

Dairy Cattle Production Systems in Humbo Woreda, Wolaita Zone, Southern Ethiopia

Asrat Ayza^{1*} Ayele Amanuel² Milkias Kassa²

1.Department of Animal and Range Sciences, Agriculture College, Wolaita Sodo University P.O. box, 138, Wolaita, Ethiopia

2.Expert of Animal Production in Humbo Woreda, Wolaita Zone, Southern Ethiopia

Abstract

The study was conducted in Humbo district, Wolaita Zone, Southern Ethiopia to assess dairy production systems. Two Kebeles were selected based on the agro-ecology of the Woreda. From each Kebele twenty households that have at least one dairy cow were selected randomly. Two main dairy production systems; mixed crop-livestock production system (80%) and agro-pastoralism (20%) were identified. Most of the respondents were keeping indigenous dairy cattle with traditional cattle husbandry and management practices such as feeding, watering, milking, housing, breeding, etc. with the average livestock holding of 9.0. The major feed resources identified in the studied areas include; teff straw, maize and sorghum stovers, fruits, ensiled natural grass and non-conventional feeds like coffee leaves with the major feeding system practiced was grazing. The major constraints of dairy development in the studied area include; feed shortage (dry season), shortage of water, dairy cattle diseases, discouraging marketing systems (seasonality), reproductive problems (long calving interval, abortion, etc) and other problems like lack of training.

Keywords: Agro-pastoralism, Dairy, Ethiopia, Qolla, Southern, Woinadega

1. Introduction

The estimates of Ethiopia's livestock population in 2012/13 indicated that the country stands first in Africa with 53.99 million cattle, out of which female cattle constitute about 55.48% and 44.52% males; 98.95% of the total cattle are local breeds and the remaining are hybrid (0.94%) and exotic breeds (0.11%), Over 60% of the cattle and sheep are reported to be found in the high lands, while goats and camels are predominantly found in the low lands (CSA, 2013).

Livestock raising always has been largely a subsistence activity. They are raised in all of the farming systems of Ethiopia by pastoralists, agro-pastoralists, and crop/livestock mixed farmers. Livestock play a vital role in economic development, particularly as societies evolve from subsistence agriculture into cash-based economies (Agajie et al., 2002). The contribution of the livestock sector is estimated to be about 12 to 16% of the total growth domestic product (TGDP). Only milk and milk products contributed 36%-46% to the household income in some areas (Asrat et al., 2013; Ahmed et al., 2003).

In Ethiopia, different types of milk production systems can be identified based on various criteria. Milk production systems can be broadly categorized into urban, peri-urban and rural milk production systems based on location (Redda, 2001), while based on market orientation, scale and production intensity, dairy cattle production systems can be categorized as traditional small holders, privatized state farms and urban and peri-urban systems (Ahmed et al., 2004, Kumsa, 2002 and Ketema, 2008).

Urban and peri-urban dairy production systems are among the forms of dairy production in the tropics and sub-tropics. The system involves the production and marketing of milk and milk products in the urban centers (O'Connor, 1990). Existence of the urban and peri-urban dairy farming is mainly motivated by availability of good markets for animal products, need for creation of employment opportunities (RLDC, 2009 and Prain et al., 2010). Currently demand for dairy products in the country exceeds supply, which is expected to induce rapid growth in the dairy sector (Haese et al., 2007, Ketema and Redda, 2004). Factors contributing to this include rapid population growth (FAO, 2004), increase in urbanization and expected growth in incomes (Asrat et al., 2014).

Humbo Woreda is one of the potential areas for milk production in Wolaita Zone with access to large grazing land. But little is known about the existing dairy production system and constraints associated with dairying though dairy operation plays a key role for engaged households. Identification of prevailing problems and describing of the existing dairy production system in the area is a prerequisite to make any development interventions. This study therefore, is designed to assess dairy production systems and identify constraints of dairy development in the studied area.

2. Methods and Materials

The study was carried out in Humbo Woreda, Wolaita Zone, which is one of the major milk producing areas in Southern Nations, Nationalities and People's Region (SNNPR). It is situated between 6°38'0" and 6°54'0" N latitude and 37°40'0" and 37°40'0" S longitude. Located at an altitude of 1100-2335 meters above sea level, Humbo

Woreda receives an average annual rainfall of 840-1400mm and the temperature ranges between 15°C to 29°C (HWARD, 2014). Two Kebeles were selected based on the agro-ecology of the Woreda. From each Kebele twenty households that have at least one dairy cow were selected randomly.

2.1. Data Analysis

Data collected was analyzed by using simple descriptive statistics, summarized and presented in tables, percentages and means.

3. Results and Discussion

3.1. Dairy production systems

Two major dairy cattle production systems were identified; namely agro-pastoralism(20%) in lowlands where there is large area of natural pasture that was left for communal grazing in traditional manner and maize production is common and mixed crop/livestock production system in the midlands respectively.

Crop/livestock production system (80%) was observed to be the typical dairy production system in the midlands the study area. In this type of production, both components (crop cultivation and livestock production) are complementary. Livestock provides power for land preparation and crop transportation after harvest and manure as fertilizer, while crop by-products represent an important source of animal feed. This system was further sub divided into sub systems based on the type of major crops produced in the area such as cereal crop based and onset-coffee based dairy cattle production systems in the study area.

The cereal crop based dairy production system was practiced at boundaries of lowlands and midlands where maize, sorghum, teff, etc are the major crops. Crop farming in this area was mainly practiced by using oxen and it was given due attention than other cattle types. The onset-coffee based dairy production system was dominant in midland areas. Crops or fruits grown include; Enset, avocado, mango, coffee, etc. This result is similar with Asrat et al.(2013) in and around Boditti, Yigrem et al.(2008) in Shashemene-Dilla, Tolera and Said (1992) in Wolaita; Zewdu et al .(2003) in the mid highlands of Ethiopia; Chewaka (2006) in Yirgachefe area and Funte et al. (2010) in Umbulo Wacho watershed in Southern Ethiopia.

Milk is kept for multipurpose use, and feed production and utilization is limited to grazing land and crop residues. Dairy products such as butter milk, butter and cottage cheese are produced and used as source of income to buy farm inputs and family needs while cattle are an asset securing farmers at the time of emergency. The predominant feed types available and provided to cattle are different in different production systems.

3.1.1.Land holding per house hold

The average land holding per house hold in the study area was 3.65ha. Greater proportion (2.58ha) was allocated for crop production and 1.07ha for pasture production which disagree 2.7ha reported by Asaminew et al.(2009). There is an interesting practice (allocation of land for pasture production) in the study area that need to be encouraged and it is an opportunity to develop smallholder dairy production in the area.

3.1.2. Livestock holding in the study area

The overall average number of livestock per household was 9.0 cattle; 0.15 sheep; 0.15 goats; 0.015 chicken and 0.8 equines with a high proportion of cattle (Table 1). Similar result for cattle (3.9) in Delbo watershed of Wolaita, (3.6) in Boditti and (3.1) in Shashemene-Dilla areas was reported by Nebiyu (2008), Asrat et al, (2013) and Yigrem et al (2008), respectively. The current study indicated that the average number of lactating cows per household (1.1) observed is similar to the one reported by Mekonin (2006) and Nebiyu (2008) in Delbo watershed area 1.2 and 1.1, respectively. Keeping small number of cows on the family farm might be necessitated due to the scarcity of feed and grazing land that is the critical problem in the area.

The average livestock (TLU) holding per household

Livestock classes	Qolla	Woinadega	Mean
Calves	0.8	0.6	0.7
Heifers	1.5	1.0	1.25
Bulls	0.6	0.6	0.6
Pregnant	1.6	1.6	1.6
Dry cows	0.8	1.6	1.2
Lactating cow	2.4	1.6	2
Oxen	1.1	2.2	1.65
Total cattle	8.8	9.2	9.0
Sheep	0.1	0.2	0.15
Goat	0.2	0.1	0.15
Poultry	0.01	0.02	0.015
Equine	0.8	0.8	0.8

3.2. Purposes of keeping cattle

In the study area the since crop farming is the major activity, dual purpose cattle of indigenous breeds were kept to produce milk for household consumption and male calves with the intension of providing draught power. The most important significance of cattle is that they are an asset (specially in Qolla areas) that can readily be converted into cash needed to purchase of farm inputs like fertilizers and crop seeds like maize for the next crop production. Animal dung plays important role and used as fertilizer for farm land. This result (Table 2) agrees with that of Asrat et al. (2013) in Boditti and Nebiyu (2008) in Delbo water shed of Wolaita.

Table 2: Purposes of cattle keeping in the studied area according to the respondents' perspective

Purposes	% of total respondents	
	Qolla (N=20)	Woinadega(N=20)
Milk and meat production	25	30
Draught power	30	30
Calf rearing	10	10
Security	15	10
Animal dung	30	20
All purposes together	100	100

N=Number of respondents

3.3. Feeds and feeding systems

Animal feeds represent the major input in any dairy operation. Common feed resources in the studied areas varied between production systems. In the mixed crop/livestock production system practiced in, natural grass (40%) in Qolla areas is the major feed resource whereas crop residue (35%) in Woinadega and free grazing on marginal/communal areas and after crop harvest was the major feeding system identified in both areas (Table 3). Similar feed resources use with most mixed crop/livestock production systems of Ethiopia was reported by different scholars; Yigrem et al.(2008); Yilma and Ledin (2000); Zewdu et al.(2003); Tadesse et al. (2005) and Asrat et al.(2014). Crop residues are also the major feed sources in the area as is the case in most parts of the country as reported by Tolera (2009). All respondents in the area use animal feeds from their own crop farm in addition to grazing.

Table 3: Major feed sources and feeding systems identified in the area

Major feed sources and feeding systems	% of total respondents	
	Qolla(N=20)	Woinadega (N=20)
Feed resources		
Hay	20	15
Crop residues	25	35
Enset	10	20
Natural Grass	40	20
Non-conventional feed	5	10
Feeding practices		
Free grazing	60	50
Rotational grazing	35	40
Zero grazing	5	10

N=Numbers of respondents

3.4. Water resources and watering practices

The main sources of water observed in the present study area were rivers, Lake, pond and spring. The majority (50% in Qolla) and (40% in Woinadega) of the households in the area obtain water from Lake and rivers respectively (Table 4).

Table 4: Water resources and frequencies of watering in the study area

Water sources	% of the respondents		Watering frequencies		Qolla (N=20)	Woinadega (N=20)
	Qolla (N=20)	Woinadega (N=20)				
Rivers	25	40	Once	Dry	60	65
				Wet	70	80
Lake (Abaya)	50	-	Twice	Dry	15	20
				Wet	15	10
Pond	-	25	Free	Dry	25	15
				Wet	15	10
Spring water	25	35				

N=Number of respondents

Frequency of watering to dairy animals varies from one production system to another, which is affected by different factors, among which season, accessibility (getting easily), performance and/or breed of the animals (that describes the amount of water), and type of predominant feed (dry or wet) and feeding systems (indoor or outdoor where some water is available) as described by Asrat et al. (2013). In the study area in wet season, the majority (70 & 80%) of the respondents water their cattle once a day (Table 4).

3.5. Managerial practices

3.5.1. Housing systems practiced

Most households (60%) in both mixed crop-livestock and pastoral systems kept their cattle within their own residence, while considerable proportions (27.5%) used open barn and the remaining (12.5%) used separate shelter for their animals. The majority of the respondents were housed together with family because of ease for cattle husbandry and management practices such as feeding systems, watering, milking and also protects their cattle from extreme environmental hazards that agrees with Asrat et al. (2014) report.

3.5.2. Breeding system

In mixed crop-livestock and agro-pastoral systems, the majority (90%) of the respondents were used local bulls for mating and some (10%) respondents were used the AI in the studied area. The type of crop farming system is one of the factors that determined the proportion of the breeding bull or oxen in study area. In cereal base system, crop farming is usually practiced with male animal power, and prior to castration these animals can be also used as breeding bull for those who do not have access or unwillingness to use AI that was also indicated by Yigrem et al. (2008) where the majority (89.7%) of the respondents were used for mating.

3.5.3. Health care

Most farmers were not got enough veterinary service. Most veterinary center is found around urban area. Thus rural areas were not vaccinate their cows frequently that is similar with the report of ILCA (1990).

3.5.4. Calf rearing practices

After parturition, cows are not milked for about two weeks during which calves are kept with and allowed to suckle their dams freely. Milking starts after two weeks of calving and the calves are allowed to suckle their dams for short time before and after milking. In the traditional dairy production system, calf suckling is recommended because it results in higher pre-weaning gain of the calf and higher weaning weight. The majority (80%) of the respondents practiced partial suckling, bucket feeding (15%) is practiced before weaning mainly by farmers who owned crossbred cows and 5% of the respondents practiced suckling of crossbred calves. This result is similar with report of Asaminew et al. (2009) who indicated the majority (80.7%) of the respondents were practiced the suckling of the local calves. The overall average weaning age of local calve was 11.8 months, that is, the calves suckle their dams up to the end of the lactation period, while for crossbred calves the average weaning age was 8.1 months.

3.5.5. Milking practices

Out of the interviewed dairy cattle producers, 50% of the households milked their cows twice day in lowland area while the rest 50% milked their cows thrice a day in midland area. The type of milking system practiced was entirely hand milking. About 3 and 2.5 liters of milk were produced daily per household in lowland and midland area respectively. This result was not similar with report of Yigrem et al. (2008).

3.5.6. Milk handling and cleaning utensils

One of the major factors affecting the quality of dairy products is related to milking utensils. The type and quality of milk utensils used as well as methods and frequency of cleaning milking utensils. The majority (90%) of households used clay pots and 10% used plastics in studied area. Different ways of cleaning milk utensils were identified in the area. The majority (65%) of the respondents washed with hot water, while the rest 15%, 10% and 10% of the respondents cleaned with grass species, woira (*Olia africana*) and washed only with water respectively. The current result agrees with Yigrem et al. (2008) report in rural areas of Shashemene-Dilla.

3.6. Constraints of dairy production

Dairy production in the studied area was constrained by different factors. Producers in the area identified the major constraints as shown in Table 5 below. These include: availability and costs of feeds, water shortage, seasonality in marketing system, animal genetics, poor animal health services, reproductive problems, etc. that are similar with the findings of Asrat et al. (2013) in Boditti, Nebiyu (2008) in Delbo water sheds of Wolaita.

Table 5: Dairy production constraints identified in the studied area

Constraints	Qolla (N=20)	Woinadega(N=20)
Shortage of water	10	10
Availability and costs of feeds	25	15
Animal genetics	15	10
Marketing system	25	30
Animal health	10	15
Reproductive problems	15	20
<i>N=Number of respondents</i>		

Despite many problems and constraints, because of the rapid urbanization, substantial population growth large grazing area that makes the studied area special in Wolaita Zone, the demand for good quality milk and milk products are forever. Dairying provides the opportunity for smallholder farmers to use land, labor and feed resources and generate regular income. Therefore, market opportunity (dairy cooperatives) is the major issue for dairy development next to support services.

4. Conclusion

According to the present findings, two major dairy production systems, mixed crop-livestock and agro-pastoralism were identified. Most of the respondents kept indigenous dairy cattle that had multipurpose use though cows in both production systems were mainly kept for milk production. Dairying was found as a good source of income for all farm families in the area. Family labor was the major source of labor for performing dairy activities where milk related activities were the responsibility of women in both systems. The major constraints for dairy production in the area included; unavailability and costs of feeds, shortage of water, discouraging marketing system, reproductive problems and poor animal genetics and health services. The ever increasing milk and its products demand, subsequent increase in human population and relative availability of grazing land are opportunities for dairy development in the area.

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