ADDIS ABABA UNIVERSITY

COLLEGE OF VETERINARY MEDICINE AND AGRICULTURE

ASSESSMENT OF CATTLE HUSBANDRY AND MARKETING PRACTICES IN BURJI WOREDA, SEGEN ZURIA ZONE OF SNNPRS, ETHIOPIA

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DEBRE ZEIT, ETHIOPIA

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A Thesis Submitted to the School of Graduate Studies Addis Ababa University in Partial Fulfillment of the Requirements for the Degree of Master of Science in Tropical Animal Production and Health

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ABBREVIATIONS

BwOARD	Burji woreda Office Agriculture and Rural Development
CSA	Central Statistical Authority
ESAP	Ethiopian Society of Animal Production
ETB	Ethiopian Birr
FAO	Food and Agricultural Organization of the United Nations
GDP	Gross Domestic Product
Ha	hectare
HHs	Households
ILRI	International Livestock Research Institute
m.a.s.l	Meters above sea level
OoA	Office of Agriculture
PAs	Peasant Associations
SE	Standard Error
SNNPRS	Southern Nations, Nationalities and Peoples Regional State
SPSS	Software package for social science
UNDP	United Nation Development Program

ABSTRACT

This study was conducted to assess cattle husbandry and marketing practices in the crop-livestock production system areas of the highland and mid-altitude and pastoralists in the lowlands of Burji *woreda* of Segen *Zurea* zone of southern Ethiopia. The cattle husbandry and marketing practices were assessed based on one time field visit, questionnaire survey and focus group discussions in highland, mid-altitude and lowland altitude area. A total of 100 farmers were selected randomly from 10 *Kebeles,* which are selected based on proportion of *kebebes* exist in altitude zones for the study. The survey showed that the majorities 81% of household heads under investigation were males and the rest 19% were female. The average family size in the highlands, mid-altitudes and pastoral areas were 9.0±0.5, 9.4±0.3 and 11.1±0.5 respectively. The survey showed that cattle were the most important species in the study area. Average livestock holding per household varied across the altitude zones, especially cattle and oxen holding per household in highland, midland and lowland altitude zones were, 13.7±2 cattle and 4.1±0.4 oxen, 11.6±1 cattle and 3.98±0.3 oxen and 29.3±2.5 cattle and 6.2±0.4 oxen respectively. Natural pasture is the major feed resource of the *woreda*, but communal grazing land in their area is dwindling at an alarming rate. Crop residues provided the second major feed resources for livestock, particularly during the dry season when biomass of natural grazing lands is very low. The constraints to cattle production system were feed shortage, drought, and diseases and parasites particularly Trypanosomiasis, shortage of grazing land, veterinary services, extension services, marketing and other infrastructures. Hence, more emphasis should be given to improving livestock productivity through strong extension services in proper management of the rangelands, feed conservation, crop residues treatment, healthcare, marketing and provision of credit facility.

Keywords: *cattle husbandry, constraints, crop residues, natural pasture, marketing and rangelands*

1. INTRODUCTION

Ethiopia, with 49.3 million heads of genetically diverse cattle, has the largest population in Africa (CSA, 2009). Cattle production plays an important role in the economies and livelihoods of farmers and pastoralists. Cattle produce a total of 3.2 billion liters of milk and 0.331 million tones of meat annually (CSA, 2008a). In addition, 14 million tones of manure are used annually primarily for fuel. About 6 million oxen provide the draught power required for the cultivation of cropland (Azage and Alemu, 1998). Livestock are therefore closely linked with the economic, social and cultural lives of millions of resource-poor farmers for whom animal ownership ensures varying degrees of sustainable farming and economic stability.

The diversity of Ethiopia's topography, climate and cultural conditions make it difficult to generalize about livestock production systems in the country. Numerous authors used different criteria to classify livestock production systems in Ethiopia (Mohammed *et al.*, 2004). However, about five production systems have been identified based on integration of livestock with crop production, level of input and intensity of production, agro-ecology and market orientation. The following systems have been defined viz. pastoral, agro-pastoral, mixed crop-livestock farming, urban and peri-urban dairy farming and specialized intensive dairy farming systems (Mohammed *et al.*, 2004).

The highlands (those above 1500 m.a.s.l) in Ethiopia comprise nearly half of the land area of the country and hold more than 85% of the total human population and about two thirds of the livestock population, which are dominantly crop-livestock systems areas and are recognized to be under stress because of shrinking cultivated areas per household, land degradation and reduced feed availability (Aune *et al.*, 2001). The lowlands (<1500 m.a.s.l) cover 78 million ha, and support 12% of the human and 26% of the livestock population. Ethiopia is a tropical African country in which mobile pastoralism is dominant in the arid and semi-arid areas in the eastern, northeastern and southeastern parts of the country, while agro-pastoralism represents an increasing practice in the semi-arid areas in the northwestern, southern and eastern parts of the country. In general, they represent the major pastoral constituency in the Horn of Africa (Amaha, 2006).

In spite of the existing enormous livestock resource, the contribution of the sub sector to the agricultural production, foreign currency earnings and total GDP is not up to expectations (Girma, 2010). Thus, the contribution of this sector in the agricultural economy of the country remains lower. Indeed, it accounts for merely 30% of the national agricultural output and 40% of the agricultural export (Kedija *et al.*, 2008). Although ,it is a general fact that the role of animals pertaining to traction power in the areas of crop production and household food consumption is remarkable, the effective and efficient exploitation of the resources could not be made in the full fledged manner (Girma, 2010).

The potentials for increased livestock production and the productivity is proportionally lowered by various livestock management problems, prevalence of major endemic diseases, poor feeding and high stocking rate on grazing lands, lack of support services such as extension services, veterinary services, insufficient data to plan improved services and inadequate information on how to improve animal breeding, marketing, and processing (Kedija *et al.*, 2008). Accordingly, existing range-livestock management practices and the perception of the farmer and pastoral communities towards rangeland degradation and deterioration were important, as this will provide the way for designing different rangeland interventions to be undertaken in the area to enhance the livestock productivity. Identification of overall management activities with their constraints and opportunities associated to cattle production and marketing are preconditions for designing suitable cattle production development strategies (Heffernan, 2004). In general cattle husbandry and marketing practices has not been studied in the study area. Thus it is not possible to improve the benefit gained from live animal, meat, milk, skin and other products from indigenous cattle.

Therefore, the study was proposed with the general objective of assessment of cattle husbandry and marketing practices with assessing associated opportunities and constraints in the study area.

The specific objectives are:

- To describe the existing range-livestock management practices
- To assess cattle feed resources and conservation systems
- To assess marketing practices

2. LITERATURE REVIEW

2.1. Livestock Production Systems in Ethiopia

Livestock have diverse functions in the livelihood of farmers in the mixed crop–livestock systems in the highlands and pastoralists and agro-pastoralists in the lowlands of Ethiopia. They are a source of income, which can be used by rural populations to purchase basic household needs and agricultural inputs. In the rural areas of many developing countries, financial services such as credit, banking and insurance are virtually non-existent. In these areas, livestock play an important role as a means of saving and capital investment, and they often provide a substantially higher return than alternative investments. A combination of small and large livestock that can be sold to meet petty-cash requirements to cover seasonal consumption deficits or to finance large expenditure represents a valuable asset for the farmer (Sansoucy *et al.*, 1995).

Cattle in Ethiopia are almost entirely of the zebu type and are sources of milk and meat. However, these cattle do relatively well under the traditional production system. About 70 % of the cattle are in the highlands, and the remaining 30 are kept by pastoralists in the lowland areas (Solomon *et al.*, 2003). Cattle production details including husbandry practices, feed resources, purposes of keeping cattle, production systems and environments interacting under smallholder settings required for improving productivity and profitability of the cattle were not properly studied in different parts of the country (Alemayehu *et al.,* 2000).

Similarly, cattle and cattle product markets and marketing situations crucial for enhancing incomes and livelihood of the smallholder livestock keepers were also not described in various parts of the country (Solomon *et al.*, 2003). Cattle production systems differ markedly due to differences in resource endowments, climate, human population, disease incidences, level of economic development, research support and government economic policies (Devendra and Thomas, 2002).

2.1.1. Mixed crop-livestock production system

In the mixed crop-livestock systems of the Ethiopian highlands and mid-altitudes, livestock production is subordinate, but economically complementary to crop production. In this agro-ecological zone, livestock, especially cattle, provide traction, which is a vital contribution to the overall farm labour requirement. Within the integrated crop-livestock production systems, animals play a particular vital role, the extent of which is dependent on the type of production system, animal species and scale of the operation. Dairy production is becoming an increasingly important integrated system in many countries, in which this component generates significant, and more importantly, daily cash income, as well as contributing to the improvement of the livelihoods of very poor people and the stability of farm households. It is for these reasons that dairying in developing countries is considered to be an important instrument of social and economic change, and is identified with rural development (Belete *et al.,* 2010).

Particularly highland mixed crop-livestock farming system of Ethiopia support 2/3 of the livestock population and hold about 95% of the cropped area. It is estimated that the highlands contain nearly 75 to 80% of the national cattle and sheep, and 30% of the national goat flock (Zinash *et al.*, 2001). In the mixed crop-livestock system of Ethiopian highlands, farm size is an effective constraint for efficiency of production as well as improving the living condition of the rural family. Because, increasing population pressure needs additional cropland to produce food crops, it has contributed to the decline in availability of grazing lands which in turn affects livestock productivity (Alemayehu, 2002).

Milk production, cash source, manure and fuel are considered as secondary. Cattle and equine play a vital role in smallholder farms for crop cultivation and transportation (Alemu, 1998). Livestock products, especially dairy, can make a unique contribution to human nutrition to the poor in developing countries by providing micronutrients in bio-available form such as vitamin A, carbohydrates, protein and calcium (Ahmed *et al.,* 2003b).

In the highlands of Ethiopia, milk produced by smallholders is used for family consumption. For butter making, milk is collected over a period of three or four days in a clay pot. When the milk has soured and sufficient milk has been collected, the clay pot is shaken back and forth until butter granules are formed. This method of butter manufacture

may take from two to three hours, depending on such factors as temperature, the fat content of the milk, the acidity of the milk and the amount of milk in the clay pot. The time taken to make the butter together with the time involved in taking this butter to the market place is a considerable drain on the already limited time of the smallholder, or specifically on that of his wife and family (Zelalem and Inger, 2000

In mixed production systems where animals are used for draught and transport, the proportion of mature oxen or donkeys in herds tends to be relatively high. In arid areas where pastoral system of production is dominant, livestock population has increased over time following the demand for both water and feed availability (Belaynesh, 2006).

2.1.2. Pastoral production system

Pastoralism as a system mainly operating in the rangelands where the peoples involved follow animal-based life styles, which requires of them to move from place to place seasonally based on feed and water availability. For food, pastoralists mainly depend on milk, and their accumulated wealth and savings are in the form of live animals. Milk production under the systems is strictly seasonal and range condition-dependent being surplus in the wet season and restricted in the dry season (Zegeye, 2003).

Even though information on both absolute numbers and distribution vary, it is estimated that about 30% of the livestock population in Ethiopia are found in the pastoral areas. The pastoralist livestock production system which supports an estimated 10% of the human population covers 50-60% of the total area mostly lying at altitudes ranging from below 1500 m.a.s.l. Pastoralism is the major system of milk production in the lowlands. However, availability of milk is dictated by the shortage and erratic nature of the rainfall and fluctuations in availability of feed (Ketema and Tsehay, 2004). Animals are consequently important in the social value system that promotes flexibility in resource use (Kedija *et al.,* 2008).

In Ethiopia livestock production is undertaken both in highland and lowland areas. The lowlands‟ pastoral areas are situated in the Eastern, South Eastern, and Southern parts of the country. These are Afar & Somali regions, Borena and Omo/Ghibe River basins respectively. Among the total livestock resources (number) of the country 20% of cattle,

25% of sheep, 73% of goats and 100% of camels are found in the lowland pastoral areas (Alemayehu, 2007).

In the semi-arid low lands, cattle are the most important species because they supply milk for the subsistence of the pastoral families. In the more arid areas, however, goats and camels are the dominant species reared. The lowland accounts for 27% of the milk produced. Because of the erratic rainfall pattern and related reasons, resulting in shortage of feed, milk production per unit is low and highly seasonal. More milk is produced in the wet season where pastoralists would mostly conserve and convert the surplus milk into butter, and trade off to the highlanders in the peripheral markets for grain (Getachew and Gashaw, 2001).

Most pastoralists move between seasonal grazing areas, taking strategic advantage of different forage and water sources as they become available. Very few pastoralists are the wandering nomads. Pastoral adaptation to arid and semi-arid areas is based on a wealth of comprehensive and deep indigenous knowledge about the environment in which they live and the various risks it involves. They know the phases of the moon and its relation to rainfall, the quality and capacity of the watering points, pasturelands and the nutritional value of different grasses (UNDP, 2002).

2.2. Farming System Characteristics in Ethiopia

2.2.1. Landholding and land use system

Most farms in Ethiopia are fragmented and smallholder mixed crop–livestock systems are interdependent. Increasing human population coupled with diminishing land resources and increasing urbanization are creating a growing number of landless people who also have to produce their own subsistence (Kebreab *et al.*, 2005).

2.2.2. Purpose of cattle rearing

The potential of livestock to reduce poverty is enormous. Livestock contribute to the livelihoods of more than two-thirds of the world‟s rural poor and to a significant minority of the peri-urban poor. The poorest of the poor often do not have livestock, but if they can acquire animals, their livestock can help start them along a pathway out of poverty.

Livestock also play many other important roles in people‟s lives. They contribute to food and nutritional security; they generate income and are an important, mobile means of storing wealth; they provide transport and on-farm power; their manure helps maintain soil fertility; and they fulfill a wide range of socio-cultural roles (ILRI, 2002).

Livestock in Ethiopia provide draught power, income to farming communities, means of investment and important source of foreign exchange earning to the nation. Of the total household cash income from crop and livestock, livestock account for 37 to 87% indifferent parts of the country (Ayele *et al.,* 2003), and the higher the cash income, the higher is the share of livestock, indicating that increased cash income comes primarily from livestock, particularly in the pastoral areas. Cattle provide traction power that is the single most important source of power in the overall farm power requirements.

Cattle are kept for multiple purposes and the emphasis on use varies with the production system. In both crop-livestock and agro-pastoral systems, animal traction ranked first, followed by milk and reproduction. Manure production is also considered as a secondary important by-product by most crop-livestock and agro-pastoralist farmers. In contrast, in pastoralist systems, reproduction/breeding requirements received higher ranks and for female animals breeding outranked the importance of milk production (Workneh and Rowlands, 2004).

2.2.3. Cattle breed type

About 99% of the cattle population in Ethiopia are indigenous that are adapted to feed and water shortages, disease challenges and harsh climates. The productivity of indigenous livestock is, however, believed to be poor even if no practical recording scheme at national level has been used to judge their merit. Crossbreeding has been practiced with encouraging results, however, a strictly controlled breeding program has not been practiced and there has been no dairy herd recording scheme at national level. Less than 1% of the 49.3 million cattle populations of Ethiopia are exotic or crossbred dairy cows (CSA, 2009).

In Ethiopia, genetic improvement of the indigenous cattle for dairy production, focusing on crossbreeding, has been practiced for the last five decades, albeit with little success. Selection as an improvement tool has been given less emphasis and as such there have been no systematic and organized selection schemes for cattle genetic improvement in Ethiopia.

In addition, little or no genetic improvement work targeted at improving beef production has been undertaken so far. Therefore, there is a need to develop effective and sustainable genetic improvement schemes for indigenous cattle breeds of Ethiopia (Aynalem *et al.*, 2011).

2.2.4. Cattle feed resources and feeding management

Livestock feed resources in Ethiopia are mainly natural grazing lands and browses, crop residues, forage crop and agro-industrial by products. Feeding systems include grazing or browsing on communal or private natural pasture and rangelands cut and carry feeding, hay and crop residues. At present, livestock are fed almost entirely on natural pasture and crop-residues. Using of improved forages and agro-industrial by-products is minimal and most of agro-industrial byproducts are concentrated in urban and peri-urban areas (Alemayehu, 2005).

In the mixed cereal livestock farming systems of the Ethiopian highlands, crop residues provide on average about 50% of the total feed source for ruminant livestock. The contributions of crop residues reach up to 80% during the dry seasons of the year (Adugna, 2007). The availability of feed resources in the highlands depends on the intensity of crop production, population pressure, the amount of rainfall, and distribution pattern of rainfall and seasons of the year. Pasture growth is a reflection of the annual rainfall distribution pattern (Seyoum *et al.*, 2001). However, with the decline in the size of the grazing land and degradation through overgrazing and the expansion of arable cropping, agricultural by-products have become increasingly important (Alemayehu, 2004).

Seasonality in feed availability and lack of knowledge on feed conservation has created feed shortage both in the highland and lowland ecologies of Ethiopia. The population pressure and expansion of crop land calls for alternative ways of feed production, conservation and utilization. The seasonally surplus total dry matter biomass could be effectively utilized to support market-oriented ruminant production (Tesfaye *et al.*, 2010). The quantity of feed is inadequate in the dry season for the existing livestock, while there is surplus in the wet season. Cereal crop residues (straws and stovers) are mostly stacked and fed to livestock during the dry season when the quantity and quality of available fodder from natural pasture declines drastically (Getachew, 2002).

The arid and semi-arid lowlands are characterized by high spatial and temporal variability in rainfall distribution and pattern. Although there are general rainy and dry seasons, the rains may start at different times in different years, increasing irregularity and distorting the normal pattern. Chances for prolonged dry spells at the end of the dry season and the beginning of the rainy season are very high. In such conditions meaningful crop production cannot be attained in rain-fed agriculture and extensive livestock production appears to be a better means of exploiting the grazing and browse resources in the arid and semi-arid lowlands. The semi-arid southern rangelands of Ethiopia support the livestock that are highly valuable to the nation as direct sources of consumption for the pastoral and agro-pastoral population, as sources of cash income and foreign currency for the nation and for provision of draught power for small-holders in the highlands (McCarthy *et al*, 2002).

At present, the production of improved pasture and forages is insignificant and the contribution of agro-industrial by-products is also minimal and restricted to some urban and peri-urban farms (Alemayeu, 2005). The same author also indicated that in the past two decades, considerable efforts have been made to test the adaptability of pasture and forage crops to different agro ecological zones and several useful forages have been selected for different zones.

Hay making is commonly used means of feed preservation technique in Ethiopia, which is expected to mitigate problems of livestock feeding during the dry period and therefore such experience is a good indicator that there are certain practices of efficient feed utilization. High quality hay can be defined as forage that is dried without deterioration and retaining most of its nutrients. Moreover, being free from mould development, retention on natural color and palatability and capability for storage over a long period of time are other important desirable qualities considered in hay. In many of urban and peri-urban areas, livestock farm owners rely on bought fodder, which is irregularly available and often of dubious quality (Vernooij, 2007).

2.2.5. Animal housing

Housing is very important for animals and the rearing system determines the kind of provision to be made. The housing systems of different livestock species in Ethiopia is predominantly open fenced barn that do not have roofing to shelter larger livestock; like cattle (except calves), camel and donkey during night time(Tesfaye, 2007).Animals were

housed in open and closed type of houses (in house hold hut) depending on age and types of animal. Those young cattle and young and mature goats are housed separately in the family hut. It is constructed inside the family hut with wood and walled by a mud. However, mature cattle, young and mature camels were housed in the open field around their encampment by fencing it with available piece of thorn wood and different bush plants. This type of house is locally called as *„Mora'*. *Mora* and mud house are constructed with the main objectives of protecting the animals from predators during night time. However, if the animals were sick, the enclosure was used to prevent movement of animals during day time. The herders believes that the major reason that the goats of all ages groups kept in the family house during night time is due to the fact that goats are not able to defend themselves from predators while other animals, cattle and camels, are able to defend themselves first by giving sign for their herders when predators come. Housing of animals is practiced only during night time and *Mora* cleaning performed by married women. Cattle calves were housed in well-protected enclosures until they reach one month old. However, after one month of age, they are tethered in *Mora* on the day time and occasionally taken out to graze. During the dry season women sometimes cut grass and carry it home for calves. The more severely of the dry season, the more important this becomes. In case of camel calves, they are always kept in the *Mora* from the time of birth up to the time they go out for grazing after one month (Kedija, 2007)

On the other hand, most of the farmers keep their calves and small ruminants in closed barns that had roof cover. Provision of closed barns for calves and small ruminants varies from place to place. Overall calves are most favored in getting roofed night time shelter followed by goats and sheep (Tesfaye, 2007).

2.2.6. Watering management

Temporary surface water, ponds, rivers, streams traditional well *"Ellas",* hand dug wells like hand and solar pumps and bore holes are the main source of water for cattle in Ethiopia. In highland areas water sources of cattle is rivers, streams and temporary surface water both in dry and wet seasons. In all pastoral areas, temporary surface water and ponds are used in the wet seasons. Livestock watering frequency varies from season to season, species to species and accessibility of water sources. During the wet seasons most of the livestock are watered every 1-2 days. But during dry seasons cattle are watered every 2-3 days and camels every 3-5 days based on availability and accessibility of watering points.

During dry seasons the pastoralist with their livestock travel more than 6-8 hours per day for looking of water source (CARE-Ethiopia, 2009).

2.2.7. Animal healthcare

Animal health care and improved health management is one of the major constraints of livestock development in Ethiopia, which caused poor performance across the production system. Many of the problems result from the interaction among the technical and non-technical constraints. For instance, poorly fed animals have low disease resistance, fertility problems, partly because the animal health care system relays heavily on veterinary measures. Moreover, poor grazing management systems continue to cause high mortality and morbidity (e.g. internal parasites), many of the diseases constraints which effect supply are also a consequence of the non-technical constraints, for example, insufficient money to purchase drugs or vaccines (Ibrahim and Olaloku, 2002).

Contact of livestock brought from various localities through the use of communal pastures and watering as well as marketing places play an important role in the transmission of economically significant infectious and parasite diseases. Such livestock movements could be the cause of direct or indirect transmission of various economically important livestock diseases (Zinash, 2004).

2.3. Constraints and Opportunities of Cattle Production in Ethiopia

The major constraints of Ethiopian farmers are feed shortage, diseases and parasites, drought, shortage of grazing land, market access, veterinary services, extension services and other infrastructure. Among those constraints inadequate supply of quality feed, drought, diseases and parasites were the main reasons for low productivity of the indigenous cattle breeds and are the major factors limiting cattle productivity in Ethiopia (Firew, 2007).

Livestock production in Ethiopia suffers from feed shortages at all levels. It is estimated that there is a 40% deficit in the national feed balance. This is again aggravated by seasonal availability of forage and crop residues in the highlands and by erratic rainfall in the lowlands. The problem is further exacerbated by the associated poor husbandry practices that lower productivity further (Firew, 2007). Availability, quality and quantity of feed vary

among various production systems and environments. Cattle largely depend on rangeland grazing or crop residues that are of poor nutritive value. Feed is not uniformly supplied and the quality is poor (Ibrahim and Ololaku, 2000).

Communal lands are resources of livelihood for rural peoples of Ethiopia. Especially, communal grazing lands are important sources of livestock feed and most of the livestock population are mainly dependent on natural pasture and secondly on crop residue. Such communal resources are not managed based on the collective action of communities from complete disappearance. Thus, communal grazing lands are decreasing in size and its productivity at a faster rate, faced with severe land degradations, subject to competition with another type of land-uses and becoming a source of frequent conflicts. Therefore, major communal grazing land problems and its impact on agricultural communities‟ life is highly dependent on it (CSA, 2003).

Infrastructural, policy-related and institutional constraints to livestock marketing in Ethiopia include lack of access to formal financial systems and credit, onerous and non-transparent taxation systems, limited investment in communication and infrastructure, poor market supply and poor forward and backward linkages. While the type of infrastructure and services varies from market to market, the majority of market yards have been equipped with a brick fence, separate compartments for shoats, cattle and camels, loading ramps, feeding and watering troughs and shaded areas (Legese *et al.*, 2008).

Lack of market-oriented production, lack of adequate information on livestock resources, inadequate permanent trade routes and other facilities like feeds, water, holding grounds, lack or non provision of transport, ineffectiveness and inadequate infrastructural and institutional set-ups, prevalence of diseases, illegal trade and inadequate market information (internal and external) are generally mentioned as some of the major reasons for the poor performance of this sector (Belachew and Jemberu, 2003).

Poor road infrastructure in general was seen as a major constraint to efficient trade and rate of the transport is the highest cost for livestock trading. Traders trucked animals from primary and secondary markets to terminal market for domestic consumption. Poor and uneven access to market information is a well-known constraint to livestock trade in the country (Umar and Baulch, 2007). In order to make timely and well-informed decisions,

sellers and buyers need access to a wide range of market information, including prices, sales volumes, disease status and the levels of national and international demand.

Despite the low productivity of traditional animal production system in the mixed crop-livestock system of Ethiopian highlands, there are substantial potentials for development. There is a considerable potential for increasing crop yield, and the quantity as well as the quality of forage through adoption of different strategies that integrate livestock and cropping systems. This can be achieved by the production of more feeds under sustainable cropping system and preparation of better mix of nutrients for livestock from these sources, and by improving utilization efficiency of the available feed resources (Alemayehu, 2002).

Strengthening veterinary drug supply and services through participation of both public and private services would also be an essential step to enhance disease control and improve animal productivity and production in the area. Strengthening of farmers‟ cooperatives in the participation of input supply such as drugs, artificial insemination and health service deliveries would play crucial role in improving milk and meat production (Herrero *et al.*, 2010).

Facilitating credit services targeted to improve dairy and beef cattle production and marketing should also be considered. Improving both feed and animal health management leads to reduce mortalities of young animals and to increase weight gain of animals. These improvements lead to more rapid herd and animal growth, both central to profitability of farmers and pastoral societies. In either case, public investment in adaptive research, sustained organizations, and infrastructure will be required to deliver increased knowledge and capacity to small farmers, particularly in improved genetics and animal health and improved organization and management are needed to achieve these improvements (Herrero *et al.*, 2010).

Opportunities for intensification differ depending on the type of systems and their location, associated with differences in primary production potential, availability of inputs, infrastructure, markets, services and identify lessons that can help meet current and anticipate future challenges to sustainable intensification of smallholder livestock production systems. The major contribution to improving feed availability and quality will be through crop improvement programs. Multi-objective crop improvement programs can

improve both human food and livestock feed and are often easily out-scaled through existing public and private crop breeding and seed systems (Herrero *et al.,* 2010).

2.4. Cattle Marketing System in Ethiopia

Marketing involves all activities involved in the production, flow of goods and services from point of production to consumers. Marketing includes all activities of exchange conducted by producers and middlemen in commerce for the purpose of satisfying consumer demand. All business activities facilitating the exchange are included in marketing (Lemma *et al.,* 2005).

Agricultural products have their own unique features that affect the consequent marketing activity; seasonality is one of these features (Vander Laan *et al.,* 1999). In the same argument, livestock marketing is deemed to possess seasonality mainly due to the fact that animals need to be trekked, fed, and watered. Prices of cattle are lower between mid October and December *i.e*. (*fite* season locally). During this period first the neighboring farmers‟ crops are not mature enough to be harvested, hence the highlanders (farmers) would not have money, and second, the pastoralists do not buy in fear of the hardship in the coming dry season. After January, the farmers can sell their crop and livestock to pay their *Meskel* festival debt (pay for the cattle they purchased on credit), and for improved seed and fertilizer (Misginaw *et al*. 2010).

Farmers sell livestock and livestock products to cover household cash expenses and to purchase crop inputs. Live animals are marketed through traditional marketing routes developed over the years. Livestock pass from primary markets (collection centers) to secondary and tertiary markets to reach the consumer. Cross-border exports are also common in the southeastern, southern and northwestern parts of the country. Marketing of livestock products such as milk, butter, egg, hide and skin is also important to households. Fresh milk and eggs are directly sold after meeting family needs at farm level. Surplus production and supply is usually higher in urban areas due to market orientation and urbanization, which creates better demand for products (Azage *et al.*, 2010).

3. MATERIALS AND METHODS

3.1. Description of the Study Area

The study was conducted in Burji *Woreda*, Segen *zurea* Zone of the Southern Nations Nationalities and Peoples Regional State (SNNPRS). The land area of the *woreda* is estimated to be 1374.6 square kilometers, and bordered with Oromia Region to the East and to the South, Amaro *Woreda* to the North and Konso *Woreda* to the West. Based on agro-climatic zones, the *Woreda* can be divided into three broad climatic zones, namely highland areas of *Dega* >2,300 m.a.s.l, which accounts for 21.3% of the total land, mid-altitude of *Woina Dega* and *Kolla* in between 1500-2300 m.a.s.l, which accounts for 42.46% of the total land and lowland areas of *Kolla* and *Bereha* < 1500 m.a.s.l, which accounts for 36.24% of the total land areas of the *Woreda*. The elevation of the study areas vary from 501-2,500 m.a.s.l. It is located between 50 23" latitude and 50 70" longitudes. The mean annual rainfall ranges from 801-1000 millimeters while the mean annual temperature ranges from 15.1 to 27.5^0 centigrade (CSA, 2007).

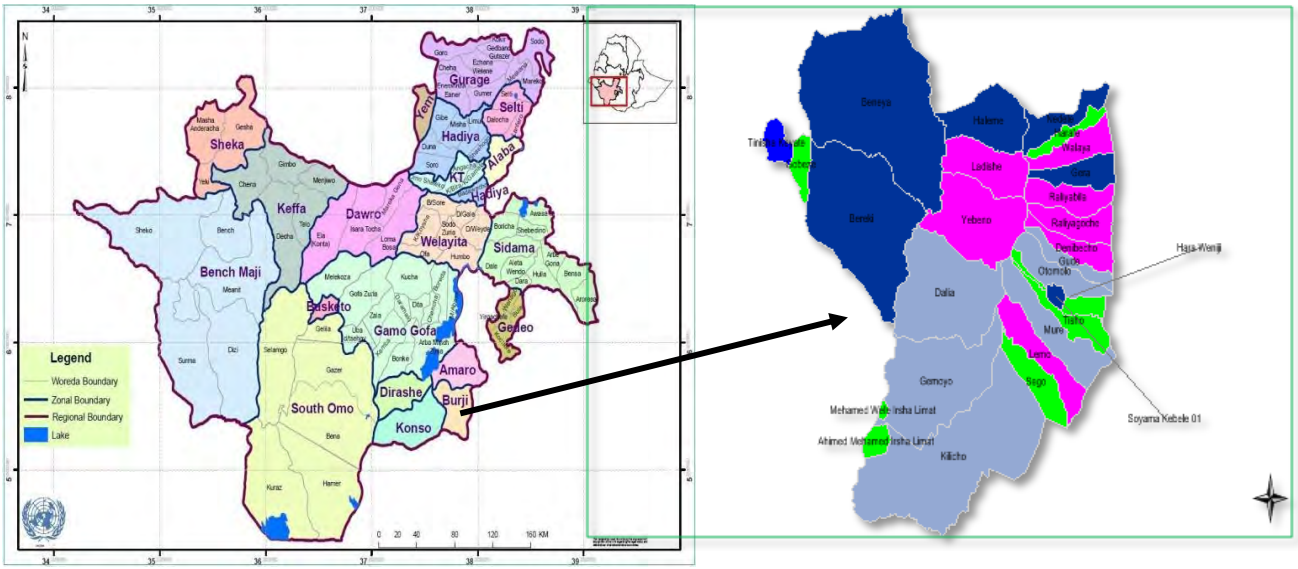

Figure 1: Map of Burji *woreda*

Administratively, the *Woreda* is divided into 25 *kebeles* of which 23 are rural *kebeles* and two are urban *kebeles*. The population of the *woreda* is estimated to be 57,949 and composed of about equal proportion of males and females (i.e. 49.57: 50.43), respectively. The populations reside in the different agro-ecological zones living on sedentary agriculture

growing different varieties of crops with a mixture of animal husbandry (CSA, 2008b). Depending on the production systems and land use pattern the *Woreda* is classified into two production systems. These are livestock and crop-livestock production systems. From total area of the *Woreda* 37,669 ha were cultivated land, 4,230 ha were protected forest, bushes and shrub land, 16,461 ha were grazing land and 25,133 ha were unusable land/infertile, 38,109 ha mountains and gorge area and 83,599 ha of land is uncultivable (Annex 3). The livestock population of the study area includes; 54,047 cattle, 52,009 goats, 4313 sheep, 134 horse, 3,871 donkey, 243 mule, 84,886 chicken and 4,500 bee colonies (Annex 4) .

3.2. Study Population and Study Design

Households of the *kebele* were constituted as the study population. The study design was cross sectional study.

3.2.1. Sample size determination

Sample size was determined according to the Arsham (2007);

$N=0.25/SE^{2,}$,where N=sample size, SE=standard error, Standard error considering confidence level of 95% at $\alpha \leq 0.05$. The total sample size computed was 100 smallholders (households).

3.2.2. Sampling procedures

Multi-stage sampling procedures (purposive and random) were employed to select the study sites, *kebeles* and households (HHs) of the "*woreda"*. Three altitude zones of highland, midland and lowland sites were purposively selected based on altitude. *Kebeles* were selected based on proportion of *kebeles* exist in each altitude and randomly from each altitude zones. HH was selected randomly from selected *kebeles*. Accordingly, two *kebeles* (Yebeno and Shule) were selected from highland, six *kebeles* (Berek, Beneya, Nedele, Ralayabila, wordeagude and Lemo) were selected from mid-altitude zone of mixed crop-livestock production area and two *kebeles* (Gamiyo and Burjekilicho) were selected from lowland areas. From each selected *kebeles*, 10 HHs were selected randomly and used for the study. Thus, a total of 100 households were included in the survey. For focus group discussion from each altitude zones eight to twelve key informants were selected in collaboration with extension service workers.

3.3. Methods of Data Collection

Both formal and informal surveys were conducted from July 2011 to 2012 March covering rainy and dry seasons. Both qualitative and quantitative data from both primary and secondary sources were collected. The techniques included were reviewing secondary data, questionnaire survey, interviewing key informants, focus group discussions and one time farm visit. Also secondary data from published and institutional documents were reviewed to generate baseline information on cattle production, marketing and institutional supports to the *kebeles* from the study area (Annexes).

3.3.1. Questionnaire survey

Questionnaire was administered to a total of 100 household heads in three altitude zones of 10 *kebeles*. Questionnaires having open-ended and closed-ended questions developed with main focus on cattle husbandry and marketing practices, feed and feeding systems and land use patterns of the households (Annex 1).

3.3.2. Focus group discussion

Focus group discussion was done with 8 to 12 informants selected considering their age and experience with cattle husbandry activities. These comprised a cross section of individuals with firsthand knowledge and experience on the cattle husbandry practices. Issues presented in the focus group discussions included the priority of feed conservation systems and utilization of communal resources, and major constraints and opportunities for cattle production and marketing practices (Annex 2).

Key informants were HHs selected in all altitude zones of the study *woreda* considering their experience in production system. In each of the study *kebeles*, discussion was made with Agricultural Development Agents, veterinary assistants and *kebele* administrators (Annex 2).

3.3.3. Farm visit (field observation)

A onetime farm visit (field observation) was made to enrich the data about feeding, watering, housing, healthcare of the cattle, utilization of resources and management of communal grazing land, feed conservation systems and feed resource situation of the households.

3.4. Statistical Analysis

The collected data were coded and entered into Microsoft Excel (2007) computer software program and analyzed using statistical package for social science (SPSS) Ver. 16 (SPSS, 2007). Survey results were summarized using descriptive statistics like mean, range, standard error of mean and percentage values of various parameters. To make comparisons among different group‟s chi square test and one way ANOVA were employed. Differences were said significant when $P < 0.05$. The highest number of responses or respondents was given the first rank and the lowest number of the responses (respondents) the end rank of variables.

4. RESULTS

4.1. Socio-Economic Characteristics

Cattle production practices of the study area were characterized based on different parameters. One of the tools used was socio-economic aspects of households. These include sex, age, and family size of households (HHs), labour force, educational level, livestock holding, landholding, and cattle holding together with other management practices. Household‟s sex, age, family size, age structure and educational level were as shown in (Table 1)

Table 1: Households sex, age, family size, age structure and educational level

Parameter		Altitude zones			Overall	p-value
		Highland	Mid-altitude	Lowland		
Sex of HHs	M	75	76.7	100	81	
	F	25	23.3	0	19	
Average age of HHs/year	Maximum	65	68	65	68	0.025
	Minimum	33	25	31	25	
	Mean ±SE	45.6±2.24	41.3±1.3	47.7±2.1	43.4±1.0	
Average family size	Maximum	13	16	17	17	0.015
	Minimum	6	5	7	5	
	Mean ±SE	9.0±0.5	9.4±0.3	11.1±0.5	9.65±0.25	
Average number of Family in age/year	≤ 5	1.6±0.13	2.5±0.13	2.3±0.16	2.3±0.1	
	>5-≤15	3.2±0.3	3.6±0.18	4.0±0.3	3.57±0.2	
	>15-≤ 45	3.8±0.4	3.23±0.2	4.1±0.44	3.52±0.15	
	≥45	1.67±0.24	1.44±0.13	1.21±0.1	1.41±0.1	
Level of education (%)	Illiterate	55	53.3	55	54	
	Basic education	20	15	15	16	
	Elementary school	20	18.3	25	20	
	Junior 2^{ndry} school	5	8.3	5	7.0	
	High school	0.0	5	0.0	3.0	

In the highland, about 75% of the respondents were male farmers, while 25% were females. In the mid-altitude 76.7% and 23.3% of the respondents were males and females respectively.

The average (Mean ± SE) age of the HHs was 43.4±1.0 with an age interval of 25-68 with significance value $P \leq 0.05$ (0.025) which was significantly different among altitude zones. Average family size in lowland and midland area were higher than that of highland. The educational level of HHs under investigation was found to be 54.0% illiterate, 16.0 % basic education level, 20% elementary school, 7.0% junior secondary school and 3.0% high school in descending order of magnitude (Table 1).

4.2. Farming System Characteristics

4.2.1. Livestock holding and cattle holding

Average livestock holding of HH vary across altitude zones as shown in (Table 2) below. There were no camel herds in the study area.

Table 2: Average livestock holding and cattle herd structure

Livestock species	Highland	Mid-altitude	Lowland	Overall
	Mean ±SE			
Dry cow	1.6±0.3	2.0±0.2	2.0±0.2	2.4±0.2
Calves female	2.3±0.4	1.35±0.1	2.1±0.3	1.7±0.14
Calves male	1.4±0.2	1.32±0.1	2.3±0.3	1.6±0.1
Oxen	4.1±0.4	3.98±0.3	6.2±0.4	4.4±0.3
Heifers	2.5±0.3	1.96±0.2	6.6±0.8	3.2±0.3
Milking cows	2.2±0.3	1.7±0.14	4.2±0.4	2.4±0.2
Bull	2.3±0.3	1.83±0.2	4.1±0.4	2.5±0.2
Total cattle	13.7±2	11.6±1	29.3±2.5	15.6±1
Sheep	4.9±0.7	4.2±0.5	2.7±0.7	4.4±0.4
Goat	3.5±0.6	8.1±0.5	9.7±1.6	7.6±0.5
Equine	1.8±0.5	1.7±0.2	2.8±0.3	1.99±0.2
Chicken	6.7±0.9	12.7±0.7	9.6±1.8	11.8±0.7

4.2.2. Landholding and land use pattern

The average landholding per HHs in the high, medium and low altitude zones was 3.6±0.3, 3.8±0.2 and 3.6±0.2 ha respectively, which was arable and private grazing land of the respondents and excludes other communal lands. According to the results of the study maximum and minimum landholding of HH in *woreda* level was 8.25ha and 1.25 ha respectively (Table 3).

Table 3: Maximum, minimum and average landholding in hectares

Altitude zones	Maximum	Minimum	Mean ±SE	P-value
Highland	6.25	1.25	3.6±0.3	P >(0.05)0.35
Mid-altitude	8.25	1.38	3.8±0.2	
Lowland	8.25	1.75	3.3±0.34	
Overall	8.25	1.25	3.6±0.2	

4.2.2.1. Types and status of communal grazing land

Status and types of communal grazing land differs from altitude areas. The HHs rank depending on the types of land available in their area for grazing by total coverage of the land size in their agro-ecology and status of grazing land by comparing to the previous land. The majority of sampled households 95% of them indicated that the status of communal grazing land was decreasing. The majority of respondents, 70% in highland, 100% in mid-altitude and 95% in lowland areas believed that the status of communal grazing land was decreasing. About 30% HHs in highland and 5% HHs in lowland indicated that no change in communal grazing land, but mentioned that loss of its fertility from time to time. Erosion leads to reduction in production and creates unusable land area, which was being changed to gorges and valley.

Table 4: Types and status of communal grazing land

	Highland	Mid-altitude	Lowland
Types of communal land	N=20(%)	N=60(%)	N=20(%)
Gorge land	1st (55)	5th (30)	5th (90)
Stone covered	2nd (55)	6rd (30)	4th (30)
Swampy	3rd (80)	7th (63.3)	7th (95)
Bush/shrub	4th (70)	1st (75)	3rd (40)
Tree covered	5th (75)	2nd (51.7)	1st (50)
Open grass land	6th (30)	4th (51.7)	2nd (45)
Infertile land	7th (95)	3rd (16.7)	6th (43)
Status of communal land			
Decreasing	70	100	95
No change	30	0.0	5

Types of communal grazing land exist in the study area also vary from altitude to altitudes. The survey result showed that the highland areas were dominated by gorge land ranked 1st (55%) followed by stone covered. In midland bush/shrub land was ranked 1st (75) followed by tree covered ranked 2nd (51.7). In lowland area tree covered land was ranked 1st (50) (Table 4)

4.2.2.2. Causes of communal grazing land deterioration

Causes of grazing land deterioration vary from altitude to altitude. Thus, the survey result indicated that 60% of HHs ranked overgrazing as 1st cause of grazing land deterioration in highland area followed by reduction in forage species composition ranked 2nd and at 3rd place expansion of farm land. In mid-altitude expansion of farm land ranked 1st (78.3%) followed by conflict 2nd and at 3rd overgrazing. In lowlands overgrazing was ranked 1st (50%) as cause of grazing land deterioration followed by reduction of forage spices composition 2nd (Table 5).

Table 5: Causes of grazing land deterioration

Possible reason	Highland	Midland	Lowland
	N=20(%)	N=60(%)	N=20(%)
Overgrazing	1st (60)	3rd (53.3)	1st (50)
Reduction in forage species composion	2nd (30)	5th (35)	2nd (30)
Expansion of farm land	3rd (35)	1st (78.3)	5th (35)
Reduction in forage biomass production	4th (30)	6th (40)	3rd (45)
Infestation with weed	5th (35)	4th (48.3)	4th (55)
Conflict	6th (30)	2nd (23.3)	6th (50)

4.2.3. Cattle feed resources

Cattle feed resources were ranked depending on the abundance of feed resources for their cattle and availability both in dry and wet seasons. The survey results indicated that majority of HHs used natural pasture and crop residues as feed resources both in dry and wet seasons. Natural pasture was ranked 1st in all altitude of the study area both in dry and wet seasons. Similarly crop residues ranked 2nd; both in highland, and in midland for dry and wet seasons, but browse was ranked 2nd as source of livestock feed in lowland area (Table 6).

Focus group discussion with key informants indicated that availability of feed resources and crop residues varied among the altitude zones. The major crops grown by farmers in the high and midland altitude zone were barley, wheat, field pea, millet, sorghum and bean, while *teff*, maize, wheat, millet, haricot bean and chickpea are the main crops grown in medium altitude zone. Maize and sorghum were the dominant crops grown in the low altitude zone. Barley constituted the largest share of crop residue fed to livestock in highland in addition to *enset*, banana leaf and sweet potato leaf. Long season sorghum was widely grown, although its stover was so dry that it loses its feed value. *Teff* straw was the 1st feed resource in mixed farming areas of mid-altitude followed by maize stover, wheat straw, field pea straw, haricot bean straw, sorghum stover. Pastoralists depended both in dry and wet season on natural pasture and browse (Table 6).

Table 6: Cattle feed resources

	Dry season			Wet season		
	Highland	Midland	Lowland	Highland	Midland	Lowland
Feed resources	N=20(%)	N=60(%)	N=20(%)	N=20(%)	N=60(%)	N=20(%)
Natural pasture	1st (100)	1st (76.7)	1st (100)	1st (95)	1st (80)	1st (100)
Crop residues	2nd (100)	2nd (75)	3nd (35)	2nd (70)	2nd (73.3)	4th (15)
Stubble grazing	3rd (95)	3rd (78.3)	5th (15)	4th (35)	5th (88.3)	5th (15)
Browse	4th (85)	4th (73.3)	2nd (50)	3rd (90)	3rd (86.7)	2nd (85)
Hay	5th (90)	5th (83.3)	4th (55)	5th (65)	4th (83.3)	3rd (80)
Feed supplement	6th (45)	6th (3.3)	-	6th (45)	6th (3.3)	6th (61)

4.2.4. Feed utilization and conservation practices

From the one time farm visit (field observation) the major constraints associated with crop residues utilization for livestock feeding were collection, transportation, storage and feeding problems. Although natural pasture and crop residues were produced in large amounts, their full and efficient utilization for livestock feeding has been hindered partly by inadequate knowledge of the farmers. Indeed, some farmers had a great concern to store the crop residues in a separate cottage constructed houses merely for storages of crop residues or on the roof in their cottages and on their farm land. Such farmers are observed to efficiently utilize these feed resources which they give to their animals bunch by bunch or some even soak with water to improve palatability and digestibility. The residues are piled in stacks near homesteads and animals were let to eat from the stacks or given small quantities in the

morning and evening, or for working oxen, before and after work. Alternatively, the residues are left in the threshing ground and consumed by animals together with the standing straws which are left for aftermath grazing. Thus, feed conservation practice causes huge wastage of feed on ground as during feeding and when rain starts residues rotten on ground.

4.2.4.1. Months of feed availability and shortage

According to the study, feed supply is adequate from September to half of January while, half of January to half of April represented critical feed shortage time. The majority of HHs indicated that feed supply was inadequate between months of December and April. About 75% of HHs indicated that huge loss of their asset occurs at starting of rainfall from March-May and June-August (Table 7).

Table 7: Months of critical feed shortage

Months	Highland N=20(%)	Mid-altitude N=60(%)	Lowland N=20(%)
September-November	0.0	1.7	0.0
December -February	0.0	1.7	0.0
December -February	0.0	5.0	75.0
March-May	25.0	91.7	25.0
March-May and June-August	30.0	0.0	0.0
June-August	45.0	0.0	0.0

4.2.4.2. Strategies to cope up feed shortage in dry and wet season

In the study area different measures were taken to cope up critical feed shortage. Survey results indicated that 24% of the HHs relied on stored crop residues and about 55% of them depended both on migration and natural pasture. Thus, the strategies to cope up feed shortage in dry and wet seasons were feeding on farm residues and on natural pasture. Also 40% in highland, 21.7% in mid-altitude and 25% in lowlands send their animals to others areas of ample natural pasture. About 30% in highland, 10% in mid-altitude and 40% in lowlands resist the condition through relaying both on farm residues and natural pasture (Table 8).

Table 8: Feed shortage copes up strategies

Feed shortage coping mechanism	Highland N=20(%)	Mid-altitude N=60(%)	Lowland N=20(%)	Overall N=100
Rely on stored feed	0.0	1.7	0.0	1
Rely on farm residues	20	33.3	0.0	24
Rely on the natural pasture	10	33.3	35	29
Rely on natural pasture and on farm residues	30	10	40	20
Send animals to other areas	40	21.7	25	26

4.2.7. Types of cattle breed

The survey result indicated that cattle breeds in study area were indigenous. Through focus group discussion farmers in the study area were asked about the kinds of breeds they keep in their herds. A total of 63.8% of them stated that they kept pure Boran cattle breed. About 36.2% of them stated that they kept Boran cattle as well as their crosses with other breeds.

4.2.8. Purpose of cattle rearing

The survey result indicated that HHs in highland and midland areas (100%) reared cattle for draught purpose. Fattening of cattle was practiced on natural pasture and with local beverage by-products. In lowlands, HHs reared 75% cattle for selling and 25% of cattle for both sale and farming. HHs do not slaughter cattle for home consumption in normal times but consume cattle products such as milk, meat and by-products (butter and yogurt). However, HHs slaughter animal during cultural ceremonies such as wedding and funeral days.

The major decisions concerning livestock sales, lending, borrowing of animals and giving animals for bride payment, and ownership is the responsibility of the family head (male) except in the case of widow woman. Respondents indicated that 48% of cattle owner in HH was husband, 32 % both husband and wife and 17% cattle owner was the family member (Table 9).

Table 9: Purpose of cattle rearing and ownership

Purpose of cattle rearing	Highland N=20(%)	Mid-altitude N=60(%)	Lowland N=20(%)	overall N=100
Selling	0.0	10	65	10
Farming	65	65	0.0	55
Both	15	15	15	15
Consumption/milk and meat	20	10	20	20
Owner of cattle				
Husband	15	66.7	25	48
Wife	5	3.3	0.0	3
Husband and wife	65	18.3	40	32
The family	15	11.7	35	17

4.3. Cattle Management Practices

4.3.1. Cattle herding practices and feeding management

Similar herding management practice was existed in all altitude zones. According to the survey result about 75% of them herded by individual, 15% by rotational herding and 10% herded by individual in highland area. In midland about 66.7% herded by individual, 18.3% herded by hiring a person and 15% herded by rotational herding. In pastoral areas about 55% herded by individual herding, 30% herded by rotational herding and 15% by hiring a person. In the subsistence farming of the smallholder producer feeding patterns include tethering, cut-carry (zero-grazing) and grazing. According to the survey result 90.0% of the HHs in highland, 95% HHs in mid-altitude and 95% in pastoral area relied on natural pasture by grazing. In highlands animals were grazed around homestead and were supplemented with weed, by-products of *enset* and crop residues (Table 10).

Focus group discussion indicated that grazing on private and communal lands, crop residues (maize and sorghum stover and straws from barley, *teff*, wheat), parts of root and tuber crops (cassava, sweet potato), sugar cane, grains, parts of *enset* and banana plants, weeds and tillers from crop fields and leaves and browses from local trees were major feed resources in different seasons of the year. Feed leftovers, local mineral sources and by-products from local beverages were occasionally supplemented to improve utilization of

crop residues and roughages. After crops harvested, livestock freely graze on grazing and crop lands and afterwards either tethered or kept by herdsmen.

Table 10: Cattle herding and feeding systems

	Highland	Mid-altitude	Lowland	Overall
Herding system	N=20(%)	N=60(%)	N=20(%)	N=100
Rotational	15	15	30	18.0
Individual	75	66.7	55	66.0
Hiring a person	10	18.3	15	16.0
Feeding system				
Cut and carry/zero grazing	0.0	1.7	0.0	1.0
Grazing	90	95	95	94
Tethering	0.0	0.0	5.0	1.0
Cut and carry and grazing	5.0	3.3	0.0	3.0
Grazing and tethering	5.0	0.0	0.0	1.0

Also crop stubble grazing was important feed resource after harvesting the crops, livestock were allowed to graze stubble of different crops like maize, barley, sorghum, wheat*, teff*, and haricot bean mainly from July to half of August and December. For the first two months, the stubble were grazed by the animals of the farm owner and later it becomes accessible to all animals in the community when dry season start from mid January.

4.3.2. Housing management

House is basically important to protect animals from predators, theft and from adverse weather conditions. Thus, about 35% HHs in highland, 80% HHs in mid-altitude and 85% HHs in lowland constructed barn for their cattle. About 15% HHs in highland and mid-altitude live their animals in a homestead shade and 50% of the HHs in highland area lived together with their animals at separated rooms with the family in the home. About 5% of HHs in midland kept their cattle on field and tie with rope on head and feet at night (Table 11).

Table 11: Housing systems

Housing system	Highland N=20(%)	Mid-altitude N=60(%)	Lowland N=20(%)	Overall N=100
Home stead shades	15	15	0.0	9.0
In living rooms with the family	50	0.0	0.0	9.0
Barn	35	80	85	69
On field and thigh with rope	0.0	5	15	13

4.3.3. Watering management

Distribution and types of watering facilities varied and influenced the frequency of watering and distance travelled in search of water bodies. The survey result indicated that major sources of water for livestock were rivers, springs/streams and temporary water in order of importance. The main sources of water in the highlands during the dry season were streams ranked 1st followed by river, temporary water and ponds. In midland river ranked 1st followed by stream, ponds and temporary water and there was no practice of hand dug watering. For lowland areas river ranked 1st followed by streams and temporary water and similarly also no practices of using pond and hand dug in lowland. However, during the wet season, temporary water ranked 1st followed by streams was the main source of water in all altitudes (Table 12).

Table 12: Water sources across seasons and altitudes

Water sources	Dry season			Wet season		
	Highland	Midland	Lowland	Highland	Mid-altitude	Lowland
	N=20(%)	N=60(%)	N=20(%)	N=20(%)	N=60(%)	N=20(%)
Streams	1st (41.7)	2nd (73.2)	2nd (26.8)	2nd (20.8)	2nd (66.7)	2nd (12.5)
River	2nd (43.2)	1st (64.7)	1st (35.3)	3rd (23.4)	3rd (66.2)	3rd (10.4)
Pond	4th (39)	3rd (61)	-	4th (28.1)	4th (71.9)	-
Temporary water	3rd (34.4)	4th (75)	3rd (25)	1st (22.4)	1st (62.4)	1st (15.3)
Hand dug	5th (100)	-	-	5th (100)	2nd (100)	-

The survey result indicated that water shortage existed in months of December to February in mid-altitude and lowland**.** Alternate day watering was much more common in dry than in wet periods both in mid-altitude and pastoral areas than in highlands. With regard to the frequency of watering of different animal species, most of the farmers water their animals

once in a day, ad-libitum (free choice) and once in two days where, 36.0%, 4.0% and 60.0% respectively. About 90% respondents offered water once in a day in the high altitude. About 65% and 100% of the respondents offered water once in two days in mid-altitude and lowlands respectively in both dry and wet seasons. The survey result indicated that distance travelled for watering livestock cover less distance as 73% respondents travelled <1.0 km. About 22% respondents travelled 1-5 km and 4% respondents travelled 6-10 km to reach water source (Table 13).

Table 13: Months of water shortage, frequency of watering and distance travelled

	Highland	Mid-altitude	Lowland	Overall
Months of water shortage	N=20(%)	N=60(%)	N=20(%)	N=100
December- February	0.0	16.7	100	30
No shortage	100	83.3	0.0	70
Frequency of watering				
Once in a day	90	30	0.0	36
Ad-libitum	5.0	5.0	0.0	4.0
Once in two days	5.0	65	100	60
Distance travelled				
watered at home	5.0	0.0	0.0	1.0
<1 km	95	86.7	10	73
1-5 km	0.0	13.3	70	22
6-10 km	0.0	0.0	20	4.0

4.3.4. Healthcare management

Major animal diseases and parasites were discussed through involving key informant farmers, and veterinary technicians. They indicated that Trypanosomiasis (*Gande/ Sumute*), Contagious Bovine Pleuro Pneumonia (*Shomibi)*, Blackleg (*Chechesa*), Foot and mouth dis ease (*Masa/ Oyale/ Aita*), Fasholasis (*Afala/ Tiru*), Anthrax (*Abasanga*), Lumpy skin diseas e (*Robe'a*), Pasteurellosis (*Huda*), Dermatophylosis (*Chito*), Lice (*Eba*), Rabies (*Wochokad ukubi*) and Mastitis (*Ununakdukubi*) were major diseases of cattle in the study area. From the survey results Trypanosomiasis cited by 82% of the HHs ranked 1st, Contagious Pleuro Pneumonia (52.3%) ranked 2nd and Blackleg (54.4%) ranked 3rd were the most ranked diseases in terms of distribution and frequency of occurrence. The survey result indicated that about 46% HHs of the *woreda* have disease problem throughout the year and only 1% HHs indicated that no disease problem, but they follow up their cattle health in different

ways. About 53% of respondents indicated that cattle disease problem depended on seasons of the year.

The survey result indicated that 73.9% HHs in highland, 70.9% in mid-altitude and 1% in the lowlands have access to veterinary service, but the service was characterized by inadequate or shortage of veterinarians and veterinary supplies. Therefore, sample farmers of 71% in highland, 65% in mid-altitude and 58% in pastoral used alternative measures of private, ethno-veterinary treatments and indigenous knowledge. Overall the survey results on animal health services indicated that 68.0% of the respondents used the government medication center, 12% of respondents used government, private and traditional medications. Private medication center existed only in pastoral area covering only 6% and the private services charge them for the drug marketing (Table 14).

Table 14: Disease problems and health service centers

	Highland	Mid-altitude	Lowland	Overall
Disease problems	N=20(%)	N=60(%)	N=20(%)	N=100
Yes	65.0	40.0	45.0	46.0
No	0.0	1.7	0.0	1.0
It depends on season	35.0	58.3	55.0	53.0
Assist health service				
Government	60.0	90.0	10.0	68.0
Private &government	0.0	5.0	0.0	3.0
Government, private and traditional medications	15.0	3.3	35.0	12.0
Government &traditional medication	25.0	0.0	0.0	5.0
Private veterinarians	0.0	1.7	25.0	6.0
Private and traditional	0.0	0.0	30.0	6.0

Government is the major animal health service provider with limited involvement of the private sector. From the survey results on animal health services, 60 %, 90% and 10% of the HHs in highland, mid-altitude and lowland use the government medication center respectively. Private medication centers existed only in pastoral covering the service of pastoral with 25% and there was no private service in highland and mid-altitude area. Those who used government, private and traditional services were 15% in highland, 3.3% in mid-

altitude and 35% in pastoral respectively and those who used government and traditional medication centers were 35% in lowland and none in both altitudes (Table 14).

The survey result indicated that average medication expense were 184.65±7.38 ETB per year and 15.85±0.37 ETB per day/trip of medication (Table 15).

Table 15: Average expense of HHs for medication (ETB)

	Mean ±SE	
Altitude zones	Medication per year	Medication per trip
Highland	151.25±8.552	15.90±0.619
Mid-altitude	168.92±6.584	15.28±0.408
Lowland	265.25±22.459	17.50±1.193
Overall	184.65±7.38	15.85±0.37

4.4. Constraints of Cattle Production

Constraints of Cattle Production were ranked in the study area depending on effect/causes loss for their production practices. The following constraints were ranked according to its effect/severity on production were as shown in (Table 16).

Table 16: Cattle production constraints

	Highland	Mid-altitude	Lowland
Constraints of cattle production	N=20(%)	N=60(%)	N=20(%)
Feed shortage	1st (75)	1st (80)	1st (75)
Disease &parasites	2nd (60)	4th (30)	3rd (65)
Grazing land	3rd (80)	3rd (21.7)	12th (95)
Market	4th (60)	9th (35)	8th (30)
Veterinary services	5th (80)	5th (53.3)	5th (55)
Extension service	6th (75)	6th (45)	6th (35)
Road	7th (75)	8th (35)	7th (35)
Drought	8th (75)	2nd (46.7)	2nd (35)
Credit	9th (70)	10th (35)	8th (35)
Predators	10th (55)	8th (16.7)	11th (100)
Improved breed	11th (50)	12th (36.7)	9th (50)
Conflict	12th (70)	4th (33.3)	13th (100)
Water	13th (75)	13th (51.7)	4th (35)

4.5. Marketing of Livestock and Livestock Products

5.5.1. Cattle marketing place

According to the focus group discussion indicated that the source of initial breeding stock for farmers were purchased from the nearby markets, gifts from parents and relatives. There were two major local livestock markets in the *woreda* as Keyate town of communal market for Burji, Konso, Amaro and Darashe ethinic group and soyama town market for Burji, Guji and Borana pastoralists of Oromoia region. The primary markets in the *woreda* were fenced in which the respective municipalities charged tax on buyers upon exit from the market. Some of the municipalities also charge sellers for unsold animals since they find it difficult to distinguish between sold and unsold animals (Table 17).

Table 17: Livestock marketing places

	Highland	Mid-altitude	Lowland	Overall
Market place	N=20(%)	N=60(%)	N=20(%)	N=100
Keyate	0.0	25	0.0	15
Keyate and in villages	0.0	1.7	30	7.0
Soyama	10	31.7	25	28
Soyama and in villages	85	0.0	10	19
In villages	5.0	35	20	24
Farm gate	0.0	6.7	15	7.0

The most common day of the livestock marketing were Saturday, Tuesday and Thursday. Marketing days on Wednesdays and Fridays are not common. In some marketing places, marketing convene twice a week, while in a few (usually capital towns of the *woreda)* marketing convened once a day in a week, although the largest gathering takes place in one or two days. Livestock were transported mainly by trekking. The survey result indicated that farmers market their cattle in near and long distance market area and most of the HHs travelled for marketing in nearest distance of 1.29±.14 k.m and longest market place 3.058±.28 k.m. The longest travelers were pastoralists as for nearest 3.14±.508 k.m and 6.05±1.12 k.m for longest market (Table 18).

Table 18: Average distance travelled in k.ms for marketing

	Mean ±SE	
Altitude zones	Nearest market	Longest market
Highland	0.94±.080	1.79±.097
Mid-altitude	0.78±.052	2.47±.11
Lowland	3.14±.508	6.05±1.12
Overall	1.29±.14	3.058±.28

4.5.2. Market information

Survey result indicated that farmers depended on actual market day information or on market information obtained from relatives, friends or neighbors for prices and selling decisions. Regarding sources of market information, most of the HHs preferred neighbors" as 70% in highland, 58.3% in mid-altitude and 65% in pastoral areas. About 23.4% in mid-altitude and 10% in lowlands prefer relatives. Those 30% in highland, 18.4% in mid-altitude and 25% in lowlands prefer own market visit.

Table 19: Sources of market information and price determinants

	Highland	Mid-altitude	Lowland	Overall
Market information	N=20(%)	N=60(%)	N=20(%)	N=100
Relatives	0.0	23.4	10	16
Neighbors	70	58.3	65	62
Own market visit	30	18.4	25	22
Price determinant at market				
Seller	10	5.0	20	9.0
Broker	0.0	0.0	10	2.0
Negotiation b/n seller and buyer	90	95	70	89

Also respondents indicated that most of them have advised on cattle marketing from extension workers and how to produce marketable livestock for marketing time. According to the survey result 25% in highland, 50% in mid-altitude and 55% in pastoral have advised, while the other groups 75% in highland, 50% in mid- altitude and 45% in lowland areas have no advice on cattle marketing issue (Table 19).

4.5.3. Reasons for selling livestock

According to focus group discussion respondents indicated that livestock were sold to cover household food gaps, clothing, school and medical fees, social events, to buy other animals, and to purchase crop inputs. In pastoral area, since the area is drought prone, the main reasons for selling animals is to cover cash needs to buy food grains and to cope up seasonal feed shortage and disease problems. They also sold to replace the old one with young stock. In mid and highland altitude, filling food gap, loan repayment and forced sales during dry period and crop planting seasons were mentioned as the most important reasons for selling. Farmers and traders estimate the age of the animals by checking their teeth and visual estimation.

4.5.4. Price determinants

The survey result indicated that 90% in highland, 95% in mid-altitude and 70% in pastoral area, cattle price determined at the market places were through the negotiation between the sellers/producers and the buyers. About 10% in highland, 15% in lowland, 5% in mid-altitude areas indicated that they are the decision makers on selling of their cattle at the markets. Hence, 98% of the HHs stated that the brokers do not have any influence when they sell their cattle (Table 19). Sellers trek back their animals, if prices perceived to be too low. In all market, payment is performed in cash on spot at the market place.

4.5.5. Seasons of cattle price variation

According to the survey result 83.3% HHs in mid-altitude and 100% in lowlands stated that cattle price increased during the crop harvesting seasons, mostly in summer and spring. Also 75% and 16.7% of HHs in highland and mid-altitude area stated that cattle price increased in spring and winter season. Thus, the number of cattle in the market declines and prices increase, but 40% HHs in highland 90% in mid-altitude and 100% in lowlands stated that cattle prices decreased during the winter seasons, and 55% of HHs in highland stated that cattle price decreased in summer and winter season (Table 20).

Table 20: Seasons of cattle price variation

	Highland	Mid-altitude	Lowland	Overall
Season high	N=20(%)	N=60(%)	N=20(%)	N=100
Summer and spring	0.0	83.3	100	70
Spring and winter	75	16.7	0.0	25
Autumn	25	0.0	0.0	5.0
Season low				
Summer	5.0	0.0	0.0	1.0
Summer and winter	55	0.0	0.0	11
Winter	40	90	100	82
Winter and autumn	0.0	10	0.0	6.0

4.5.6. Reasons for cattle price variation across months/seasons

The reasons for the cattle price variation as stated by HHs, 80% in highland and 38.3% in mid-altitude indicated that seasonal fluctuation was the major reason for cattle price variation as long dry season followed by heavy rainfall. 100% HHs in lowland area indicated that seasonal fluctuation and severe drought were the reasons, which forces to sale cattle in cheap price. About 20% HHs in highland and 15% in mid-altitude indicated that shortage of grazing land during crop planting season as most grazing land covered with arable crop, which leads to shortage of grazing land and at the same time famine exist during plantation season as together leads to force the households to sale in cheap price (Table 21).

Table 21: Reasons for price variation

	Highland	Mid-altitude	Lowland	Overall
Reasons for price variation	N=20(%)	N=60(%)	N=20(%)	N=100
Drought and seasonal fluctuation	0.0	3.3	100	22
Shortage of grazing land	20	15	0.0	13
Seasonal fluctuation	80	38.3	0.0	39
All above factors	0.0	43.3	0.0	26

About 43.3% of HHs indicated that seasonal fluctuation, shortage of grazing land and drought affect cattle price in the study area. In such an event, grass fails to grow; livestock

are deprived of feed and lose their productivity, due to the typically uneven patterns of rainfall. In such cases, localized herders tackle this current situation by moving with their animals to an area where feed is relatively available. Also through focus group discussion, the respondents stated that market problems, such as trader‟s availability, lack of infrastructure and the socio-economic factors (fasting periods, holidays) and conflict also play a role in cattle price variation (Table 21).

The survey result indicated that 73.7% HHs in highland, 93.3% in mid-altitude and 70% in lowland of the producers believed that the trend for cattle price in their area is increasing and most of them are happy with existing price except harsh conditions exist in the area. About 26.3% in highland, 6.7 % in mid-altitude and 30% in lowland stated that they were not happy of existing price especially in lowland area due to seasonal fluctuation and drought happened every year. There is remarkable seasonal variation in demand, supply and price of livestock and livestock products depending on times of holidays, crop planting and harvesting, drought and feed supply. During Ethiopian New Year (September), Christmas and Ester holidays, both demand and price of animals and their products increases, but during short and long rain planting seasons, drought and feed scarcity time the price were decline.

5. DISCUSSION

According to this study both men and women were engaged in cattle production and marketing practice. The majority of households (HHs) under investigation were found to be males 81.0% when compared to their female contemporaries 19.0%. The results of the current work differ from the report of (Azage, 2004) who reported 33% female headed households and 67% male headed household livestock keepers in Addis Ababa. Less number of female headed households involved in livestock keeping in the current study could probably be due to cultural issues that force females to get married and for economic reason. In pastoral areas, the system mainly practiced in the rangelands where the people involved follow animal-based life styles, which requires of them to move from place to place seasonally based on feed and water availability due to these 100% respondents were males (Table 1).

According to the results of the study, average (Mean ± SE) family size was falling under the age categories of >5 - ≤15 and >15 - ≤ 45 are 3.6±0.12 and 3.5±0.2 respectively, This indicated that family members in the productive age group were higher than that of the non-productive age groups (dependents) less than or equal to 5 year and >45 year were as 2.3±0.1 and 1.4±0.1. This in return implied that in study area HHs have good sources of labor to utilize different farm activities. In Ethiopia, all age groups who are above ten years old in the rural areas are involved in agricultural activities (CSA 2008b).

Average family size of the HH was 9.65±0.25 persons per HH within range of 5-17 members, with $P \leq 0.05$ (0.015) which was significantly different among altitude zones. The large family size in midland and lowland area could be related to the relatively labour intensive diversified farming activities and the weak family planning services. The survey result of the family size in the study area was greater than that of country‟s average 5.23 of (CSA, 2008a), this is due to polygamous marriage was common among the rural HHs. Similarly, study by Agajie *et al*. (2005) indicated that having many wives is one of wealth indicators and commonly practiced type of marriage in the Central Rift Valley. Similarly in study area family size could presumably be associated with the wealth status and a number of children, so as to meet the labour force for different farm operations. Therefore family size has a direct impact on the availability of labour and on the chance of children

to go school. If there is an adequate amount of labour for the family, the extra sons and girls were allowed to go school otherwise, they were not be given permission.

According to the survey result indicated that educational status of the HHs was 54.0% illiterate people in Burji *woreda*. This result of illiterate people in study area is low compared to that of Alaba district of SNNPRS (65%) reported by Tsedeke (2007). Being have more literate people is better, opportunity for livestock, production in study area. In general, the level of education was very low (nearly above half) 54.0% of the HHs were without any kind of education and this represents a serious limitation to transfer technology and emphasizes the importance of education that must be improved.

The average livestock holding, especially total cattle and oxen holding per HH was 13.7±0.2 cattle and 4.1±0.4 oxen, 11.6±1 cattle and 3.98±0.3 oxen and 29.3±2.5 cattle and 6.2±0.4 oxen in highland, midland and lowland altitude zones respectively. There was significant difference ($P < 0.05$) 0.0 and 0.02 for cattle and oxen herd size respectively among altitude zone. The difference showed that number of livestock holding and objective of the farm production systems differs among altitude zones depending on the resources they have in the area. This study is similar to the study of (Devendra and Thomas, 2002) indicated that cattle production systems and livestock holding differ markedly due to differences in resource endowments, climate, human population, disease incidences, level of economic development, research support and government economic policies.

The overall mean cattle holding was 13.7±0.2 heads/HH and this was higher than cattle holdings in most highland areas of the country such as in Mekele, 8.01 heads/HH reported by (Negussie, 2006) and Awassa area, 6.85 heads/HH reported by (Ike, 2002). However, the current finding was lower than the holdings in Metema *woreda* (15.5 ± 0.7) heads per household reported by Tesfaye (2007). Availability of vast communal grazing land may account to higher cattle holdings than other areas. The result indicated that cattle were the largest species of livestock reared by the smallholder producers. This proportion and the response of farmers reflected that cattle rearing were important husbandry practices and almost all HHs depends on cattle for the farm activities. According to these information sources unlike other places there is no way by which a farmer faces difficulty of ploughing their plot of land because of shortage of draught animal, since the minimum holding can enable them farming effective.

There are two types of farming systems found in the study area such as crop-livestock and livestock (pastoral) production systems. From the total land area coverage, 46.64% are suitable for crop production. This showed that the area favorable for crop production and for livestock rearing activity. About 78.2% sampled HH in the study area depended on crop-livestock and about 21.8% of them relied on livestock production. The area receives a bimodal rainfall where small rains occur between September-November while the main rain occurs between half of March-June (BwOARD, 2008).

Landholding and land use pattern of respondents in the study *woredas* was summarized in (Table 6). The average landholding of the HHs were 3.6±0.2 have no significance difference $P \geq 0.05$ (0.35) among altitude zone. This landholding in study area was higher than that of Southern Ethiopia at Alaba district, Yeshitila (2008) reported that the average land size owned by a farmer is about 2.5 ha. This result is smaller than the mean average landholding of 5.28 ± 0.215 ha per household in Metema district (Tesfaye 2007).

The majority of HHs (93%) believed that the status of communal grazing land in their areas was decreasing. About 7% of the HHs in highland area indicated that no change in communal grazing land, but loss of its fertility and erosion leads to its production reduction and unusable as changed to gorges and valley area, which is in agreement with reports of (ESAP, 2002) as the decline in grazing land production has become one of the most important causes of feed shortage and drop in livestock productivity.

Since, sample HHs indicated that expansion of farm land ranked 1st (52%) as causes of communal grazing land reduction followed by overgrazing ranked 2nd (45%) and 3rd reduction in forage biomass production of the communal grazing land (Table 5). Also focus group discussion indicated that livestock and human population pressure contributed to the current degradation of the grazing land in the high and mid-altitude zones while, shortage and erratic rainfall were the major contributing factors in the lowlands. Expansion of farm land was the major contributor for shortage of grazing land in mid-altitudes. Differences in opinion as to the cause of reduced land productivity and land deterioration were due to the climatic condition of the area and utilization potential of the communal resources in altitude zones and human population pressure, which is in agreement to the study of (Alemayehu, 2004). Moreover, Poor knowledge of the farmers on management of the grazing land was also another factor and wild fire (sometimes fire put on purposely) destroys a wide area of the grazing lands in the months of February and march to obtain the first showers induce

quick growth of grass feed with favorable influence on the availability of feed in May and June months However, with the decline in the size of the grazing land and degradation through overgrazing and the expansion of arable cropping, agricultural by-products have become increasingly important (Alemayehu, 2004). Seasonality in feed availability and lack of knowledge on feed conservation has created feed shortage both in the highland and lowland ecologies of Ethiopia.

The survey results indicated that natural pasture were the major feed resource and contributes 92.6% as feed resource and ranked 1st in both dry and wet season of year followed by crop residues contribute 58.1% of total feed resource and ranked 2nd in highland and mid-altitude area. Browse ranked 2nd in lowland areas as source of cattle feed, which is in agreement with the study of (Elias *et al*., 2007) in the lowland agro-pastoral system. Other feed resources have taken minor place as source of livestock feed and there was no practices of silage making and urea treated with crop residues used as feed source and feed supplements, but *Atela*, *Amole chewu*/salt, *Bole* and *magado* used as feed and mineral supplements.

The lowlands were characterized by grass-dominant pastures. In this farming system, permanent pastures provide 100% and ranked 1st depending on the feed resources available followed by browse and in the pastoral area grazing on natural pasture and browsing provide 100% of feed resources in both dry and wet seasons. It was reported that forage development program were on training for farmers and seedlings were distributed to farmers in some *kebeles* of *woreda*. Accordingly respondents indicated that the absence of forage development programs in study area, which is in agreement to the report of (Alemayeu, 2005).

According to focus group discussion in all altitude zones; the natural pasture were abundantly available to animals for about eight months in mid-altitude and pastoral areas starting from April to mid July (main rainy season) and from mid September to November (short rainy season) including crop harvesting periods of both seasons. Many of the farmers who live in mid-altitude involved in crop production practice uses stubble grazing and fallow land as an animal feed resource during crop harvesting time (half of June to end of July) and from December to half of January and severe dry season followed by heavy rain fall from half of January to end of May; during this season farmers use crop residues as an animal feed.

Also focus group discussion indicated that browsing plants were available and used throughout of the year, but mainly in the dry season when the production of the herbaceous layer is very negligible, i.e., from mid January to end of March at which sever dry season of the year both in midland and pastoral area used as feed resource. In highland area the season was to the opposite as there was no dry season, but affects cattle production as starting from April to end of June there was heavy rain fall existed in highland. There were no crop production activity and animals are endangered of swampy and unproductiveness of natural pasture due to mud occurring in the area and farmers use *enset*, banana, sweet potato, *gode* and sugarcane leaves used as animal feed in addition to wheat and barley straw. This study result is in agreement to the study of (Seyoum *et al.*, 2001) indicated that the availability of feed resources in the highlands depends on the intensity of crop production, population pressure, the amount of rainfall, and distribution pattern of rainfall and seasons of the year. Pasture growth is a reflection of the annual rainfall distribution pattern.

In the study area measures were taken to cope up with critical feed shortage period. The survey result indicated that 72% respondents relied on stored crop residues and ranked 1st showing significantly difference at ($P < 0.05$) 0.028 among the study sites. About 49% HHs relied on migration and travelling long distance in search of feed to grazing area showing significantly difference ($P < 0.05$) 0.009 among the study sites and 38% of them resist the condition through relied on farm residues and natural pasture. The most coping mechanism was conserving crop residues and sending animals to other areas of the feed availability were the main coping mechanisms used against critical feed shortage. Which is in agreement with reports in central and southern highlands of Ethiopia as indicated that there is increasing importance of crop residues as a livestock feed (Solomon *et al.*, 2008b; Tsegaye *et al.*, 2008). According to Tsegaye *et al.* (2008), shortage of grazing lands and the absence of alternative feed resources accentuate the increased dependence on crop residues in the central highlands of Ethiopia.

According to the survey result, 80% of respondents indicated that the grazing area was dramatically shrinking. Therefore, conserving crop residues as feed sources were preferable than depending on pasture such as wheat, barley and millet straw, and *enset* (*E. ventricosum*) where preferred in highlands, because of the availability in areas. This study is in agreement with (Solomon, 2004) as preference for barley and wheat in Sinana

Dinsho of Bale high land area. *Teff*, maize and haricot bean crop residues were more preferable in mid-altitudes due to availability and production potential areas. The measures taken to solve feed shortage in lowland pastoralists were migration as travelling long distance to search feed for livestock instead of conservation. Supplementing lactating, sick animals, and calves with collecting grasses and leaves of shrubs were another way of feed shortage solving problem in lowlands. Additionally farmers in mid-altitude and highlands cope up feed shortage through purchase of grasses and crop residues from neighbor farms or local markets and conserved fodder. Fodder conserved by cutting, drying and pooling in protected place or leaving it uncut on the fenced fields.

The survey result showed that objectives of cattle rearing in the highland and mid-altitude areas were to fulfill multipurpose functions of the HHs of which the source of draught power ranked 1st, income source ranked 2nd, milk and milk products ranked 3rd, social functions as a gift ranked 4th, organic fertilizer ranked 5th and meat ranked 6th. The current result of the study is in agreement with reports of (CARE-Ethiopia, 2009). The major objectives of HHs in lowlands were income source followed by product consumption, and draught purpose. Selling of any commodity for the sources of cash in the HH depends on the amount of money needed to cover their expense. For example, in most instances, HHs sell cattle to cover large expenses, where as they sell crop and/or butter for relatively smaller expenditures. However, butter and crop were used as a source of cash when there was a surplus.

According to the study result 66%, 18% and 16% of HHs were herded cattle by individual hiring, rotational/communal hiring and hiring a person respectively. This study result is in agreement with report (Alganesh *et al*., 2004) as rotational/communal herding through farmers in a village together herded their cattle and herding were performed by rotation of herders from each household. The second one is individual herding in that every household herds his/her own cattle by any of the family member. The third is hiring a person: This is the case where a sort of hired man herds cattle of an individual family or a group of families.

Livestock plays a critical role in the livelihood of smallholder farmers. However, sample households reported that productivity and contribution of their animals is low due to several constraints. The majority 77% of them ranked feed shortage as the number one problem

that hindered cattle production greatly having no significant difference as (P >0.05) 0.63 among the three study sites.

About 45% of HHs in highlands indicated that production loss existed from June-August. Also, 34.2% in highland, 45% in mid-altitude and 35.3% in pastoral area HHs reported that mortality loss of animals mainly due to feed shortage, difficulty of grazing land and drought were high. The crop residues used as animal feed resources were *teff* straw, stover of maize and sorghum and the straws of wheat, chicken pea, haricot bean and barley were available as feed and supplementing for three months of the dry and wet season of feed shortage. Sampled households in pastoral area reported that there were critical feed shortages during the dry season from January to half of March. Therefore, the current study is similar to (Tessema *et al*., 2003) as seasonal variations in feed quality and quantity is the main limitation to animal production and cause fluctuation in productivity throughout the year, particularly in the dry seasons during which feed is scant and poor in nutritive value. Relatively the feed available in *Kolla* agro-ecology is good compared to *Woina Dega* agro-ecology.

The 2nd (35%) ranked constraint of the HHs was drought (stressful period: a focus on ensuring survival of breeding stock) and the primary problem for livestock production in low lands, which was followed by disease and shortage of grazing land, which were more or less similar to the constraints faced by animals of different pastoral areas in Ethiopia (Beruk, 2003). But, no drought problem in highlands and ranked shortage of grazing land in 2nd.

Importantly, sample farmers of 34% ranked disease and parasites in 3rd as reported that animal disease and parasites were major threat of their livestock production showing significantly higher difference at (P <0.05) 0.0 among the study sites due to difference in altitude area. This study is in agreement to the study of (Girma, 2010), which indicated that meat and milk yields are low and losses high, especially among calves and young stock. Contagious diseases and parasitic infections are major causes of death, factors that are exacerbated by malnutrition and starvation due to frequent drought. Recurring drought is a factor for the loss of huge livestock resource that influences the animal population, although it is difficult to determine the extent of losses. Practically all animals are range-fed. During the rainy seasons, water and grass are generally plentiful, but with the onset of the dry season, forage is generally insufficient to keep animals nourished and able to resist

disease (Solomon *et al.*, 2008a). Therefore farmers need up to date and accurate information on how best to manage and care for their animals, new veterinary health practices, the best ways to treat diseases and news of the domestic as well as the international markets.

According to the survey result in study area animal disease problem was ranked 3rd where as differently animal health problem was mentioned as a second constraint according to the report of (Shitahun, 2009) especially in waterlogged areas due to Liver-fluke and Lung-worm infestation; and also prevalence of Trypanosomiasis that affect cattle health. Moreover, Leech and Ticks were mentioned among the parasites that hindered cattle performance as they are blood sucking parasites, which is similar to the current study result in highlands ranked diseases and parasites in 2nd rank.

According to the survey result 28% of respondent"s ranked shortage of grazing land in 4th rank and reported that shortage of grazing land was an overriding constraint both in highland and midland areas. This rank could be attributed to grazing habit of cattle on marginal lands and expansion of farm land. Thus, the shrinking communal pastureland seems to be the most economically important constraint of cattle production compared to disease/parasite prevalence and veterinary service.

Similarly 25% of respondent"s ranked market problem in 4th rank and reported market were an overriding constraint both in highland and midland areas due to poor road infrastructure in general was seen as a major constraint to efficient trade and rate of the transport is the highest cost for livestock trading. Traders trucked animals from primary and secondary markets to terminal market for domestic consumption, which is in agreement to the study of (Umar and Baulch, 2007) indicated that poor infrastructure and uneven access to market information is a well-known constraint to livestock trade in the country in order to make timely and well-informed decisions, sellers and buyers need access to a wide range of market information, including prices, sales volumes, disease status and the levels of national and international demand.

Veterinary service ranked 5th with total weighed score of 59% followed by extension service at 6th rank. This compared to the first four major constraints due to lack of enough specialists. The low veterinary service performance was the outcome of few government veterinary staffs in number and cannot cover such a vast area to adequately address the

veterinary needs of livestock keepers. Besides government staffs need adequate mobile facilities for which currently the government does not have the capacity to provide which is in agreement with study of (Tafesse, 2001).

Depending from this bench mark the sample farmers were indicated to be: - feed shortage particularly in the dry and wet seasons, drought, disease and parasites, market, inadequate veterinary services, shortage of grazing land and in adequate infrastructure supplies were ,major constraints which face households similarly with (Agajie *et al*., 2002) for North and West Shewa Zones where the most important livestock production constraints prioritized by The interaction of these constraints affects the performance of the genetic potential of animals leading to subsistence level of livestock production. Therefore, prioritizations of all major and minor constraints in altitude zones have shown different ranks in according to its severity in which the households face in their area.

6. CONCLUSIONS AND RECOMMENDATIONS

In this study, assessment of cattle husbandry and marketing practices were conducted in two livestock production systems of highland and mid-altitude zone of mixed-crop livestock and livestock production systems of lowland area. In mixed farming system of the highlands and mid-altitude crop production is common and day to day activities of the people and cattle rearing were the major activities of the lowland pastoralist. Cattle are the most important livestock species of households for their day to day activities such as cultivation, threshing, transporting, manure and income source. Communal grazing lands were the main source of livestock feed with poor management of the resources. Natural pasture, crop residues, crop stubbles, browse, leaf and pseudo-stem of *enset*, weed and sugarcane leaves were the feed resources of the study area. Pasture areas were decreasing as cropped areas expand due to this subsistence-oriented smallholder has limited means with which to boost production. Overall, the main constraints of livestock production and productivity can be summed up as feed shortage, drought, overgrazing, land degradation, livestock disease and parasites, backward breeding practice and lack of marketing and unwise utilization of feed and feed resources due to high number of livestock was added to further deterioration. Therefore, to sustain the production system in the study area the following points are recommended:-

- Improve the current condition of communal rangelands through management of degraded areas by awareness creation on the value of these common resources and development of rules and regulation to sustain the existing resource and implement over the utilization of communal/pastoral rangeland management systems to reduce constraints such as shortage of feed, drought and grazing land deterioration which perpetuated through time due to land use changes and seasonal fluctuation.
- Awareness creation to minimize feed shortage through conservation of forage/pasture in the form of hay at the end of rainy season due to abundant pasture existence in wet season. However, lack of experience in haymaking hinders the practice. Hence, due consideration should be given to train the farmers in haymaking and feed conservation practices.
- Further research and development work should be encouraged to alleviate dry season feed shortage through different options such as utilization of non conventional

feeds, forages development program, use of irrigation, alternative means of crop residue utilization and conservation practices**.**

- Provision of strong extension services to farmers for feed resource development and training them in basic principles of collection, storage of harvested feed resources and crop residues should be sought. It was noted that farmers lack awareness on the production and use of improved forages and hence consolidated extension service and training is required for the farmer by agricultural development professionals.
- Improve animal health service delivery including training, increasing health service centers and drug supply system with close monitoring and supervision.
- Improve infrastructural and institutional set-ups, which improve the access of households/producers to the potential markets whereby they could supply more volumes with higher share of the end market price. These improvement measures will raise the household income and purchasing power of producers and local traders, which in turn will create positive impacts on the local economy.
- In generally there is a need from government to provide extension services with the capacity, support and physical means to expose small scale farmers to markets and by so doing, efficiency in production and marketing of cattle to achieve huge profit.

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8. ANNEXES

Annex 1 : Questionnaire used for the survey

1) Kebele of household_____, Sex____ , Age_____

2) Level of education of the interviewed household (encircle one)

1. Illiterate 2.Basic Education 3.Elementary School 4. Junior Secondary
5. High School 6.Higher Education 7. Religious Education

1. Family size (including the head of the household) under different age category:

Age /year	Male	Female	Total
≤5 years			
5<x<15 years			
15≤x ≤45years			
> 46years			
Total			

3) What is income source for the households? 1. Livestock production 2.Crop production

3. Both 4. Non crop-livestock production

4) What is purpose of rearing cattle in house hold? 1. Selling 2.Farming 3.Both 4.wealth

5) Who is the owner of cattle in the household?

1. Husband 2.Wife 3. Husband and wife 4.The family

2. Livestock herd structure

Livestock Species	Type of animal	Cattle	sheep	goat	equine	chicken
	Dry cows					
	Calves female					
	Oxen					
	Heifers					
	Milking cows					
	Calves male					
	Bulls					
Total						

6) What type of herding systems do you practice?

1. Rotational/communal 2.Individual 3. Hiring a person

7) Do you have sufficient family labour power for cattle production? 1. Yes 2.No

8) In which season do you face labour shortage? 1. Summer 2.spring 3.winter 4.autumn 5.all

9) Do you have consequent cattle production problems? 1. Yes 2. No

10) If yes what are the problems? (Mention)

1. Drought 2.feed shortage 3.disease and parasites 4. Shortage of grazing land
5. Predator 6.water shortage 7. Market 8.lack of infrastructure 9.veternary service

10. Lack of extension service 11.Lack of improved breed 12.Lack of credit 13. Conflicts

3. Prioritize constraints that affect cattle production

No	Constraints	Rank 1, 2, 3 …in the order of severity
1	Feed shortage	
2	Drought	
3	Disease & parasite	
4	Market problem	
5	Lack of credit	
6	Lack of improved breed	
7	Lack of accessible road	
8	Lack of veterinary service	
9	Lack of extension service	
10	Water scarcity	
11	conflict	
12	predator	
13	Shortage of grazing land	

11) If yes, what are the indigenous alleviation strategies? Mention.

1. Travelling long distance area along with cattle to search feed 2. Storing crop residues at farms and near the home 3.selling animals in cheap price during severity 4. Use government clinics for medication 5. Left of fallow land for grazing 6.collecting feeds from mountains where animal unreached areas

12) How grazing lands are owned in your area? 1. Individually 2. Communally 3.Both

13) Is there communal grazing land in the kebele? 1. Yes 2. No

14) If yes, what types of communal grazing land available in the kebele? (Rank in %)

1. Open grassland 2. Tree covered grassland 3. Bush/shrub grassland
4. Swampy grassland 5. Stone covered grassland 6. Gorges 7.Infertile land

15) If yes, what is the status of communal grazing land? 1. Decreasing 2.Increasing 3. No change

16) Do you have sufficient grazing land for your cattle? 1. Yes 2.No

17) If the status of communal grazing land available in the area is decreasing, mention the possible reasons. (Rank in order)

1. Expansion of farm land 2. Reduction in species composition
3. Reduction in biomass production 4. Infestation with weeds
5. Overgrazing 6. Others (specify)

18) What type of feeding system do you follow?

1. Cut &carry (Zero grazing) 2. Grazing 3. Both

19) What is the type of grazing system employed during wet season? 1. Unherded 2.Herded 3. Paddock 4.Tethered 5.Zero-grazing 6. Others (specify)

20) What is the type of grazing system employed during dry season? 1. Unherded 2.Herded 3. Paddock 4.Tethered 5.Zero-grazing 6. Others (specify)

21) Is there feed shortage for cattle in general? 1. Yes 2.No 3.It depends on the season
22) When is feed shortage critical? 1. sep-Nov 2. Dec-Feb 3.mar-May
4. jun-Aug 5. No feed shortage
23) What do you do to cope up with the feed shortage in this (these) month (s)?
1. Rely on stored feed 2. Rely on farm residues 3. Rely on the natural pasture
4. Send my animals to other areas 5. Rely on the market 6.Others

4. Type of feed resource

Season	Natural pasture	Crop-residues	Stubble grazing	Hay	Silage	Feed supplement	Browse trees
Dry							
Wet							

5: Type of crops-residues produced in the woreda / year as cattle feed

No	Crops	Area (ha)	Average Yield(qt.)	Mark for 2x cropping
1	Maize Stover			
2	Wheat straw			
3	Barley straw			
4	*Teff* straw			
5	Pea/ bean straw			
6	Chickpea straw			
7	Field pea straw			
8	Sorghum			
9	Haricot bean			
10	Millet			

24) Do you think that animals in the woreda have adequate feed throughout the year?
1. Yes 2. No
25) When there is feed scarcity, what measures have been used by the farmers to alleviate feed shortage? (Rank in order)
1. Storing the feed during available in the area 2. Hay making
3. Destocking 4. Using browse trees 5. Purchasing feed supplement
6. Traveling long distance for searching feed 7. Others (specify)
26) Are you experienced in hay making? 1. Yes 2.No
27) If yes, how do you decide appropriate time of cutting for hay making?
1. Pattern of rainfall 2.Plant growth 3. Need of the animal 4. Others (specify)
28) How do you store hay? 1. Stacked outside 2.Stacked under shed 3. Baled outside
4. Baled under shed 5. Others (specify)
29) Are you experienced in silage making? 1. Yes 2. No
30) Are you experienced in straw treatment with urea? 1. Yes 2.No
31) If no, rank the reasons in order? 1. Shortage of money 2. Lack of proper tools
3. Lack of knowledge how to do it 4. Others

32) Have you offered to browse your cattle? 1. Yes 2.No
33) If yes, how do you fed browse to your cattle? 1. Cut and carry feeding alone
2. Direct browsing on standing tree 3. Cut &carry feeding by mixing with straw D. All
34) Is their forage development program in the woreda? 1. Yes 2. No
35) Mention in order the dominant and useful species used as cattle feed in the kebele
Grass, Legume, Browse tree/shrub
1st_____
2nd_____
3rd_____
4th_____
5th_____

6: Housing types for cattle (rank in %)

Type of house	Open without enclosure	Enclosed barn or shed	Separated house	Separated room in the family house	Others
Rank					
(%)					

36) What type of housing system do you use? 1. Home stead shades 2. In living rooms with the family 3. Barn 4. Other (Specify)

7: sources of water for cattle? (Rank 1, 2, 3 … in order of use)

Seasons	Pond	River	Spring	Hand dug well	Temporary water
dry					
Rainy					

37) Is there shortage of water for your cattle? 1. Yes 2. No
38) If yes, state the months of the year at which water shortage becomes severe
1 .Sep-Nov 2.Dec-Feb 3.March-May 4.Jun-Aug 5.No shortage
39) If yes, what is it?
_____
40) What is the average distance travelled by cattle to the water source (point) during dry season? 1. Watered at home 2. <1km 3.1-5 km 4.6-10 km 5.>10 km
41) How frequently cattle are watered during dry season?
1. Once in a day 2.Twice in a day 3.Ad- libitum 4.Once in two days
42) Is there a problem of cattle disease? 1. Yes 2.No 3.It depends on the season

8: Major cattle diseases

No	Type of diseases		Time of Out break (month	Treatments given		Age of affected cattle	Mortality/ 10 affected cattle
	Local name	Common name		Local	Scientific		
1							
2							
3							
4							
5							
6							

43) Who assist the health of your cattle?
1. Government 2.Private Veterinarians 3.Traditional medication 4. Other (Specify)
44) How much do you pay on average per year for medication of your cattle? _____
45) How much do you pay on average in a single trip to medicate your cattle? _____
46) What is importance of keeping cattle? 1. Milk &Meat 2.Drought power 3. Sale 4.wealth
47) How many litter per cow milk obtained per day 1.1-2L 2. 2.5-3L 3. 3.5-4L 4.>4 L
48) What is the importance of milk in house hold 1. Drinking 2.sale 3.for churning to obtain milk product
49) Do you get market information before you sell your cattle? 1. Yes 2. No
50) If yes, from where do you get market information?
1. Extension agent 2.Relatives 3. Co-operatives 4. Neighbors 5. Own markets visit
51) Do you get advice on cattle marketing issue form development/extension agent?
1. Yes 2. No
52) If yes, on what aspect? 1. On quality of cattle to be produced for the market 2. On the time to sale cattle 3. On price of cattle at different markets 4. Other (specify)
53) Where do you mostly sell your cattle? 1. Keyate 2.soyama 3.in villages 4. Other
54) What is your reason of preference while you decide to sell your cattle at a particular market? 1. Relative advantage of price 2.Proximity of the market 3. Other
55) How many hours does it take to reach the market that you frequently visit to sell your cattle? 1. Nearest market _____hours 2. Farthest market _____ hours
56) How do you take your cattle to the market? 1. Trekking 2.Trucking 3. Both
57) To whom do you sell your cattle? 1. Trader 2.Abattoir 3. Local butcher 4. Farmers
58) What is your suggestion to improve physical market access? 1. Creation of livestock marketing area 2. Development of infrastructure 3.feed development program 4. Disease prevention program 5. Extension services 6. Others
59) Who determine the price at the market place? 1. Seller 2.Buyer 3. Broker 4. Negotiation b/n seller and buyer
60) If yes, in which market is the cattle price is higher and lower?
1. Better /higher price at market? 2. Lower price at market?
61) What do you think is the reason for these price variations?
1. Difference in number of traders 2. Proximity to urban center
3. Difference in road and transportation facilities 4.Other (specify)
62) in which seasons of the year do you think is the cattle price become higher and lower?

1. Seasons higher price? 1. Summer 2.spring 3.winter 4.autumn
2. Seasons lower price 1. Summer 2.spring 3.winter 4.autumn

63) Why do you think is the reason for cattle price variation across months/season?
1. Drought 2.Shortage of grazing land 3.Seasonal fluctuation 4. All

64) Are you happy with the prevailing cattle price in your area? 1. Yes 2. No

65) If no, what do you think is the solution to improve cattle price in your area?
1. Improvements in marketing infrastructure 2. Adequate information on marketing
3. Broadening Access to Markets

Annex 2 : Focus group discussion

1. What kind of agricultural activities practiced and economic dependency of the society.
2. Types and status of communal grazing land
3. Breed type exist in area and breeding practices
4. Methods of feed conservation system and most crop residues used as cattle feed
5. Ways to feed shortage and harsh condition alleviation
6. Marketing system and factors that force to sale cattle and Opportunities to improve marketing problem
7. Health service level

Annex 3: Total land use pattern and classification (ha)

No	Type of land use	Total(ha)	Highland	Midland	Lowland
1	Homestead /backyard and others	17,130	4,768	13,554	8
2	Cultivated &uncultivated land	121,268	7,158.5	101,057	13,052
3	Grazing land Communal and Private	16,461	2,057.6	4,318.7	10,084.7
4	Protected forest ,bushes and Shrub land	4,230	528.8	93	3,607.3
5	Unusable land/infertile	25,133	6,141.7	5,380.2	13,611.1
6	Mountains and gorge land	38,109	15,831	4,276	18,002
7	Farmed/cultivated	37,669	4,708.6	29,473.7	3,486.7
	Total	260,000	41,194.2	158,152.6	61,851.8

Source: BwOARD, 2008

Annex 4: Burji woreda livestock population

Kebeles	Cattle	Goats	Sheep	Horse	Donkey	Mule	Chicken	Bee colonies
Soyama tawon	1730	1580	545	-	154	12	5820	
Beneya	5083	2862	85	-	174	8	4627	
Gobeze	1564	2543	104	-	124	6	3412	
Bereki	1743	2660	96	-	163	10	4148	
Tinshoa keyate	2059	2733	173	-	112	8	3776	
Gamiyo	2767	2977	126	-	158	7	2961	
Burje kilicho	2895	2709	113	-	162	12	3636	
Sego	1230	1351	117	-	82	8	3855	
Lemo	1769	1617	182	-	146	5	2566	
Mure	2311	3091	202	-	186	3	3187	
Tisho	1872	1723	246	-	148	4	3841	
Harawonje	1359	1322	154	-	135	3	2965	
Otomalo	1797	1239	257	-	185	6	3641	
Wordia gude	1502	1820	123	-	165	14	2256	
Wordia dimach	1848	3104	113	-	172	8	2856	
Wordea goch	2545	2607	134	-	235	12	3605	
Bila	1328	6690	115	-	131	11	3226	
Gera	2763	1482	105	-	168	5	2885	
Walaya	1604	1211	124	-	153	6	3068	
Harale	1269	1454	83	-	86	4	2973	
Nedele	2838	2620	242	54	235	18	3694	
Halame	2435	1633	235	62	184	20	2392	
Ladish	2825	3062	254	18	135	22	2855	
Yebano	2511	1391	232	-	146	17	4247	
Dalio	2400	1528	153	-	132	14	2294	
Total	54047	52009	4313	134	3871	243	84886	4,500

Signed declaration sheet

I, the under signed, declare that the thesis is my original work and has not been presented for a degree in any University and that all sources of material used for the thesis have been duly acknowledged.

Name Signature

Seid Guyo Guje _____

Date of Submission _____

This thesis has been submitted for examination with my approval as University advisor.

Advisor Signature

Berhan Tamir (BSc, MSc, PhD, Associate Professor) _____