

Survey on Dairy Production, Post-Harvest Handling and Marketing Systems in Kaffa and Sheka Zones

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Abstract

The study was conducted in Kaffa and Sheka zones to assess dairy production, processing and marketing system through careful collection and documentation of information on the current practices and challenges of dairy production, processing and marketing systems and recommend possible remedy. Two woredas were selected from each zones based on their dairy production potential. From each woredas two kebeles were selected. From each kebeles 20 households were interviewed using semi-structured questionnaire and data was analyzed using SPSS program. Accordingly, the respondents in the study area practiced mixed crop- livestock production systems with dairying used as additional source of income for family. The major constraints for dairy production and marketing system in the area include shortage of grazing land, lack of improved forage seed and improved dairy breed, diseases, lack of awareness on cattle housing system, limited infrastructure, and poor access to services, lack of dairy producing and marketing cooperative and knowledge gap on improved dairy production, processing and marketing. Informal dairy marketing was the only means of marketing system in the study area. Dairy production, processing and marketing in the studied areas can be improved by supporting smallholder dairy producers through inputs and services related to feed supply, veterinary , AI, land, access to market, awareness creation on housing system, credit, extension and training.\

Keywords: Dairy production, marketing system, postharvest handling

Introduction

Ethiopia has one of the largest livestock inventories in Africa with a national herd estimated at 55.08 million Cattle, 55.51 million sheep and goats, and 10.37 million pack animals. All livestock and livestock products to agricultural economy currently support and sustain livelihoods for 80% of all rural poor. Of the total population, 35 – 40 % of all livestock are located in the pastoral areas (MoARD 2007). Female cattle constitute about 55.38% of the national herd. Of the total female cattle population, dairy and milking cows total 17,407,122, 12.13% dairy cows and 19.5% milking cows (CSA 2013/14). Eighty-three percent of all milk produced in Ethiopia comes from cattle with the remainder coming from goats and camels (MoARD 2007). Sheep's milk is not commonly collected or consumed in Ethiopia. The Central Statistics Agency (CSA, 2013/14) estimates 2.9 billion liters of cow milk produced by sedentary populations annually while camel milk is estimated at 230.51 million liters annually. The average lactation period per cow during the reference period at country level is estimated to be about six (6) months and the average milk yield per cow per day is about 1.37 liters (CSA, 2013/14).

The South Nations, Nationalities and Peoples Region is the third highest potential region in the country in livestock production having 11.04 million cattle population next to Oromia and Amhara which owns about 22.50 million and 14.22 million cattle population respectively (CSA, 2013/14).

Since Kaffa and Sheka zones are well known in livestock population, well suited agro-ecology and vegetation cover for many years it is known that there is little information in dairy production system, processing and marketing. Identification of prevailing problems and understanding of the existing dairy production system in the area is vital to devise appropriate development interventions. It is justifiable to generate scientific information on production, processing and marketing system to support smallholder dairy producers. Therefore, the objective of the study was to assess dairy production and marketing systems and to identify constraints and opportunities of dairy production and marketing system in the study area.

Methodology

The study was conducted in kaffa and sheka zones of SNNPR. These two zones are high potential areas for *milk production in southwestern Ethiopia*. The study was carried out in four woredas which are purposively selected based on their dairy production potential. Accordingly, four districts namely; Gimbo and Chena from kaffa, Masha and Andracha from Sheka were selected. Next, from each woreda two potential kebeles in dairy production were selected purposively, except Andracha woreda which only one kebele was selected. Then after, 20 households were selected randomly from each kebele and then interviewed using semi-structured questionnaire.

In order to identify dairy production systems in the area, two types of survey procedure were employed to collect required data. Firstly, secondary data were gathered to a great understanding of dairy production, processing and post-harvest handling systems. Secondly, the rapid rural appraisal techniques and semi-structured

interviews were conducted to collect wide range of qualitative data such as production system, purpose of dairy production, household characteristics, trends in dairy development, dairy husbandry and management system, constraints in dairy production, processing and handling etc.

Personal observations at the time of visits and supervisions were also made to fill the gap that might have not been described during the survey particularly to describe some of the routine dairy marketing activities practiced by producers.

Data Analysis

Data collected were analyzed using appropriate statistical software—Statistical Procedures for Social Sciences (SPSS version 16.0). Survey results were reported using descriptive statistics such as tables, graphs, percentages and summarized discussions.

Results and Discussion

Production system

Production system identified in the study areas were mixed crop- livestock production system. Mixed crop-livestock production system is a system of which outputs or products and/or by-products of crop and livestock are the resource input for one another. In the mixed crop-livestock production system, milk produced is retained for home consumption and seldom for sale.

Cereal crops predominantly produced in the study areas are maize, barley, wheat, millet, bean, pea, teff, sorghum, wheat and barley. Crop farming in the study area is mainly practiced using oxen draught power, seldom with hand tools and oxen are given due attention than other cattle types. And because of small farm size holdings and a large part of land is covered by natural forest in the study areas, it is common to see highly diversified cropping practices within a single farmland. *Enset*, coffee, fruits and vegetables are common cash crops grown in the area.

Purpose of dairy production

In the study areas, cattle of dual purpose predominated by local type (zebu), were mainly kept to produce milk for household consumption and male calves were grown to assist the crop production by providing draught power. Above all, cattle were an asset to farmers, which provides collateral during purchase of farm inputs like fertilizers and improved seeds for the next crop production cycle. Moreover, cattle were also used for meat production.

Household characteristics and socio-economic profile

Out of the total interviewed respondents (N = 140), 95% were male and the rest (5%) were female household members of different age and educational status.

Most (97.2%) of the respondents were married, while 0.7% and 2.1% were single and divorced respectively. About 38.5% of the respondents ranged in age between 31–40 years and 41–50 years (28.7%).

Regarding the religion of the respondents, 65.7% were orthodox followers, 30.1% were protestant, 3.5% were Muslim and 0.7% was catholic followers.

With respect to educational status of the household head, the majority of dairy producers were literate. From the interviewed respondents, about 44.8% and 36.4% have completed grades 1–6, and grades 7–12 respectively, while 16.8% were illiterate.

The results in general indicate in the table below that those dairy cattle owners in the study areas were mainly literate; suggesting that with good extension and training program they can improve their dairy production and marketing systems.

Household characteristics	Number of respondents(n)	Percent(N=140)
Gender		
male	133	95
female	7	5
Age		
21-30	23	28.7
31-40	55	16.8
41-50	41	
>50	24	
Marital status		
single	1	0.7
married	136	97.2
divorced	3	2.1
Religion		
Orthodox	94	65.7
Protestant	43	30.1
Muslim	5	3.5
Catholic	1	0.7
Educational status		
Illiterate	24	16.8
1-6	64	44.8
Secondary and above(7-12)	52	36.4

Table 1: socio-economic profile of respondents

✚ Please adjust the value for each socio economic variable

Private grazing land size

Land is one of the important prerequisites for any farming activity. One of the big challenges of dairy producers in the study area is the diminishing land size they own. Because of natural forest coverage in the area, farmers did not have extra land to graze their animals or did not have access to communal grazing land. Majority of the respondents (18.9%) in the area have grazing land about 0.25 hectares and 16.1% of the respondents have a grazing land of 1-2 hectares.

Cattle husbandry and management practices

Feeds and feeding systems

In the study area, grazing land/natural pasture is the major feed resource. In the study area, crop residues are also source of feeds during dry season as there is no improved fodder production. The majority (42.7%) of the households used animal feeds from their own crop farm/private land; while 27.3% used a combination of own farm and communal grazing land and 25.2% used only communal grazing land. In this system, milking cows are allowed to graze and there is no additional/ supplementary feeding. In the study area, the respondents did not use improved forages and of the interviewed, 91.6% of them had interest to take improved forages to feed their animals during the shortage of feed while the rest of them had no interest to take improved forages due to small land size they own. Moreover, 84.6% of the respondents had a land to sow improved forages if it is given or provided for them while the rest had no land.

Source of feed	Frequency	Percent(N=140)
Natural pasture	104	74.3
Pasture and crop residues	36	25.7

Table2: source of feed

Water sources

The main sources of water for animals identified in the study areas were rivers, spring water and pond. The majority (86.7%) of the households in the study area obtained water from rivers, while 10.5% from spring water and 0.7% from pond water. Frequency of watering to dairy animals varies from one production system to another, which is affected by different factors, among which season of the year, accessibility, performance and/or breed of the cow, and type of predominant feed and feeding systems are some to be mentioned.

Housing systems

About 49.6% of respondents in kaffa and sheka zones dairy cattle owners have no house for their animals and kept their animals open out of their own residence while 50.4% kept their cattle within their own residence compound with open barn/shed. Among respondents those keep their cattle within their own residence compound with open barn, 74% clean the cattle's barn every day, 19% clean every week, 3.5% clean barn twice a week.

Milking practices

Out of the interviewed dairy cattle owners, 88.8% of households milked their cows twice a day while the rest milk their cows once a day. The average amount of milk per cow per day per liter is 1.74 liters.

The high percentage of milking twice a day is similar to the milking frequency practiced in many parts of the country as Sintayehu et al 2008 reported. Time of milking is normally in the early morning and late evening for twice/day milking. In the study area, farmers did not bother about the regularity of milking time.

Calf rearing practices

Most of dairy cattle owners (68.07%) in the study area practiced partial suckling before and after milking, while 15.4% practiced partial suckling prior to milking and 10.5% practiced partial suckling during milking. The colostrums are given freely to calves. Since local/zebu cows are believed not to give milk without partial suckling, local calves from such cows are not weaned early. The respondents in study area provided supplementary feeding for their calves after one month age.

The trend of dairy population

The trend of dairy population of the previous years was also studied. The farmers reported that dairy cattle population in the area was decreased due to shrinkage of grazing land. Because of the shortage of grazing land and diseases and other factors, the dairy cattle populations in the area are decreasing.

Reasons for decreasing number of population	Frequency	Percent (N=140)
Lack of feed	16	11.5
Shortage of grazing land	11	7.7
Disease	31	22.1
Lack of feed and disease	62	44.2
Shortage of grazing land and disease	20	14.4

Table3: Reasons for decreasing number of population

Milk handling and processing

Hygienic milk production is important and should take into account the sanitation of the barn, personnel involved in milking and the utensils used to collect and store milk. Cleaning of the teats and udder before milking contributes to hygienic milk production. In the study areas, 60.8% of respondents practiced to sanitize teats and udder before milking while the rest did not practiced to sanitize teats and udder with the assumption that teats are cleaned when the calf suckles before milking. In fact calves are also allowed to suckle after milking to ensure complete milking. Moreover out of the interviewed, majority of respondents (79.7%) wash their hands before milking while the rest did not given due attention to wash their hands. The hand cleaning materials are tap water and seldom have they used detergents like soap with tap water. In the study area almost all dairy producers do not wash their hands between cows. The 86% of respondents in the study area reported that milking personnel used own cloths during milking.

Milking practices (%)	frequency(n)	percent (N=140)
Twice milking	127	88.8
Hand wash before milking	114	79.7
Hand wash b/n cows	26	18.2
Udder wash	87	60.8
Use clean water	113	79
Use own cloth	123	86

Table4: milking practices

Different types of utensils are used for milking, milk storage and processing in kaffa and sheka zones. Most farmers use gourds which are made of *traditionally called* "Qill" as well as clay pot. The dominant milk processing method across all the kaffa and sheka zones is traditional home processing method and it involves processing of fluid milk into fermented or sour milk, butter and cottage cheese (*ayib*). The majority (47.9%) of dairy producers used traditional churning material called clay pot while the rest used wooden 'Kell', both wooden kell and clay pot and plastic material.

Type of milk churning materials in the study area	Frequency	Percent
Clay pot	67	47.9
Wooden kell	23	16.4
Clay pot and wooden kell	42	30
Plastic materials	8	5.7

Table5: Type of milk churning materials

Milk and milk product marketing

In the study area respondents reported that there is no formal channel for milk marketing. As a result dairy cattle

owners practice informal milk marketing system. The present study is in agreement with the previous studies that reported formal market was limited to urban and per-urban areas where collection of milk is possible (Belete, 2006, Sintayehu et al, 2008, Adebabay, 2009, Negash et al., 2012 and Bilatu et al., 2013). The respondents near urban areas sold whole fresh milk informally to hotels, coffee and tea houses, neighbors, and direct to consumers. Zegeye (2003) and Lemma et al. (2005) came with the same conclusion that both rural and urban milk is distributed from producers to consumers through the informal (traditional) means. The authors also added that dependable system is not developed to market milk and milk products in Ethiopia. Milk is not sold at gimbo woreda due to shortage of production while milk is sold 15 and 16 ETB at chena during wet and dry season respectively. The average price of butter in kaffa zone was 115 and 120 ETB during wet and dry season respectively. Moreover, the average price of cheese in kaffa zone was 35 and 40 ETB during wet and dry season respectively. Accordingly, the average price of milk, butter and cheese in masha and andracha was 9.5 and 12, 90 and 100 and 25 and 30 ETB during the wet and dry season respectively.

Determinants of price and demand for dairy products

The major factors affecting the price and demands of dairy products in the studied areas include season (dry and wet seasons), fasting (followers of the Orthodox Christian religion), holidays and festivals. The price and demand for milk and milk products, especially butter, are highly vulnerable to the above mentioned factors.

Season

Wet seasons are characterized by better vegetation cover, and hence provide better roughage supply to dairy cattle, resulting in higher milk yields. Moreover, the wet season in the studied areas mark the period of limited cash income for cereal as well as cash crop producing farmers. Thus, farmers are forced to sell much of their dairy products for immediate cash generation to cover some family expenditure. It was also noted during the survey that there was a relatively higher supply of especially butter and local cheese/Ayib in the rural open market points. Therefore, during the wet season the price of butter as well as the price of cottage cheese is lower, and there was relatively higher supply of milk and milk products in most rural markets.

Contrary to this, there was relatively a shortage of succulent roughage during dry season and hence poorer performance of cattle in the area. Moreover, during the early dry season, farmers in the mixed crop–livestock system harvest cash (mainly coffee) and food crops. Therefore, rather than selling, there is preference to consume dairy products at home. This results in less supply of milk and milk products to the market and even higher price for dairy products. Out of the dairy products, the price of butter was the most affected by season. In addition to feed limitations during the dry season, most traditional and religious holidays occur and further aggravate the price of butter.

Access to market/distance from towns

Fresh milk could not be kept for long hours before consumed or processed. Distance from the market was a major factor that prohibited farmers from selling whole fresh milk to urban consumers. Moreover, the prices of dairy products in the rural markets were lower than in urban markets. Even the price of dairy products in larger towns was higher than smaller towns. Therefore, distance from market determines the type and price of dairy products marketed.

Fasting vs. non-fasting days

The price of dairy products especially butter and the demand for whole milk, *ergo* and other dairy products in rural and urban areas in the study areas, were highly affected by the long fasting period as most of interviewed farmers (65.7%) are the followers of the Orthodox Christian religion. As it is indicated in many literatures (Mohammed et al., 2004, Sintayehu, 2008, UNIDO, 2009, and Zelalem et al., 2013, Melesse et al, 2013) fasting season is the main challenge for milk marketing and during this time milk producers' sale their milk with relatively lower price. Butter traders usually store large amount of butter until the end of fasting, and sell it afterwards.

Festivals and holidays

During religious and some cultural festivals in the study area, dairy products were highly demanded. Thus, the prices of dairy products especially butter increase highly. Religious festivals of Ethiopian Christians such as 'Enkutatash' (Ethiopian New Year), 'Meskel' (Finding of the True Cross), 'Genna' (Ethiopian Christmas), and 'Fasika' (Ethiopian Easter) were the main ones when animal products are highly demanded leading to high prices. In addition, the demand for dairy and other animal products increase many folds during the locally celebrated festivals such as 'Meshikero' (which is kaffa peoples' New Year).

Factors that affect the price and demand of dairy products	Frequency(n)	percent(N=140)
Season	28	19.6
Fasting	34	23.8
Fasting and season	13	9.1
Festivals and holidays	24	17.1

Table6: Determinants of price and demand of dairy product

Constraints of dairy production and marketing

Dairy production and marketing in the studied areas was constrained by different problems. Dairy producers in the studied areas prioritized the major problems and constraints as: lack of improved forage seeds, diseases, shortage of grazing land, lack of awareness on cattle housing systems, limited infrastructure, lack of improved dairy animal, lack of dairy producing and marketing cooperative, knowledge gap on improved dairy production, processing and marketing. The extent and significance of the problems and constraints differed between and within the different production systems and/or studied areas.

Lack of improved forage seeds

Of the interviewed respondents, the result indicated that 95.8% face a problem of lack of improved forage seed and about 84.6% of farmers reported that they prepared a land to sow if they get improved forage seed. In the study areas, improved forage planting and purchase concentrates are not adopted. Due to knowledge-gaps; conservation and utilization of available crop residues are not widely practiced.

Shortage of grazing land

Respondents in the study area mentioned that there is shrinkage of grazing land because of an expansion of cereal crop production due to an ever increasing of human population. As a result of shrinkage of grazing land, some of the interviewed farmers were obliged to reduce their herd size. From the survey study result, it was observed that 72.7% of the respondents were mentioned as the trend of their herd size is steadily decreased as compared to the previous years due to lack of feed, shortage of grazing land and disease. This reduction in herd size in the study area lead to an overall reduction in volume of milk produced.

Limited infrastructure

It was apparent that the main road from Bonga to Mizan is asphalted however the problem is lack of feeder roads in remote areas where there is potential milk production. The need for electricity for establishing cooling chains is a prerequisite; accordingly it is a positive move in the area for rural electric power expansion being developed

Lack of improved dairy animal

Demand of improved dairy cow is increasing from time to time because of shortage of grazing land; farmers are obliged to reduce their animal number. Moreover, supply and introduction of new improved breed is a cross cutting problem in the study area.

Poor access to inputs and services

Access to inputs and services includes extension, veterinary services, credit, market information, AI and dairy inputs. However, as farmers reported, service delivery in the studied areas is not as effective and not up to the satisfaction of dairy farmers because the services rendered are very limited, untimely and irregular.

The extension service has not satisfied the needs of farmers in terms of providing need-based service, hands on training and subject matter coverage tailored to different dairy production systems and market orientation. The livestock extension service is by far secondary to crop extension. Although most dairy farmers in the study area get information on dairy cattle management practices, it was not supported with practical skills and demonstrations due to absence of demonstration sites. Access to animal health service as well is low since the service is ill-equipped. In the study areas, herdsman often equip themselves with common drugs and other supplies that are required to treat their animals. Moreover, due to limited veterinary service, almost all the respondents use traditional treatments, herbs, to treat sick animals. There is also a serious shortage of veterinary experts and limited access to veterinary service. Credit services offered to dairy production, in general, is by far minimal compared to crop production. In the study areas, farmers have limited awareness about improved dairy and forage production technologies.

Knowledge gap on dairy production, processing and marketing systems

In the study areas, dairy producer farmers reported that woreda agricultural development office gives little attention to livestock production over crop production. As a result, they were given little training and have little knowledge on dairy production, processing and marketing systems.

Opportunities for dairy production and marketing

Demand for and consumption of milk

In study areas there is longstanding and strong culture of consumption of dairy products. In addition to raw milk, milk products such as butter, local cottage cheese, fermented milk (yogurt), ghee, butter milk, and whey are also commonly consumed. The increased population, very high rate of urbanization, improved income in some segments of the society, is also among the major driving forces that dramatically increase the demand for milk and milk products.

Indigenous knowledge

The existence of diverse production systems and agro ecologies coupled with diverse flora species rendered in the southwestern parts of country to have indigenous knowledge, specifically in the area of livestock production and dairy processing. For instance strong indigenous knowledge exists in the preservation of milk and milk products in the dairy system using various sources of herbs.

Agricultural extension service and technologies

Agricultural extension service in Ethiopia started long ago although it has been delivered entirely by the government. Currently, almost all PAs have extension/development agents. Efforts have been made to provide extension services in the area of dairy production although livestock extension is underdeveloped compared to crop production.

High involvement of rural women in milk processing and marketing

The involvement of rural woman in managing the herd at household level and taking care of the milking cows, processing of milk and marketing of milk products increase the decision making power of the rural women and which in turn is an asset in improving the livelihood of the rural women.

Conclusion

The results in general indicate that dairy cattle owners in the study areas were mainly literate; suggesting that with good extension and training program they can improve their dairy production and marketing systems. The majority (42.7%) of the households use animal feeds from their own crop farm/private land, while 27.3% use a combination of own farm and communal grazing land and 25.2% use only communal grazing land.

Out of the interviewed dairy cattle owners, 88.8% of households milked their cows twice a day while the rest milk their cows once a day.

The majority (42.7%) of dairy producers used traditional churning material called clay pot while the rest used wooden 'Kell', both wooden kell and clay pot and plastic material.

In the study area respondents reported that there is no formal channel for milk marketing. As a result dairy cattle owners practice informal milk marketing system.

The major constraints for dairy development in the area include shortage of grazing land, lack of improved forage seed, and improved dairy breed, diseases, lack of awareness on housing system, limited infrastructure, poor access to inputs and services, lack of dairy marketing and processing cooperative and investors and knowledge gap on improved dairy production, processing and marketing.

Recommendation

- Smallholder dairy producers should be supported through services related to improved forage supply, marketing systems, awareness creation on housing system, veterinary, AI, credit, extension and training. They also should be supported through supply and introduction of improved forages and dairy breed. Targeting women by the extension system is another crucial factor to increase adoption of technologies.
- Governments' rural electrification program needs to be expanded in some of the remote rural areas where there is high milk potential. The government should also consider better means of coping with access problems to milk and other dairy products market through increasing dairy market out lets by forming market oriented dairy producer led-cooperative, and increasing and improving infrastructure facilities in order to reduce transaction cost associated with distance from milk market out lets and market information.
- Training farmers on modern livestock feed production, better feeding, housing and management practice can bring change in the scale of production as well as business operations.
- For potential dairy areas, where there is no market access, a milk collection scheme through establishment of milk marketing groups may fill the knowledge gap on the dairy production, processing and marketing system.
- In conclusion, development of dairy production and marketing in the studied areas could be achieved with the contribution and integration of different stakeholders in a sustainable way.

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