livestock Research Institute) Nairobi, Kenya., 2001; 103.

25. Sisay A. Livestock production systems and available feed resources in different agroecologies of north Gonder zone, Ethiopia. M.sc. Thesis. Alemaya University. Alemaya., 2006.

26. Solomon A, Workalemahu A, Jabbar MA, Ahmed MM, Hurissa B. Socio-economics and Policy Research Working Paper 52. Nairobi: Kenya, ILRI (International Livestock Research Institute)., 2003.

27. Solomon Zewdu, Binyam Kassa, Bilatu Agza, Ferede Alemu and Gadisa Muleta. Smallholder cattle production systems in Metekel zone, northwest Ethiopia. Research

Journal of Agriculture and Environmental Management., 2014; 3(2): 151-157, February, 2014. Available online at http://www.apexjournal.org ISSN 2315 - 8719© 2014 Apex Journal International.

28. SPSS (Statistical Package for Social Science), 2006. SPSS user's guides.

29. Takele. On Farm Phenotypic Characterization of Sheko Breed of Cattle and Their Habitat in Bench Maji Zone, Ethiopia. M Sc Thesis. School of Graduate Studies, Alemaya University of Agriculture., 2005; 105.

30. Tilahun H, Schmidt E. Spatial Analysis of Livestock Production Patterns in Ethiopia. ESSP II Working Paper 44. Addis Ababa, Ethiopia: International Food Policy Research Institute/Ethiopia Strategy Support Program II., 2012.

31. Tsedeke Kocho. Production and marketing systems of sheep and goats in Alaba, southern Ethiopia. M Sc Thesis. School of Graduate Studies, Alemaya University of Agriculture., 2007.

32. Van Dorland, H.A., Workneh Ayalew, Asfaw Tolessa, G.J. Rowlands, J. E. O. Rege. Understanding the purpose for helping cattle and their perceived traits by farmers in oromia Regional State, Ethiopia. Pp 191-201. Proceeding of the 11th Annual Conference of the Ethiopia Society of Animal Production (ESAP) on Farm Animal Biodiversity in Ethiopia: Status and Prospects. Addis Ababa, Ethiopia, 28-30 August 2003, ESAP., 2004.

33. Workneh Ayalew and Rowlands J. (eds). Design, execution and analysis of the livestock breed survey in Oromiya Regional State, Ethiopia. OADB (Oromiya Agricultural Development Bureau), Addis Ababa, Ethiopia, and ILRI (International Livestock Research Institute), Nairobi, Kenya., 2004; 260.

34. Yeshitila A. Efficiency of livestock feed resources utilization and forage development in Alaba woreda, southern Ethiopia. MSc Thesis. Haramaya University, Haramaya, Ethiopia., 2007.