Challenges and Opportunities of Dairy Cattle Production in Selected Districts of Sidama Zone, Southern Ethiopia

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Abstract

The study was conducted to deal dairy production constraints and opportunities in Sidama Zone Aroresa Woreda districts, Southern Ethiopia. Multistage simple random sampling method was used; 45 households were selected from each agro-ecology (lowland, midland and highland) thus a total of 135 households were selected for the study. The primary data were collected through pre-testing semi-structural questionnaires, discussions and field observations. The obtained data were analyzed by using descriptive statistics and compare means method. The study showed that respondents' perception of other livestock effect on dairy cattle production was variable and not consistency some had said it has advantage while other had said disadvantage and some other had said it has no effect. Even though, however, cattle were accounted first, followed by sheep and goat but donkey, horse and poultry were found in a few numbers. The most respondents (93.4%) were kept local cattle breeds and the rest were also kept cross breed. The study also showed that all of the respondent farmers practiced mixed farming system; different cereal crops produced such as maize, teff, wheat, enset, barley, sweet potato, potatoes, coffee, banana, mango, and cassava. More ever, the study showed that the statistical values of chi square among major challenges were significantly vary across agro-ecology at less than 5% significance level, according to feed was the first major constraints which accounted for a large proportion in dairy cattle production and followed by health problem, water and labour scarcity, respectively. The major diseases that hinder production in the study were mastitis (38.5%), Foot and mouth disease (33.3%) and Anthrax (28.2%). However, the study area had some opportunities to increase dairy production and the major opportunities were significantly associated with the types of agro-ecology at P< 5%; market access (56%) was found highest, followed by veterinary and AI service (21.5%) and infrastructure (22.2%). In improving the incomes and standard of living of the smallholder cattle keeper in the study area, introduction of improved genetic material (diseases tolerance animal) and high quality improved feeds should be done.

Keywords: Cattle, Challenges, Dairy, Districts, Ethiopia, Opportunities, Southern

INTRODUCTION

Milk is the most complete food item because of its great biological value as it contains a variety of nutrients and these nutrients in milk help make it nature's most perfect food (Melesse and Beyene, 2009). Hence plays an important role in improving human nutrition especially for growing children, pregnant women, the sick and the old of the smallholder household members as whole.

Dairy production is traditional in most parts of Ethiopia. Depending on the area under consideration cattle, goats, camels and sheep all provide milk for human consumption. However, cattle are the main source of milk even though they are primarily kept as draught power source with very little or no consideration given to improving their milk production capabilities in the country. In Ethiopia, dairy cattle production systems can be broadly categorized into pastoralism, highland smallholder, peri-urban and urban and intensive dairy farming; based on climate situation, land-holding size and farming systems (Ketema, 2000; Zegeye, 2003).

Regarding dairying, the national milk production remains among the lowest in the world, even by African standards (Melesse and Beyene, 2009); different reasons are contributed for low productivity. These include high human and livestock populations, land shortage, animal diseases prevalence, feed scarcity and poor genetic potential of indigenous cattle breeds (Asrat et al., 2013; Eyassu and Reiner, 2014).

However, if the constraints are seriously interrupted by human in a way that selecting and breeding high- producing cows and high quality bulls, better feeding practices to help cows produce to their genetic potential, providing high quality forage all year round, developing and implementing animal health management programs, employing sound milking practices which help in sanitation and control of mastitis, providing of low interest bank, providing crossbreed pregnant heifers, artificial insemination and bull service and infrastructures such as clean water, health centre, marketing and other country wide. By nature, the country (Ethiopia) has huge potential (opportunities) for dairy development for example; the country is characterized by diverse topographic and climatic conditions favourable for dairying. These consist of a high central plateau ranging from 1,800 to 3,000 metres above sea level, a rift valley that divides the country from north to south with altitudes ranging from 1,000 to 1,800 metres above sea level. Depending on the altitude difference, temperature ranges from less than 10^0C in alpine areas to 35^0C and more in lowland areas (Mohamed et al., 2003; SNV, 2008). Moreover, rainfall in most part of the country is adequate for crop and pasture production (Mengistu, 1987). The favourable

climate throughout the country supports use of improved, high-yielding animal breeds and offers a relatively disease-free environment for dairy development (Mohamed et al., 2003; SNV, 2008). Therefore, given the considerable potential for smallholders income and employment generation from high-value dairy products, development of the dairy sector in Ethiopia can contribute significantly to poverty alleviation and nutrition in the country Ethiopia.

In general speaking, the constraints and opportunities of dairy cattle is not equivalent across country (Ethiopia) due to effect of agro –ecology, climate type, rainfall type etc; for instance, in humid lowland areas(like Gambella, Benshangul-Gumuz Regiens, Benchi Maji zone etc) prevalence of diseases are more serious constraints while forage availability is good opportunity. On the other hand, in highland areas, land shortage is serious problem, but it has potential of labour and marketing of dairy product. In other words, in drier low land areas like Borena, Afar and Somali regions water shortage is more problem than others problems however, they have large land size for grazing. So in order to plan and implement dairy cattle development strategies in specific areas; assess of opportunities and constraints of dairy cattle production is relevant. Therefore, on back ground of this, the current study was concerned to assess opportunities and constraints of dairy cattle production at selected districts of Sidama zone, Southern Ethiopia.

MATERIALS AND METHODS
Description of the study area
The study was conducted from October 2014 to January 2015 in Sidama Zone districts of Aroresa Woreda, Southern Ethiopia. The study area is far by186 km from Hawassa city and 461km from Addis Ababa. It is situated 60 20' North Latitude 390 00' East Longitude. It has variability, in topography and its average rain fall is 733 mm, and the mean annual temperature range is 18.5 ^{0}C (AWAO, 2004 unpublished).

Sampling techniques
In the present study, multi-stage and random sampling method was used. In the first step, districts were stratified in to three groups based on agro-ecology (lowland, midland and highland). In the second step, from each stratum (agro-ecology), one districts were selected by using randomizing sampling method; totally three districts were selected. In the same manner, 45 households were selected from each selected districts randomly. Thus a total of 135 households were selected for the survey study.

Data collection method
The data were collected from both primary and secondary sources. The primary data were collected through pre-testing semi-structure questionnaires and field observations. The information's obtained in this way were different constraints and opportunities of dairy cattle production, while the secondary data were obtained from bureau of agriculture in Sidama Zone, Aroressa Woreda, internet, Journal, articles and books.

Data analysis
The collected data were analyzed statistically using SPSS (version 20) for Windows. The quantitative data were analyzed by using compare means method, express in mean such as livestock numbers. While the qualitative data (nominal)were analyzed using descriptive statistics, represented in percentage. These data were also analyzed using chi square by crosstabs method and the values were considered significant at p<0.05.

RESULTS AND DISCUSSION
Socio- economic characteristics of the households
The socio-economic characteristic of respondents in percentage is presented in Table1, the study also indicated that statistical value of chi square in all variables (age, sex, educational level, religion, marital status and land size) of socio-economic characteristic of respondents were declared statistically significant at less than 5% significance level. Accordingly, from 135 samples of households interviewed 71.7% were male headed. This indicated that male headed was dominantly found in the study area. Age of most respondents had found in range of 31-60 years (46.6%), followed by 18-30 (36.6%) and >60(16.6%) years old, respectively. Regarding to educational status among the sample respondents, 18.2% were not educated; while (56.4%), (16.4%) and 18.2% were educated elementary, secondary and high level, respectively. Among interviewed respondents 33.3%, 65.6% and 1.67% were Orthodox, Protestant and Muslim religions followers, respectively. Of the interviewed house hold most were married and have 1-2 hectar land size.

As it was discussed with respondents, age, sex and educational level of the household head have implications on the dairy cattle practices. They have said that male household head has power and capacity in collecting feeds and performing outdoor cattle management activities than females and educated households might improve routine managements of dairy. Moreover, land size has impact on dairy productivity, farmers have more land size could provide feeds for cattle in better way. Current study is similar to CACC (2003) and

Yigrem et al. (2008) study.

Herd size and composition

Live stock species and composition are presented in Table 2, the result showed that cattle were accounted first, followed by sheep and goat but donkey, horse and poultry were found in a few number. On the other hand, camel and swine were not total found in the study area. The number of cattle was observed to be higher in the stock, possible reason would be cattle has multiple uses for farmers for instances cattle use for working, milking, breeding, fattening for sale (cash income) and manure production. The number of sheep was however observed to be higher in the stock than goats, possibly due to the ease of handling, management and the practices of herding them along with cattle. The current result was in agreement with Suleiman (1998) study; in agro-pastoralist stock is comprised mainly for cattle and to some extent sheep and goat with little poultry. The present study was also in comparable to Daodu et al.(2009) study in Oyo area of Southwest Nigeria who resulted that; of the ruminant, cattle were more with 48% of the population compared to sheep 28% and goats 24%. More ever Girma et al. (2014) had reported similar findings to current results who accounted cattle, sheep, poultry and donkey in importance of rank.

As discussed with respondents during data collection, some farmers had said that the presences of other livestock (sheep, goat, poultry etc) have direct effect on dairy cattle production because multiplicity and variety animals could compete for feed and nutrition in communal and private grazing. They can also compete in supplementing purchased feeds and grains from family own, in treatment purchased drugs and land for barn (animal housing). On the other hand, some other farmers had said that the presences of other livestock (sheep, goat, poultry etc) have advantage on dairy cattle production and improvement productivity because according to the respondents' farmers', the presence of diversity livestock enable to increase cash income, in year round by selling some of them. Thus wealth farmers can improve dairy cattle management in a way that purchasing supplements feeds, drugs, improved breeds of cattle, introducing of new technology like silage conservation and artificial insemination services. However, some other respondents had said that differently from these two groups view indicated on above, the presences of other livestock (sheep, goat, poultry etc) have neither merit nor demerit on dairy cattle production and improvement rather it is affected by personal effort(dairy owner), knowledge, commitment and experience. Therefore, the perception of respondents on toward the owning of heterogeneity livestock effect on dairy cattle production was not consistency some had said it has advantage while other had said it has disadvantage and some had said it has no effect.

The result also indicated that breeding cattle (lactating and pregnancy) were dominantly found the herd due to the fact that they are reserved or breeding and milk production with few bulls retained to replace those sold. As presented in Table 2, the respondents indicated that the majority of lactating cows (32.9%) was found in both lowland and midland. The reason may be in highland agro-ecology, there is shortage of land for grazing while relatively in lowland and midland they have large grazing land. The current study was in consistent with Mohammed (1990) and Girma et al. (92014) study. Girma et al. (2014) had found in both urban and peri urban production system Adam tulu (Ethiopia); higher numbers of cows are pregnant and lactating.

Table 2, represents breed types of dairy cattle by respondent. In the study area, farmers were kept two types of dairy cattle. These are local breeds and cross breeds but no present exotic breed types. Most of respondents in the study area raised local breed but some were also keeping small number of cross breeds. The reason may be due to low accessibility of improved breeds and lack of awareness on improved breed. This result disagreed with Tsehay (2001) study who state that more specialized dairy farming are practiced by investors and some small holder farmer in India and are basically based an exotic pure breed stock.

Table 1: Socio- economic characteristics of households in Percentage (%)

Category		%(N=135)	Chi square (X^2) value
Sex	Male	71.7	25.785*
	Female	28.3	
Age	18-30 years	36.6	18.311*
	31-60 years	46.6	
	>60	16.6	
Educational status	Illiterate	18.3	73.2652*
	1-8	56.4	
	9-12	16.4	
	Higher level	8.2	
Religion	Orthodox	33.3	82.176*
	Protestant	65	
	Muslim	1.67	
Marital status	Married	90	197.6435*
	Single	5	
	Widowed	5	
Land size(hectar)	<0.5	10	72.1315*
	0.5-1	5	
	1-2	85	

 *=Stand for significant difference

Table 2: Livestock species and composition (in TLU and percentage)

	Agro-ecology							
	Lowland		Midland		Highland		Total	
Live stock	TLU/hh	%/lv	TLU/hh	%/lv	TLU/hh	%/lv	TLU/hh	%/lv
Pregnancy cows	11.2	18.7	6.3	14.0	8.4	18.1	25.9	17.2
Lactating cows	14	23.4	10.5	23.3	8.4	18.1	32.9	21.8
Dry cows	7	11.7	8.4	18.7	6.3	13.6	21.7	14.4
Heifers	4	6.7	3	6.7	4.5	9.7	11.5	7.6
Calves	4	6.7	3	6.7	3.5	7.5	10.5	7.0
Bull	2	3.3	4.2	9.3	4.2	9.1	10.4	6.9
Oxen	10	16.7	4	8.9	5	10.8	19	12.6
Total	52.2		39.4		40.3			
		87.3		88.7		86.9	131.9	87.6
Sheep	0.2	0.3	0.6	1.4	0.4	0.9	1.2	0.8
Goat	0.6	1.0	0.3	0.7	0.2	0.4	1.1	0.7
Donkey					0.7	1.5	0.7	0.46
Horse			1	2.3			1	.66
Poultry	0.4	0.67	0.1	0.22	0.4	0.86	0.9	0.59
Swine								
Camel								
Total livestock	59.8	100	44.4	100	46.4	100	150.6	100.0
Local breed cattle	48.6	93.1	38.1	96.7	36.5	90.57	123.2	93.4
Cross breed	3.6		1.3		3.8	9.42		
cattle		6.89		3.3			8.7	6.59

TLU=Tropical livestock unit, %= Percentage, hh=households

Production system
All of the respondents in the study area practiced crop-live stock production system. In this regards, crop cultivation and cattle production are complementary. Cattle serve as power work for land preparation in planting crops, and threshing ripen crops during harvesting and manure as fertilizer; while crop by-products and residues are an important source of animal feed. According to the respondents interviewed, maize, teff, wheat, enset, barley, sweet potato, potatoes, coffee, banana, mango, and cassava were major crops produced in the study area. The main feed sources of dairy cattle in the study area were natural pasture, followed by Enset, fallow land, crop residues and non conventional feeds (atela, salt, bole) in rank order of importance. In the study area, milk and milk products had multiple uses; for sale (cash income), family consumption, moreover, cattle were used as asset, social value and for breeding. The results of current study are similar to Zewdu et al (2003) in the mid highlands of Ethiopia and Chewaka (2006) in Yirgachefe area.

Challenges of dairy cattle production

As presented in Table 3, shortage of feed, health problem, water scarcity and labor scarcity were major challenges which affect dairy cattle production and productivity. The statistical values of chi square among major challenges were significantly vary across agro-ecology at less than 5% significance level. In the study area, feed was the first major constraints which accounted for a large proportion in dairy cattle production. From the fact points of view, quantitative and qualitative shortage of feed and fodder affects the performance of milking animals, through under feeding animals in general; in particular, it affects milk production negatively. The cause for shortage of feed may be due to the fact that most farmers had small grazing land for animals; this was also true most natural pastures areas are converting to crop production. Moreover, population numbers are becoming increase over time in turn; overgrazing was common due to inadequate use of natural pasture and crop residues and by-products; and lack of knowledge in improved forage (legumes, grasses, and crops-forage) in conserving and managing. As discussed with respondents, feed shortage of dairy cattle was the most serious problem during dry season in the study area this is because of most farmers are poorly experienced in hay and silage forage conservation however, the area has ample forage in summer season. The present finding is in lined to Komwihangilo et al. (2009) study of improved cattle in agro-pastoral systems of Central Tanzania who reported that the quantities and qualities of pasture is a big challenge for cattle production; in similar to current study Daniel (2000) is also reported in North Gondar, Ethiopia who stated that shortage of feeds for dairy cattle production is major problem due to the shifting of natural pasture to cropland.

Improved dairy production has been hampered by poor health and very high mortalities. According to the result of respondents, the second most importance constraint was health problem and the most predominant dairy cattle killer diseases were mastitis (38.5%), foot and mouth (33.3%) and anthrax (28.1%) diseases. However, the statistical values of chi square among major diseases effect were not associated with the types agro-ecology at less than 5% significance level. As indicated by the respondents, the effect is more severe during summer and spring seasons because in those periods, the environment might be conducive for microbes and parasites reproduction. Similar study was conducted by Rosati et al. (2009) who reported that mastitis may developed if the quarter becomes intended as when the cow lies in mud or manure and bacteria intended the teat canals on the other hand, Laisser et al. (2015) reported from Lake Zone in Tanzania foot mouth disease is most serious, followed by babesiosis and Lumpy skin disease. In similar way, Daodu et al. (2009) study in Oyo area of Southwest Nigeria; foot and mouth disease, and swollen join are major diseases for Adult ruminant while Diarrohea and foot and mouth diseases are major diseases for young ruminant. In similar manner, Dessalegn(2015) also reported in Bench-Maji Zone, Southwest Ethiopia; trypanosomosis, black leg, anthrax, bovine pasteurellosis, and gastro-intestinal parasites are major diseases in order of their importance.

To some extent water shortage and labour scarcity were also challenges for some farmers however; the effect is not same in all agro-ecology and seasons. As discussed with respondents, water shortage was a big challenge during dry season this was especially true for lowland farmers because as indicated by the respondents, lowland environment is characterized by having erratic, unpredictable, temporal and uneven distribution of rain fall, it is also too hot. In lowland area, as it was discussed with farmers and observed during data collection period more farmers are usually in seasonal movement to search water for their cattle. On the other hand, labour shortage was a problem of midland and highland areas because they have small land size for free grazing. In similar to current study, Laisser et al. (2015) study in agro-pastoral communities of Lake Zone in Tanzania who reported that together water and feeds shortage are most serious problem especially during the dry season.

Opportunity of dairy cattle production

Despite of there were many problems and constraints that might be slow down the development of the dairy sector in the study area; however, there were also suitable condition to improve dairy production and productivity for the future such as marketing accessibility, veterinary and artificial insemination service (AI) and infrastructure (Table 4). These were warranted to the dairy producers to remain with their dairy production activity. The statistical values of chi square among major opportunities were significantly associated with the types of agro-ecology at less than 5% significance level. As indicated in Table 4, market availability was the primary opportunity (56.3%) for the sector improvement; followed by veterinary service and artificial insemination service (21.5%) and infrastructure (22.2%) respectively.

Market opportunity is a key instrument for dairy industry because all dairy farm items are connected with market channel for example to rent land for farm, purchase equipment for housing, labor and to sell milk and milk products, to purchase improved breeds, feeds, AI and drugs etc. In relation to marketing system, in the study area, land and labor are too cheap. There is also increasing demand of milk and milk products consumption by community. This may be related with population number are increasing from time to time in turn, feeding habit of the community are changing to animal origin. Moreover, dairying provides the opportunity for smallholder farmers to use land, labor and feed resources and generate regular income.

Expanding of veterinary and AI service, and infrastructure are also important aspect for dairy industry

development. Veterinary service accessibility is necessary to have health animal for production; as it enables to prevent, control and treat different diseases, and parasites which could be destructive for animal as well as for human. Now days, AI service is a crucial technology to disseminate improved breeds to small holders in short time; AI service is also important to control transmissible diseases, it is also cost effective. Infrastructure includes health center, training center, information, road etc. these can help to support different services such as adequate land access, organizing input supplies (improved breeds, feeds, AI and drugs) and provision of credit, extension and training. More ever, as it was discussed with respondents and observed during data collection, government policy is good and encouraged for dairy industry in the current situation and the area has suitable climate (optimum rainfall and temperature) for dairy production improvement especially in midland and highland areas.

Similar study was conducted by Eyassu and Reiner(2014) from Dire Dawa, Ethiopia; there is high demand for milk, milk consumption tradition of the society, presence of people with different cultural and religious backgrounds, availability of cheap labour for dairy farms and milk vending activities, there is no milk processing plant in. thus investors will have fewer competitors in the sector that would affect marketing of their products, conducive environmental policy and access to road (bus), train and air transportation systems. Asrat et al. (2013) also reported similar results to current study in Bodit, Ethiopia who described the major opportunities of dairy industry as rapid urbanization, substantial population growth and change in the living standard of the dwellers, the demand for milk and milk products in the areas are increasing.

Table 3: Major challenges of dairy cattle production by respondents in percentage (%)

Major challenges	Agro-ecology				Chi square (x^2)value
	Lowland % (N=45)	Midland %(N=45)	Highland % (N=45)	Total %(N=135)	
Feed shortage	42.2	51.1	53.3	48.9	8.5963*
Health problem	37.8	31.1	26.7	31.9	
Water scarcity	17.8	6.7	6.7	10.4	
Labor scarcity	2.2	11.1	13.3	8.9	
Major diseases					
Mastitis	37.8	40	37.8	38.5	0.7398**
Foot and mouth disease	33.3	35.6	31.1	33.3	
Anthrax	28.9	24.4	31.1	28.1	

*=Stand for significant difference, **=Stand for insignificant difference

Table 4: Major opportunity of dairy cattle production by respondents in percentage (%)

Major opportunities	Agro-ecology				Chi square (x^2)value
	Lowland % (N=45)	Midland %(N=45)	Highland %(N= 45)	Total %(N=135)	
Marketing accessibility	55.6	60	53.3	56.3	1.053557*
Veterinary and AI Service	22.2	22.2	20.0	21.5	
Infrastructure	22.2	17.8	26.7	22.2	

*=Stand for significant difference, AI=Artificial insemination

Conclusions

All of the respondents in the study area practiced mixed farming system/crop-live stock production system. Crop cultivation and dairy cattle production are complementary and important to farmers' livelihood. The majority of feed sources for dairy cattle production in the study area were natural pasture, followed by Enset, fallow land ,crop residues and a few of used non convectional feed.

The major constraints that cause to decline dairy production were feed and water shortage, health problem and labor scarcity. The diseases that hinder production in the study were mastitis, foot and mouth disease, and anthrax. However, the study area had some opportunities to increase dairy production such as market accessibility, veterinary service and artificial insemination and infrastructure.

Recommendations

According to the study the major challenges of dairy cattle production in the study area were feed shortage, health problem, and water and labor scarcity. Therefore to solve these problems much work should be done in improving the incomes and standard of living of the smallholders cattle keepers in the study area through introduction of improved genetic material (disease tolerance animals) coupled with improved feeding and general management. Much greater emphasis must be given on developing the knowledge and skills to introduce and manage high quality improved feeding system successfully. This would involve more use of improved quality grasses, legumes and treated agricultural by-products which could result in a reduction of the overgrazing

and efficient utilization of the limited grazing land. It is recognized that animal performance and especially milk production is much more dependent on the quantity and quality of feed eaten rather than on the genetic makeup of the animal. Furthermore, the management systems of the animals should be improved in order to increase animal production and reduce health problems.

Conflict of interests
The author(s) did not declare any conflict of interest.

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