

Full Length Research Paper

Cattle production system in pastoral areas of Hadiya zone, Southern Ethiopia

Misginaw Tamirat¹ and Ayalneh Bogale^{2*}

¹Department of Agricultural Economics, College of Agriculture and Veterinary Medicine, Jimma University, Jimma, Ethiopia.

²African Centre for Food Security, School of Agricultural Sciences and Agribusiness, University of KwaZulu Natal, South Africa.

Accepted 9 May, 2012

With the main aim of scrutinizing cattle production system in pastoral areas of Hadiya zone, Ethiopia, this paper characterises the system by explaining the purpose of production, breed and breeding methods, feed and watering system, purpose of marketing, mortality and commercial off take to the nearby markets. Both secondary and primary data were employed. Face to face interviews took place in the two districts considering 160 pastoral households. Focus group and key informant discussions were also conducted to acquire information which could not be generated during the personal interviews and to get general understanding about the production system and trends. The results showed that the Hadiya pastoralists are keeping large number of cattle like other pastoralists not as a security against risks but it is their cultural obligation to do so and attain the cultural titles. Therefore, economic factors have little effect in affecting cattle marketing. The study gives a meaningful insight into the Hadiya pastoralists' production system and serves as useful reference for interventions in pastoral areas.

Key words: Cattle production system, pastoralism, Hadiya, Ethiopia.

INTRODUCTION

Pastoralism is an economic and social system well adapted to dry land conditions and characterized by a complex set of practices and knowledge that has permitted the maintenance of a sustainable equilibrium among pastures, livestock and people (Koocheki and Gliessman, 2005). Today there are nearly 200 million pastoralists in the world solely dependent on livestock production. However, pastoral communities are marginalized and generally not given due consideration in wider socio-political analysis (Oxfam, 2008).

Pastoralists can be nomads, that is, solely livestock producers, who grow no crops and simply depend on the sale or exchange of animals and their products to obtain foodstuffs. They can be transhumant, who often have a permanent homestead and base at which the older

members of the community remain throughout the year (make a regular movements). Pastoralists may also be agro-pastoralists which can be described as settled pastoralists who cultivate sufficient areas to feed their families from their own crop production (FAO, 2003; Hundie, 2008).

Livestock farmers keep cattle for multiple purposes like the milk, meat, blood, hides, and horns as source of income (Hurrisa, 2003; Osterloh et al., 2003). Socio-cultural functions of cattle include their use as bride price and payment of fines in settling disputes in communal areas (Chimonyo et al., 1999). They are also reserved for special ceremonial gatherings such as marriage feasts, weddings, funerals and circumcision.

Cattle are given as gifts to relatives and guests, and as starting capital for youth and newly married man. They are used to strengthen relationships with in-laws and to maintain family contacts by entrusting them to other family members (Dovie et al., 2006). Cattle also play an

*Corresponding author. E-mail: bogalea@ukzn.ac.za.

important role in installation and exorcism of spirits. They are given as sacrificial offerings to appease avenging spirits (Bayer et al., 2004).

The livestock sector in Ethiopia contributes 12 and 33% to the total gross domestic product (GDP) and agricultural GDP, respectively, provides livelihood for 65% of the population, and also accounts for 12 to 15% of total export earnings, the second in order of importance, next to coffee (Gamtesa and Eman, 2006; Mengistu, 2007). Livestock raising also contributes significantly in addressing the reduction of persistent and multidimensional poverty (Wanapat et al., 2007).

In Ethiopia, livestock production is undertaken both in the highland and lowland areas. The lowlands' pastoral areas are situated in the Eastern, South Eastern, and Southern parts of the country. These are Afar and Somali regions, Borena and Omo/Gibe River basins, respectively. Among the total livestock resources of the country 20% of cattle, 25% of sheep, 73% of goats and 100% of camels are found in the lowland pastoral areas (Mengistu, 2007).

Ethiopia is a country of an agrarian economy characterized by high population growth, huge dependence on erratic rainfall, low agricultural productivity, structural bottlenecks and land-lockedness (MoFED, 2006). The country is known to have the largest livestock inventory in Africa with the total of about 47 million heads of cattle, 26 million heads of sheep, 24 million of goats, 49 million of chicken, 6 million of equines (donkey, horses and mules) and 2 million of camels (CSA, 2007). The richness of the country is both in terms of large number and diversity of livestock population.

The lowland has fewer animals than the highlands and this plays an important role in the economy. The highland is considered as livestock deficit and the lowlands being a major source of supply. For instance, 20% of the highland draught animals come from the lowlands (Coopock, 1994; Gamtesa and Eman, 2006).

Despite this large number of livestock population and its diversity, the benefits obtained from it are low compared to other African countries and the world standard. For instance, the current average beef yield per animal of 108.4 kg is by far less than 121 kg for the Sudan, 130 kg for Eastern Africa, 146 kg for Africa, 163 kg for Kenya, and 200 kg for the whole world (FAO, 2004). In the same way, national average cow milk yield per animal for Ethiopia is estimated to be 198.6 kg compared to 320.7 kg for eastern Africa, 480 kg for the Sudan, 703 kg for Kenya and 2199 kg for the world (FAO, 2004).

Different development programs have been undertaken in pastoral areas of the country but most of them did not succeed in getting the required results. The World Bank supported a series of major livestock development projects including supporting development of commercial dairy farms around Addis Ababa, development of stock routes and markets in pastoral areas, and improvement of

rangeland management and veterinary services in pastoral areas (MoARD, 2007). African development bank also supported, among others, the dairy rehabilitation and development project (DRDP), the South East rangelands project (SERP).

The reason for under performance of these projects is partly attributed to the fact that these development programs did not give adequate consideration to the specific socioeconomic setup of the pastoralists; rather most of them are pro-highlanders.

This paper, therefore, seeks to explore specific characteristics of the cattle production system among the Hadiya pastoralists by explaining the purpose of production, breed and breeding methods, feed and watering system, purpose of marketing, mortality and commercial off take to the nearby markets.

The study is unique in that it looks at the production system of the Hadiya pastoralists who have rarely been studied before and brings out some distinguishing features of the system. The paper focuses on socioeconomic factors than the biological ones because pastoralism is a tribe based cultural and economic system

MATERIALS AND METHODS

Sampling and data collection

The study was conducted in Hadiya zone, southern Ethiopia. Two districts of the zone, Soro and Gombora, were selected for the study due to their importance in pastoral livelihoods. Soro district is located in Hadiya zone. Its capital Gimbichu is 32 km far from Hosanna and 260 km from Addis Ababa. The 894 sq.km of the area is classified as *weina dega* (51%), *dega* (20%) and *kolla* (29%) agro ecological zones.

Soro district has a total population of 210,514 people living in 46 rural Peasant associations (PAs) and 3 rural towns, where 19 of the PAs which are adjacent to the Gibe River are dominantly pastoral and agro pastorals. The rainfall pattern in the district is bimodal with a the mean annual rainfall of about 801 to 1400 mm while June to mid of September being the main rainy season (the second rainy season generally begins after February), and mean annual temperature is 17.5 to 27.5°C. Root crops, maize, whe at and teff are main crops in the district in descending order according to the amount of production. Inset is the major food source for human and used as animal feed, medicine, mat, rope, fence, cosmetics, umbrella, home, fire wood, and source of income.

Gombora district has its capital at Habicho, 25 km far from Hosanna. The 668 sq.km of the area is classified as *weina dega* (45%), *kola* (55%) agro ecological zones, and the district is major producer of teff, wheat and maize. The mean annual rainfall of the district is about 701 to 1200 mm and the mean annual temperature is 18.5 to 30.5°C (CSA, 2007). Gombora district has a total population of 95,332 people living in twenty two PAs and one town administration, 8 of the PAs are pastoral and agro pastorals.

The survey was carried out between September and December, 2009. The data for the study was collected from both primary and secondary sources. Primary data was collected using both formal and informal methods. The primary data sources include individual pastoral households, group of pastoralists and traders, and key informants. Individual interviews using the pre-tested questionnaire were made to generate pastoral household level data.

Table 1. Demographic characteristics of the pastoral households by commercial position.

Demographic characteristic	Autarky Mean (SD)	Selling Mean (SD)	Buying Mean (SD)	Total sample Mean (SD)	F value
Number of wives	1.51 (0.856)	2.24 (1.02)	1.4 (0.754)	1.71 (0.88)	14.03 ^{***}
Age	36.6 (12.3)	43.4 (10.2)	37.3 (9.87)	39.0 (11.1)	6.2 ^{**}
Education level of the household head	2.3 (2.7)	1.34 (1.9)	2.4 (2.3)	2.04 (2.38)	3.2 ^{**}
Herding experience	28.8 (12.0)	35.6 (9.6)	29.9 (10.1)	31.4 (10.9)	5.9 ^{***}
Selling experience	20.8 (10.4)	27.5 (9.5)	22.4 (9.3)	23.5 (9.99)	6.34 ^{***}
Family size (AE)	5.3 (1.46)	6.1 (1.48)	5.4 (1.3)	5.6 (1.4)	4.2 ^{**}
Dependency ratio	1.72 (0.65)	1.53 (0.63)	1.58 (0.60)	1.6 (0.62)	5.71 ^{***}

Source: Survey result, 2009. ^{***}, ^{**}, ^{*}, Statistically significant at 1, 5, 10% levels of significance. Numbers in the bracket are standard deviations.

For the overall understanding of the study areas' production and marketing system, area visit, focus group and key informant discussions (experts and knowledgeable elders of pastoralists, traders and consumers) were undertaken using the checklist prepared for the purpose. A two stage purposive sampling [to select the districts and the Peasant associations (PAs) followed by random sampling techniques (to select the households)] was used.

Factors like percentage of pastoral population of the districts, number of pastoral PAs and cultural issues (local titles based on cattle number) were important while selecting the districts. Six major pastoral PAs from Soro district and three PAs from Gombora district (one third of the pastoral PAs from each district) were then identified and selected based on season the pastoralists are available in the PAs, accessibility, tribe/clan distribution, neighbouring ethnic groups and area of production.

From the total of these nine PAs, proportional to the pastoral population, 160 pastoral households were selected: 108 from Soro and 52 from Gombora districts. The markets considered for this study were selected purposively based on their importance in cattle marketing in the study area and representation of primary and secondary markets.

Methods of data analysis

Descriptive statistical analysis was applied in the documentation of the basic characteristics of the sampled households along with the characterisation of the cattle marketing system in the area. This included; the use of ratios, percentages, means and standard deviations. The study also tested variables individually whether they had an effect on the pastoralists' choice of commercial off-take strategy using the Chi-square test for categorical variables and F-tests for continuous ones.

The productivity of a livestock production system is considered using different parameters such as division of labour, ownership pattern, herd structure, role of livestock in the livelihood, reproductive performance (age at first parturition, parturition interval, and calving rate), productivity (milk, age), mortality and off-take. Different researchers used one or combinations of these parameters in indicating effectiveness of a production system. However, there is no standard index to indicate or measure the effectiveness of the system with regard to its commercial off-take or mortality level.

To ease the characterisation process, the producers are categorised into three commercial off take positions according to their livestock marketing behaviour, namely selling position if a respondent is a seller only and/or sold more than it bought; buying position if the respondent is only buyer and/or bought more than it

sold; and autarky position if the respondent neither sold nor purchased during the study time.

RESULTS AND DISCUSSION

Demographic characteristics of pastoral households

Age, education level, family size, dependency ratio are discussed subsequently as indicators of the demographic characteristics of sampled pastoralists. The F test statistics in Table 1 shows that there is significant difference (P<0.01) in the age of the household heads in the three commercial off-take positions. Household heads in the selling position (43.4 years) are significantly older than that of autarkic (36.6 years) and buying positions (37.3 years) while the average age of the respondents was found to be 39 years. Similar to age of the respondents, the herding experience (35 years) and selling experience (27.5 years) of the respondents in the selling position was significantly higher than the autarkic position with 28.8 and 20.8 years, respectively, and that of buying position was 29.9 and 22.4 years, respectively.

The dependency ratio of the sample respondents was 160%. This ratio is possibly attributed to polygamous nature of the pastoralists. Moreover, the ANOVA result implied that there is statistically significant (p<0.05) mean difference among the positions of the commercial off-takes with regard to the education level of the respondents. The average year of schooling of 1.34 years for the selling position was significantly lower than 2.3 years for autarkic and 2.4 years for buying positions (Table 1).

There is also a significant mean difference in terms of possession of wives among the categories where those in the selling option have higher number (on average greater than 2) of wives than the other positions. Even though 91.1% of the respondents were married, marital status of the respondents was seen to be statistically significant among the commercial off-take options. The Chi-square test for marital status among the buying,

Table 2. Livestock possession of the pastoral households by commercial off-take position.

Livestock species	Autarky	Selling	Buying	Total sample mean (SD)	F value
	Mean (SD)	Mean (SD)	Mean (SD)		
Oxen	14.81 (11.9)	23.74 (1.68)	16.83 (1.84)	18.4 (1.1)	6.43***
Bulls	1.74 (0.607)	1.90 (0.071)	1.76 (0.151)	1.8 (0.069)	0.486
Cows	20.38 (11.9)	25.50 (1.479)	19.03 (1.264)	21.5 (0.87)	5.38***
Steers	33.68 (2.12)	38.22 (1.6)	38.57 (1.77)	37.1 (1.07)	2.05
Calves	20.5 (1.864)	24.10 (1.540)	20.41 (1.466)	21.5 (0.933)	1.65
Goats	15.34 (0.723)	13.96 (0.98)	13.5 (0.85)	14.2 (0.5)	1.1
Donkeys	1.89 (0.082)	2.04 (0.070)	2.10 (0.063)	2.02 (0.041)	2.1
Chicken	16.43 (1.28)	11.96 (0.95)	17.35 (0.82)	15.4 (0.65)	8.2***
TLU	71.5 (4.16)	89.7 (3.11)	75.3 (3.36)	78.7 (2.2)	6.8***

Source: Survey result, 2009. ***, significant at 1%, level of significance.

selling and autarkic positions was significant at 1% significance level. Also the test reveals that there is significantly higher number of singles (24%) in autarky position than in the selling (3%) and buying (3%) positions. Regarding religion, 85% of the respondents were Protestants and only 7% of the respondents practice traditional Hadiya religion (*Wa'a weshima* /worship).

Resource ownership of the households

Livestock holding

Livestock are the single most important assets that pastoralists heavily depend on to safeguard their household from any sort of crisis and to secure everything they need. As depicted in Table 2, the livestock species of the study area are cattle, goats, donkeys, and poultry. There is statistically significant difference in the size of livestock owned by market positions where the highest average tropical livestock unit (TLU) owners are pastoralists with selling position (about 90 TLU/household) followed by pastoralists with buying position (about 75 TLU/households) and pastoralists with autarkic position (about 72 TLU/household).

Table 2 also demonstrates that there is a statistically significant ($P < 0.01$) difference in average possession of oxen, cows, and chicken. Significantly higher number of oxen (about 24 oxen/household) was in the selling position than about 15 oxen/household under autarky, and about 17 under buying options.

Similarly, the difference in the possession of cows among the commercial off-take options was statistically significant where there are higher number of cows (about 26 cows/household) in the selling option than about 20 and 19 cows/household in the autarkic and buying options of commercial off-take, respectively.

The survey showed that numerically cattle are the most important species followed by goats. According to the

pastoral households surveyed, the topography, climatic condition, and cultural issues do not allow them to rear camel and sheep.

Social capital of the households

Social capital refers to community and wider social networks on which individuals and households can draw by virtue of their belonging to social groups of varying degrees of inclusiveness in society at large (Hundie, 2008). Social capital is a 'stock' of trust resulting from close functional or emotional attachment to a group or society that facilitates the provision of public goods. Social capital gains higher value in communal livelihood conditions (Chimonyo et al., 1999). The role of social capital in pastoralist societies, which live communally in clans or tribes at household level decision making along with influencing marketing behaviour is considerable.

According to Bailey et al. (1999), social capital helps in exchange of market information, on credit purchase and sale, making a number of local and distant contracts. Besides Hundie (2008) noted that it can generate benefits for those who owned it by building strong social ties and maintaining information flows, conserving resources, establishing strong vertical/external linkages (trusts).

Based on the group and key informant discussions undertaken, the major social capital substances which affect cattle production and marketing in the area are number of livestock owned (wealth), number of wives married (wide marital relatives), beginning from own source, the number of times the household restocked after drought, social status (prestige), existence of relative cattle traders, traditional knowledge and skills, and number of *denbegna* known.

As indicated in Table 3, 72% of the respondents have no relative (kin) cattle trader and those having relative (kin) cattle traders were higher in number in the selling position. There was a significant difference ($p < 0.05$)

Table 3. Social capital of the pastoral households by commercial off-take position.

Social capitals		Autarky (%; n=47)	Selling (%; n=50)	Buying (%; n=63)	Total sum	χ^2 value
Regular client/ <i>Denbegna</i>	Yes	58	83	66	69	8.39**
	No	42	17 ^b	34	31	
Relative(s) cattle trader	Yes	27	12	23	27	0.939
	No	73	88	77	72	
Title holder	Yes	37	74 ^a	38	49	18.6***
	No	63	26	62	51	

Source: Survey result, 2009. ***, **, *, Statistically significant at 1, 5, 10% level of significance. ^a, There are significantly higher numbers of holding title in selling position than buying and autarkic. ^b, Those with no *denbegnas* are significantly higher under autarky than selling position.

among the off-take positions of the respondents in terms of having regular client/*denbegna*. Households who have no *denbegna* under autarky position are significantly greater in number than those in the selling category. Results also depict that there are significantly higher numbers of respondents holding title in selling options (74%), than buying (38%) and autarky (37%) positions.

Gender and division of labor

The nature of pastoral production system necessitates the division of tasks. The division of labour by age and gender determines who takes care of different activities. Like other pastoral production areas, management and taking care of large species, building and repairing shelters and marketing of livestock among the Hadiya pastoral communities is the responsibility of adult men. Whereas, women and children take more responsibility in herding small ruminant stock including goats and taking care of the yard and dung clearing. Besides, women are responsible to processing and marketing of dairy products.

Owen et al. (2005) reasoned that labour is a key factor in livestock development in Sub-Saharan Africa (SSA), mainly because of the technologies developed for improving livestock feeding are more labour intensive. Women are the most over burdened social groups engaging in productive, reproductive and social affairs. And men have the highest role in social activities and a full control over almost all the basic resources. In line with the findings of Abubeker et al. (2007), women and children among the Hadiya pastoralists own small flocks and hens.

Purposes of production and source of beginning stock

Cattle production is the major part of all production systems in Ethiopia. There is a wide range of reasons for

which households keep cattle. The reasons vary across ethnic groups, agro-ecological and socio-economic conditions. If the household keeps cattle for several reasons like the pastoralists, livestock can be regarded as means towards the realization of several needs (Musemwa et al., 2007).

Though the Hadiya pastoralists share many similarities with other pastoralists, they have distinctive motive to keep cattle. They keep large size of herd as a guarantee against loss during drought and diseases. Traditionally, the Hadiya pastoralists have something special with their cattle both culturally and from religious point of view (the belief that the spirit of traditional god (*wa'a*) dwells in cattle. This tradition is hitherto being mainly practiced by the 'Soro' clans (occupy three districts), and yet the motive behind the pastoralists is to secure the cultural title of '*Tibima/Abegaz/Gerad* and *Kumima*' which is attained in ascending order after achieving the first stage that is, possession of at least 100 cattle would be "*Tibima/Garad*" and the second, in which single individual can own more than 1000 cattle and hold the "*Kuma*" title.

The Chi-square test showed that there is statistically significant ($P < 0.1$) difference among the three positions of commercial off-take in terms of purpose of production. As reported in Table 4, thirty percent of the respondents kept cattle for prestige as their first reason, 29% kept cattle as source of income (livelihoods), 18% kept cattle for social functions, 15% kept cattle because they have no land, and the remaining 3% kept cattle for cattle products. All the pastoralists did not get any extension service and their only access to information on herd management, health, feeding system was from elders in the community and family members.

In Hadiya pastoral community, women are not entitled to inheritance of property of their parents, but when she gets married will be given heifers to begin her own. There is a significant difference ($P < 0.01$) in terms source of beginning stock among the off-take positions, 22% begin from better return from other businesses (farming, production of charcoal, making farm equipment for farmers, swimming transportation and the like). 40 and

Table 4. Nature of cattle production system by commercial off-take position.

Parameter		Autarky (%; n=47)	Selling (%; n=50)	Buying (%; n=63)	Total sample	χ^2 -value
Purpose of production	Meat and milk	2	1	1	3	10.11***
	Social functions	24	3	8	18	
	Income source	31	7	13	29	
	Prestige	24	13	11	30	
	Have no land	20	7	6	15	
Mechanisms of natural breeding	Selecting the bull	16	13	24	53	5.50*
	Uncontrolled breeding	13	19	15	47	
Source of water	River water	23	24	28	75	3.96
	Pond water	6	4	8	18	
	Tap water	1	2	4	7	
Cattle selection parameters	Coat colour	7	6	4	6	20.46***
	Conduct	31	10	41	25	
	Body confirmation	14	39	15	21	
	Sex of the offspring	34	32	25	33	
	Milk output	14	13	15	17	
Beginning stock	Own capital	21	6 ^a	31	21	15.35***
	Gift from family	31	49	41	40	
	Marriage gift/ <i>gegeya</i>	48	45	28	39	

Source: Survey result, 2009. ***, **, *, Significant at 1, 5, 10% significant level, respectively. ^aThere are significantly higher number of respondents who begin from better return in other businesses in selling than buying and autarkic positions.

39% begin from gifts during marriage (male's family gift as his share) and female's family gift (*gegeya*), respectively.

Breeding and breed type

In the study of cattle marketing chain, production is the most important component of the chain which comprises a number of agents including input suppliers. Traditional breeders are one of those input suppliers supporting respondents who do not have experience in selecting best cattle type for breeding/mating. The traditional breeders used selection parameters like sex of the offspring (33%), body confirmation (19%), conduct of the animal (25%), for the products of cattle (27%) and coat cover (6%). The pastoralists believe some birds and flies do not attack cattle with those colours: *dalecha* (white headed red), *bora* (red and white), and *bure* (black and white). Anteneh (2006) reported that cattle in the area are endogenous short horned African zebu; the 'Guraghe-Hadya' family. None of the respondents were found to own cross breed cattle and reasoned that the exotic breeds could not stand the hardship (in terms of feed shortage, heat and long distance travel) in the desert.

As shown in Table 4, even if all the respondents used

natural breeding, 53% of the pastoral households selected the bull for mating (controlled breeding), while the remaining 47% do not. Pastoralism, by its nature makes it difficult to control which animal breed to reproduce, unless poor-quality males are excluded, either by mechanical means or castration. However, the presence of these in the herd ensures that the herd does not mix with other herds, and hence controlling breeding within the herd (FAO, 2004).

Seasonality of production and price variation

Agricultural products have their own unique features that affect the consequent marketing activity and seasonality is one of these features (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.

In the study area, prices of cattle are lower between mid October and December (that is, *fite* season locally). During this period, first the neighbouring highland farmers' crops are not mature enough to be harvested, and hence the highlanders (farmers) would not have money to buy animals, 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.

Even though (possibly) the high supply pulls the price down, the farmers do not prefer to purchase breeding or drought animals from pastoralists. First, most of the cattle from the *Gibe* basin (highly tsetse fly infested area) are suspected of their health. Second, the cattle could not easily adapt to the feed shortage and restricted movement (tethering). Third, the oxen are not trained to carry on ploughing activities.

Beginning from the second rainy season (after February-May which is the local *Kerato/tseseyedey* season), the price of cattle especially that of heifers and steers begins to rise. At this time of the year, the pastoralists begin to replace old or barren animals, and the cattle that died in the winter. Second, the farmers begin to purchase cows for milk production and oxen for the coming ploughing season as well as those engaged in fattening for the *Meskel* festival. In the beginning of the main rainy season (early June *Hageye/kremt* season) which is also the main ploughing season for the crop producers, the market price falls again. The reason for this includes (a) the crop producers are constrained financially, and they will be even forced to sell some of their livestock to procure production inputs such as fertilizer and improved seeds (b) the pastoralists' 'winter weakened' cattle do not fetch better prices.

The price of cattle will be the highest during the *Meskel* festival season (August to half September) even though 63% of the cattle sold at this time were on credit basis to be paid after crop harvest in January.

Availability of feed and water

In this pastoral production system, cattle are kept by all pastoralists in a mixed flock with small ruminants and equine. One of the basic characteristic of pastoral production system is an entire dependence on the use of natural pasture, with different herbaceous vegetation and browses. There is however, a marked seasonal variation in the availability and quality of feed resources, because of seasonal variation in rainfall distribution. Obviously, there is acute feed and water shortage in the dry seasons and the grasses are not only depleted but also lose their nutritive value (FAO, 2003).

To cope with hardships of the dry season feed and water shortage, the surveyed households take migration as the first strategy. If the area they planned to migrate to is occupied by others groups/clans, they collect dried grasses from river banks where the cattle are unable to graze until they succeed in getting areas to migrate. When the feed and water conditions get harsher, they loop tree leaves and branches. During a longer dry season, they may travel on average about 200 km.

The respondents reported that they have no experience of making hay even though they collect and store feed for calves and for cattle needing special treatment. Supplementary feeds like salt (*bole*) is among the major household expenditure items. In the dry season, the pastoralists use water wells not only due to the scarcity of water but when winter is strong, leech (*alkit*¹) will be worse.

Livestock mortality and commercial off-take

Mortality is defined as death of livestock due to factors other than slaughtering which can be expressed as the number of deaths that occurred during a given phase (pre or post weaning) as a percentage of herd size during the previous phase (Mukasa-Mugerwa, 1981).

According to Otte and Chilonda (2002), high mortality and mortality risks especially in young stock are a major cause of low productivity in traditional cattle production systems in SSA. The magnitude of factors that influence mortality rate differs among different husbandry and management practices (El-Abid and Nikhaila, 2009).

In the study area, the average mortality rate among young stock is more than twice as high as the older animals, and according to the pastoral elders, male animals resist drought and disease more than the females.

Mwangombe et al. (2011) noted that livestock loss in the drylands has mainly been due to severe and persistent droughts which have led to tremendous human suffering. However, the participants of the group discussion emphasised that mortality rate of cattle in wet season is comparable with that of dry season. The possible explanation is that the study area is located in the hub of tsetse fly infested area whereby the severity of infestation increases with the beginning of the rainy season.

As depicted in Table 5, the pastoral households encountered an average loss of 0.91 TLU per household during the survey period. The calculated mortality rate for the system was 1.5%. This lower rate was possibly because of the fact that TLU calculation attaches lower value for younger stocks.

In developing countries, animal production is being subjected to great pressure to satisfy the demand for animal protein required by the continued increase in human population and also to have surplus for international trade in which to subsidise their imports (Kinung'hi et al., 2004). But in order to reap the maximum possible benefit from the available herd, their off-take level needs to be higher. Negassa and Jabbar (2007) calculated off-take rate by dividing the commercial off-take by total cattle (TLU) times 100, to put in percentage

¹ A worm attacking animals when they drink water in dry season and may even kill if not treated timely (Focus group discussion)

Table 5. Livestock off-take and mortality rate by commercial off-take position.

Parameter	Autarky	Selling	Buying	F-value
	Mean (SD)	Mean (SD)	Mean (SD)	
Cattle sale (TLU)	3.68 (2.3)	5.74 (3.05)	2.42 (1.8)	26.3***
Purchased cattle (TLU)	3.84 (2.4)	2.23 (2.5)	6.52 (2.1)	48.5***
Net off-take rate	0.00 (0.02)	0.04 (0.04)	-0.07 (0.06)	90.3***
Cattle died (TLU)	0.98 (1.7)	1.00 (1.4)	0.81 (1.2)	0.282
Mortality rate	0.1 (0.02)	0.1 (0.02)	0.2 (0.03)	0.234
Non cattle sale (TLU)	0.026 (1.5)	0.43 (0.3)	0.3 (0.55)	3.4

Source: Survey result, 2009. ***, Significant at 1% level of significance.

Table 6. Reason of cattle commercial off-take by commercial off-take position.

Reason of sales	Autarky (%; n=47)	Selling (%; n=50)	Buying (%; n=63)	Total sample	χ^2 -value
Escape disaster	41	47	23	32	6.34**
Insecurity	20	19	23	27	
Travel abroad/SA ^c	16	26	8	16	
Replacement	10	3	23	14	
Income need	14	3	23	11	

Source: Survey result, 2009. **, Significant at 5% significance level. ^c, Migrate to South Africa.

terms. Table 5 shows a statistically significant difference ($P < 0.01$) in the average number of cattle sold among the commercial off-take positions where the highest amount of 5.74 cattle/household was reported by the respondents in the selling position and 3.68 and 2.42 cattle/household were for autarky and buying positions, respectively. On the contrary, the number of cattle purchased in the selling position was the lowest, purchasing on average 2.23 cattle/household while the statistics for the autarky and buying positions were 3.64 and 6.52 cattle/head, respectively.

The calculated net off-take rate was -1% implying that the pastoral households were net buyers, that is, their prime objective is to stock cattle. The average net commercial off-take rate of cattle, for smallholder farmers in highland and lowland sedentary areas of Ethiopia was 7% which is much higher than the pastoralists' under consideration (Negassa and Jabbar, 2007).

Additionally, Barrett et al. (2004) has documented justifications limiting the market off-take from the pastoral areas; first, there is lack of investment opportunities in the pastoral areas, thus making live animal herd building the best investment alternatives. Second, most of the producers have limited demand for cash income and because of this they have limited supply response to prices. This is because most of the resources required for livestock production are free in pastoral areas.

Purpose of marketing

Markets link producers to consumers. Markets affect

producers/pastoralists either when they trade cattle or purchase food and other necessities. The pastoral households purchase cattle for breeding, fattening, for gifts (marriage, circumcision, fines) or to be slaughtered and consumed. Moreover, the sample pastoralists ranked their reasons for selling cattle as to escape the disease and drought (32%), 27% of the respondents sold in fear of predators and raids, and 16% to travel to South Africa.

Replacement and income need accounted for 14 and 11%, respectively (Table 6). But all the respondents who were engaged in buying, bought cattle for breeding purpose and all of them bought steers and heifers for the purpose. There was a statistically significant ($P < 0.05$) difference among the three off-take positions with respect to reason of off-take. As shown in the Table 6, about half of the households in the selling position are risk averse that is, they sell cattle in expectation of bad weather and/or disease.

CONCLUSION AND RECOMMENDATION

Cattle production among the Hadiya pastoralists has both economic and social/cultural values. Thirty percent of the respondents rear cattle for prestige as their first objective, 29% as source of income, and 18% for social functions. The surveyed respondents possessed 78.7 TLU on average. The respondents used natural breeding, 53% of them select the bull and inseminate, and the remaining 47% of the households do not practice any controlled breeding.

With regard to cattle mortality and commercial off-take, 58% of the respondents did not lose any cattle during the survey period; the remaining respondents reported that they lost on average 0.91 TLU of cattle and the net commercial off-take for the system was -1%. Thus, the system is a net buyer.

Cattle are bought for breeding, fattening, gifts or to be slaughtered and consumed. The surveyed pastoralists ranked their reasons to sell cattle in order to escape disease and drought, in fear of predators and robbers, to emigrate to South Africa, replacement and income need. They have a clear marketing calendar, in which they exchange cattle that is, they purchase cattle at the beginning of the rainy season and sell them during the dry season as a result of expectation of bad weather and disease.

The pastoralists travelled about 45 km, on average, to sell their livestock and livestock products. Even though pastoralists are endowed with ample endogenous knowledge of cattle production, and also know their environment more than anybody else, they need assistance to utilize their resources efficiently. Therefore, the following recommendations are forwarded to alleviate the problems and to use their opportunities efficiently.

As the results previous suggestion, all the respondents reported that they do not get any extension service. In order for the pastoralists to improve their marketing system and hence improve livelihoods, extension services on livestock management, marketing and small scale crop production is necessary. The delivery of extension service should be in accordance with the livelihoods of the pastoralists. Therefore, the relevant agricultural institutions such as federal, regional and zonal agricultural development offices should train development agents equipped with basic knowledge about pastoralism and pastoralists livelihood. Proposed actions should be based on, or integrated with local knowledge of pastoralists in order to win the convenience of clan leaders.

Pastoralists keep cattle for prestige and as an insurance against risks. If there was some kind of social security for restocking in place, or credit, at least they would have not relied on cattle as the only insurance against risks. Apart from restraining from sale, absence of institution that helps the pastoralist to rehabilitate from disasters, made them to rely on raiding as a restocking strategy. Above all, absence of social security systems created socio economic crises that are manifested in raiding/robbery.

Absence of insurance against risks is not only limited to the aforementioned crisis but also to protect their livelihood in case of crises, the pastoralists engage in sharing cattle for someone. This effort creates difference of ownership, control and benefit which makes decision difficult either to slaughter or sale the animal shared. So any development effort made needs to be acknowledged while the system and the mechanisms it sustains exists.

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