Full Length Research Paper

Milk marketing and post harvest loss problem in Ada’a and Lume districts of east Shoa Zone, Central Ethiopia

Kassahun Melesse, Bilatu Agza* and Adey Melesse

Debre Zeit Agricultural Research Center P. O. Box 32, Debre Zeit, Ethiopia.

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A study was carried out in Ada’a and Lume districts of central Ethiopia to assess marketing and postharvest loss problem of milk under small scale milk producing household level using structured questionnaire from 130 households. For the majority of the interviewed households, marketing of raw milk was not found to be a major problem as these areas are located in the peri-urban where there are a number of milk processing plants and their proximity to the capital city of the country. Majority of milk producers delivered their milk either to their own cooperatives, collectors or processors within 30 min after milking. Nearly 5% of producers in each district sold raw milk directly to consumers at their farm gate without any quality test. In both districts the highest milk and butter prices were recorded in November and December whereas the lowest prices were recorded during the major fasting period. Unable to cool milk immediately after milking, use teat dip solution and check udder and appearance of foremilk for any abnormality, absence of separate clean milking place and improper order of milking were among the major reasons for post harvest loss in the study areas. The most important reason for milk rejection in both districts was spoilage due to improper cleaning of milk handling equipments and use of inappropriate containers. The amount of milk spilled out per week per household was almost equal in Ada’a district (0.72 ± 1.09 lit/week/HH) and Lume district (0.73 ± 0.92 lit/week/HH). About 50% and 42% of milk producing household animals were encountering the udder infection problem in Ada’a and Lume districts, respectively. Post harvest loss of milk in Ada’a and Lume districts was estimated to be 3.8% and 9.5%, respectively.

Key words: Post harvest loss, milk marketing, rejection, spoilage, price.

INTRODUCTION

Postharvest loss is a major problem of the dairy sector in tropical countries. The high temperature coupled with the absence of cooling facilities and inadequate transportation means hasten the spoilage of milk produced in these countries (O’Mahoney and Peters, 1987). Postharvest loss of milk and dairy products reported about 40%, estimated to cost the Eastern Africa countries over 90 million USD annually (www.fao.org). In Ethiopia, the rural milk production system accounts for about 97% of the total milk production in the country where it is difficult to transport the raw milk to the market areas or to the processing plants due to poor infrastructure (Staal and Shapiro, 1996). Only about 5% of the milk reaches the market area and the rest is processed at the farm into different dairy products (Mohammed et al, 2004). In addition, there are post-harvest losses associated with poor handling, contamination, low level of technology applied in the conservation of milk to extend its shelf life and lack of market (Felleke, 2003). The same report indicated that losses attributed to post harvest problems from production to consumption through collection, processing and marketing are immense both on the formal and informal milk marketing structures. However, the amount of milk spoiled and the reasons associated to postharvest loss are not studied and documented well in different

*Corresponding author. E-mail: bilatuagza@yahoo.com. Tel: +251911027842.
areas of the country and as a result there is no comprehensive information available in the area which can help to devise different interventions to minimize the loss. Therefore, the objectives of this study are to assess major reasons for milk postharvest loss and estimate the amount of loss at smallholder milk producing household level in central Ethiopia.

MATERIALS AND METHODS

The study was conducted in Ada’a and Lume districts of East Shoa Zone, Central Ethiopia. Ada’adistrict is found 47 kms South East of Addis Ababa, the capital of Ethiopia. About 90% of the district belongs to the sub tropical agro-climatic zone. The altitude of the district ranges from 1500m to over 2000m, and the mean annual rainfall, mean minimum and maximum temperatures are 851 mm, 11°C and 29°C, respectively (Addis et al., 1998; IPMS, 2005). Lume district is in Oromia Regional State located about 70 km South East of Addis Ababa, in an altitude ranging from 1500 to 2300 m above sea level. About 80% of the district belongs to sub-tropical agro-climatic zone (Kassahun, 2008).

Based on altitude, land use system, village’s situation in representing the district and socio-cultural settings, five villages were chosen from each district in which 8 to 15 household per village were selected randomly. A total of 75 producers from Ada’a and 55 producers from Lume district were randomly selected. A semi-structured questionnaire was prepared for data collection for both qualitative and quantitative variables. The questionnaire was tested in the pilot area and necessary adjustments were made before commencement of the actual survey. A total of 130 milk producing household were interviewed from both districts.

Descriptive statistics was employed for data analysis using Statistical Procedures for Social Sciences (SPSS) version 20.0 (SPSS, 2011).

RESULTS AND DISCUSSIONS

Socio-economic characteristics

In Ada’a and Lume districts the proportion of male headed households was higher (73.3 % in Ada’a and 80.0% in Lume) than that of female headed households. The present result agrees with previous report which indicated only one fourth of households in Ethiopia are headed by women (Marco, 2007). The mean family size was similar in both districts (5.83±0.23 persons per household in Ada’a district and 5.63±0.29 persons per household in Lume district). The mean family size reported in the present study is less than the national average which is6.4 persons per household (Randall et al., 2008). About 93% of the household heads in Ada’a district had secondary level of education and below (below grade 12); however, in Lume the figure was 96.4%.

Marketing of milk

Although it is not well developed system, marketing of raw milk was not a major problem for the studied districts as these areas are located in the peri-urban areas where there are a number of milk processing plants and due to their proximity to the capital city of the country. Majority of milk producers delivered their milk either to their own cooperatives, collectors or processors. However, as shown in Table 1, the proportion of producers who delivered raw milk to collectors in Lume district (30.9%) is far higher than that of Ada’a (2.7%). A number of milk collectors were found to collect raw milk from Lume district and sell directly to consumers, kiosks and milk shops in the same district or brought the milk to Ada’a district and deliver it to processing plants. Nearly equal proportions (5%) of producers in both districts sold raw milk directly to consumers at their farm gate without formal quality test. In the studied areas formal marketing system was dominated unlike the rural areas and other parts of the country that are far from major cities as indicated by Brokken and Senait (1992) and Felleke (2003). The present study is in agreement with the previous studies that reported formal market was limited to urban and peri-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).

Table 1. Sale of milk by farmers in Ada’a and Lume districts of central Ethiopia.

<table>
<thead>
<tr>
<th>Points of milk sale</th>
<th>Ada’a (N=75)</th>
<th>Lume (N=55)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>At the farm gate</td>
<td>4</td>
<td>6.15</td>
</tr>
<tr>
<td>At kiosk</td>
<td>3</td>
<td>4.62</td>
</tr>
<tr>
<td>To cooperative</td>
<td>51</td>
<td>78.46</td>
</tr>
<tr>
<td>To collectors</td>
<td>2</td>
<td>3.08</td>
</tr>
<tr>
<td>Directly to processors</td>
<td>5</td>
<td>7.69</td>
</tr>
</tbody>
</table>

N= Number of respondents.
Table 2. Milk delivery time after milking in Ada’a and Lume districts of central Ethiopia (minutes).

<table>
<thead>
<tr>
<th>Time of milking</th>
<th>Ada’a (N=75)</th>
<th>Lume (N=55)</th>
<th>Over all (N=130)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean time</td>
<td>SD</td>
</tr>
<tr>
<td>Morning</td>
<td>67</td>
<td>29.18</td>
<td>15.49</td>
</tr>
<tr>
<td>Evening</td>
<td>66</td>
<td>28.56</td>
<td>15.31</td>
</tr>
</tbody>
</table>

N= Number of respondents.  
SD= Standard deviation.

Milk delivery time after milking

Twice a day milking was practiced in almost all of the households in the studied districts as in many parts of the country. On average, both morning and evening milk was delivered within 30 minutes after milking to collectors, processors, cooperatives or consumers (Table 2). The time taken to deliver the milk is relatively lower when compared to other areas of the country as these districts are located in the peri-urban areas where infrastructure and marketing structures are relatively well developed. However, unlike the current study, in some parts of the country such as Holeta, Selale and Debrebirhan the evening milk is collected the next day morning (Yilma et al., 2013).

Milk and butter price

Though the price variation across months is more or less constant, the highest milk prices were recorded in November and December in both districts (Figure 1). The exact reason for this high price is not well known, however, it could be related to the high milk demand as majority of people do not fast during this time and milk production is relatively low because of the dry season. The price of milk reached its lowest level in January, February and March when the big fasting season in the Ethiopian Orthodox religion falls. Then there was a sharp increment especially in Lume district after the big fasting period and during the rainy season (June, July and August). As it is indicated in many literatures (Mohammed et al., 2004, Sintayehu, 2008, UNIDO, 2009, and Zelalem 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. The average price of milk in Lume was relatively lower than that of Ada’a district as it is far from the processing plants and collectors incur transportation cost to bring the milk to the point of consumption or processing.

The trend of butter price was similar to that of raw milk in both districts (Figure 2). The price of butter was low during the big fasting period (January, February, and March) and the highest was between November and December. During the rainy season the price was relatively lower because of the higher milk yield that is
associated with the availability of better quality feed resources and green feed supplements.

The mean milk and butter prices indicated in the present study were higher than the previous studies in different parts of the country due to the ever increasing inflation rate and associated cost of production. Belete (2006) reported 24 Birr, Sintayehu (2008) 25.00-50.00 Birr, Adebabay (2009) 39.08 Birr and Teshager et al. (2013) 60.99 Birr for a Kg of butter. Similarly, Kedija (2007), Woldemichael (2008), Sintayehu (2008) and Adebabay (2009) estimated the price for a liter of milk as 2.54-2.71 Birr, 2.33-3.00 Birr, 2.00-4.00 birr and 4.00 birr, respectively. However, monthly variation in milk and butter price was not well studied in other parts of the country to compare with the present study.

Major causes of post harvest loss

Several reasons mentioned for milk post harvest loss by milk producing households are summarized in Table 3. Unable to chill milk immediately after milking, use teat dip solution and check udder and foremilk for any abnormality were among the major reasons for postharvest loss in Ada’a district. However, in Lume unable to check udder and foremilk and also appearance of milk for any abnormality, absence of separate clean milking place and improper order of milking were major reasons for postharvest loss. Similar reasons mentioned for the milk postharvest loss by Yilma et al. (2013).

Milk rejection problem

Almost equal proportions (26%) of milk producers in both districts faced milk rejection problem from cooperatives or collectors due to several reasons and spoilage was the most important one(Table 4). Improper cleaning of milk handling equipments and use of inappropriate containers were major reason for milk spoilage in Ada’aand Lumedistricts, respectively. Poor milk handling practices such as storage of milk in a hot place for long time, inappropriate transportation system, and inappropriate cleaning of milk containers were also the reason for milk spoilage in these districts. Poor milk handling practices were also reported by Sintayehu (2008), Belete (2006) and Adebabay (2009) in different parts of the country.

Milk spillage problem

Milk spillage problem was one among the several post harvest loss problems accounting for about 43% and 47% milk producing households in Ada’a and Lume districts, respectively. The amount of milk spilled out per week per household was almost equal in Ada’a district.
Udder infection problem

Udder infection problem was found to be apparent in both districts and significant amount of milk was lost due to this problem. About 50% and 42% of milk producing households were suffering from udder infection problem in Ada’a and Lume districts, respectively. The mean disposal period of milk from infected animals was about five days in both districts ranging from 2 to 15 days. Milk from infected udder disposed in the majority of households and it could be used for animals, human consumption, processed in to milk products or used for calves and pet animals (Table 5). However, insignificant proportion of milk producing households used milk from infected udder for human consumption purpose in Ada’a district. This might be due the producers’ understanding from the repeated training they obtained about the negative health effect of consuming milk from infected udder. The problem of udder infection is serious in many parts of the country. For instance, Lidet et al. (2013) reported 52.9% prevalence of udder infection (mastitis) in Areka area (Southern Ethiopia); Zenebe et al. (2014) reported 64.3% in Adigrat area (Northern Ethiopia). Mekbib et al. (2010) reported 71% in Holeta area (Central Ethiopia) and Abera et al. (2013) reported 46.7% in Adama area (South East Ethiopia).

Forced consumption of milk

There are times when milk that would otherwise be sold has to be consumed at the household because of lack of market and other problems. This type of consumption is considered as forced consumption and post-harvest loss as well. In Ada’a district, the peak forced consumption recorded in October and the trend was almost similar in the rest of the months (Figure 3). The lowest was in November when the price is higher due to high demand. Forced consumption was high in March and July in Lume district. In March the market demand was low due to fasting reason and forced consumption could be high due to this fact. The exact reason is not clear why forced consumption was high in July. However, milk production was high during this time and milk producing households might not get market for all of the milk they produced and they could be obliged to consume the surplus milk.

Estimation of postharvest loss

Post-harvest loss of milk in Ada’a and Lume districts was estimated to be 3.8% and 9.5%, respectively (Table 6).
Table 6. Estimated postharvest loss of milk in Ada’a and Lume districts of central Ethiopia.

<table>
<thead>
<tr>
<th>Milk utilization in the household</th>
<th>Ada’a</th>
<th>Lume</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Weekly milk production (Lit)</td>
<td>151.32</td>
<td>117.6</td>
</tr>
<tr>
<td>B Amount of milk sold per week (Lit)</td>
<td>129.35</td>
<td>84.38</td>
</tr>
<tr>
<td>C Amount of milk consumed per week (Lit)</td>
<td>6.40</td>
<td>6.97</td>
</tr>
<tr>
<td>D Amount of milk rejected from sale per week (Lit)</td>
<td>5.60</td>
<td>9.22</td>
</tr>
<tr>
<td>E Amount of milk dumped per week (Lit)</td>
<td>0.16</td>
<td>2.81</td>
</tr>
<tr>
<td>F Amount of milk donated to neighbors per week (Lit)</td>
<td>1.18</td>
<td>3.98</td>
</tr>
<tr>
<td>G Amount of milk processed per week (Lit)</td>
<td>8.71</td>
<td>11.04</td>
</tr>
<tr>
<td>H Estimated Milk post harvest loss per week</td>
<td>3.8%</td>
<td>9.5%</td>
</tr>
</tbody>
</table>

SD= Standard deviation
H=((D+E)/A)*100

The estimations assume only milk that is rejected from sale and milk dumped as post-harvest loss. The lower estimated post-harvest loss in Ada’a district might be due to better marketing of milk in the district as a result of availability of milk processing plants. The post-harvest loss in this study was far below for the Sub Saharan Africa which is about 40% (www.fao.org) which estimated postharvest loss of milk and its derivatives from milking to consumption. However in the present study estimated postharvest loss was assumed as the loss of milk during milking to milk delivery to collectors and processors.

CONCLUSIONS AND RECOMMENDATIONS

It was found that most milk producers in Ada’a and Lume districts deliver their milk to cooperatives. This provides an opportunity to have sustainable and regular marketing for the milk they produced. However, the price fluctuation during the major fasting seasons as a result of low demand was the major marketing problem in these districts. Milk produced during this time should be converted into longer shelf life milk products such as UHT milk by processing plants. However, all of the cooperatives do not have their own processing plant to convert raw milk into longer shelf life products. Therefore they are obliged to deliver the collected milk from their members to processing plants at lower prices. There should be contractual agreement with collectors and/or milk processors to guarantee milk producers to have sustainable marketing. In the long run, to increase profitability, cooperatives should plan to have their own processing plants in order to be able to convert raw milk into longer shelf life product. The major source of milk...
spoilage was associated with wrong milking procedure, improper milk handling and cleaning procedures. Such problem can be solved through continuous training and follow up. Udder infection was serious problem in relation to low quality of milk. The problem can partly be solved through proper milking procedure and hygienic practices.

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REFERENCES


