Problems and Prospects of Dairy farming in Central Region of Eritrea, East Africa

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ABSTRACT

Dairy farming is one of the leading agricultural activities in almost all parts of the world including Eritrea. Dairying in Eritrea is highly subsistence and major contributions come from small scale producers who owns have almost 90 per cent of dairy animal. There is high a demand for milk and milk products in the local market, so as a result the prices of the dairy products are increasing continuously. Supply side is remains weak especially during peak demand period. Objective of this paper is to examine the current status and future prospects of dairy industry in central region of Eritrea. Study is based on both primary and secondary sources of information. Primary data gathered from the famers who are the members of dairy cooperative societies. Thirty dairy farmers were selected through random stratified sampling techniques from Serejeka, Berik and Galanefhi subzone of Zoba Maekel. Simple percentage method has been employed to examine the current status of dairy sector in the central region of the country.

Study reveals that dairy sector is struggling due to high price of fodder compared to their output price. Consequently farmers are reducing their proportion of gross profit. Low fixed price set by cooperative societies are discouraging the farmers to sell their products to the dairy centers. As a result almost 90% of small dairy farmers are selling their milk directly to the consumers bypassing the dairy cooperative societies without pasteurization. Fodder supply to this sector is major problem. Most of the farmers do not have sufficient mechanism of constant fodder supply. They (dairy farmers) do not follow the hygienic parameter is another major problem. Moreover, lack of finance, transportation, illiteracy among the dairy farmers is major hindrance for the dairy sector in the region. So, this industry is struggling for its survival and existence. To meet the challenges and constraints it faces, the sector requires renewed attention and investments from the agricultural research and development community and robust institutional and governance mechanisms.

KEY WORDS: Dairy farming, Central region, Eritrea, Zoba Maekel,

Background of Dairy Farming in Eritrea

The Italian settlers started commercial dairy farming in Eritrea during the 19th century when Eritrea was under Italian colonization (Ghebremariam *at. el*. 2006). The growing demand for milk and milk products especially in the urban centers stimulated the development of dairy farms by Italian settlers who were given large areas of fertile land mainly in the highlands to establish modern dairy farms using high merit dairy breeds such as the Holstein-Friesian (Patil and Udo 1997). These farms were intensively managed and were the main suppliers of milk to the urban population, particularly to the Italian community residing in major towns during colonial period (Teclu 1995). The commercial dairy sub-sector reached its peak in the 1970's when the daily milk production around Asmara was over 30,000 liters and some of the farms such as Elabered and Merassani had daily milk production of about 10,000 and 3,000 liters, respectively.

Since its establishment Italians privately owned the milk processing plant was functioning well during Italian colonial period until it was taken over by the Dairy Farmers Association in 1969. Later, some Eritrean nationals joined the association and changed its name to Eritrean Agricultural Association, "*Conserzio Agricultura Eritrea''* with the objective of assisting and encouraging member farmers with milk sales and input supply, including feed.

Until the military government of Ethiopia came to power in 1975, they nationalized all privately owned big farms and processing plants, the association owned the milk-pasteurising factory and a feed milling plant. However, with the escalation of war for independence following the military rule, farmers at best lost their animals, but frequently were killed by the Ethiopian army. In addition a significant number of animals died because of starvation as a result of successive drought years (Rena 2006). Because of these and the nationalization policy of the Ethiopian government, the association ceased to function. It was only in November 1992 that the association re-started supplying milk to the milk processing plan. In 2012, livestock accounts for about 18% of agriculture's contribution to GDP, (Ministry of Agriculture 2012).

Even though there is insufficient data on the national herd population dynamics, there is a tremendous increase in number of dairy cows in the last ten years. However, supply side of milk and other dairy products are remain low in comparison of its demand due to increasing size of urban areas and increasing purchasing power of people. The dairy sectors in the central region are systematically struggling for its basic existence due to lack of finance, management, institutional and other facilities.

Statement of the Problem

Livestock rearing, as part of farming activity, has instantaneous influences on the livelihoods of Eritrean population living both in rural and urban areas (MoA, 2002). Being appraised either at household or country level, the contribution of livestock products acquired mainly from cattle, sheep, and goats has multipurpose advantages. Among the livestock products milk, cheese and butter are important items which have great demand in this country. In this country the milk production is largely dominated by small scale farmers who own over 90 percent of the national cattle population.

In rural areas, where 80 percent of poor Eritreans lives up to about 90 percent of the households keep mostly indigenous cattle (MoA 2005). By far, the majority of milk production systems in Eritrea are characterized by (a) a 'low input–low output' approach, (b) livestock is not an important source of cash, but a source of food, store of wealth and status symbol, and (c) milk demand is increasing and driving more and more of these dairy farms to intensify and often to diversify as to increase household returns. Due to market forces first, and to higher competition for production factors secondly, the main factor for milk production systems in Eritrea have been evolving seemingly in the same direction (towards intensification). Even though the demand is increasing, along with the income of the people both who are living in rural and urban areas? The quantity, quality and their availability are remains vulnerable especially during high demand period.

Objectives of the study

The main objective of this research is to study the problems and future prospects of dairy farming in Central region of Eritrea (East Africa). Our study will have the following specific objectives.

(i) To assess the nature and characteristics of dairy-farming activities in the study region;

(ii) To examine the main challenges faced by dairy farming sectors and their future prospects;

(iii) To suggests remedial measures to improve the dairy farming in the central region.

Research Methodology and Data Collection

The study is based on both primary and secondary sources of information. Data have been generated at three tier level. First investigation was made from officials of Asmara Diary cooperative societies. Questions were asked pertaining to the overall nature and amount of milk arrival and their quality,

purchase and sell price of milk after processing etc. Investigation have also been also made with the officials regarding policies and its implications regarding fodder, artificial insemination, and other incentives for the dairy farming communities in the form of transportation, storage facilities and health facilities for the dairy animals. Second levels of primary information have been gathered from farmers who are the member of dairy cooperative societies. Thirty dairy farmers were selected through random stratified sampling techniques from Serejeka, Berik and Galanefhi subzone of Zoba Maekel. They were asked twice during study period using both closed and open structured questions in the questionnaire. The nature of interview was open discussion keeping in the mind of its significance. Questions have been asked regarding the nature of cow, yield per capita, milking method, transportation and carrying container etc. The data gathered have been tabulated using simple percentage method in order to know the behavior and characteristics of dairy farmers and their activities. Suggestions have been made keeping in the mind of the problem faced by farmers and participants who are involved in different kind of activities.

Study Area

Zoba Maekel located in the central part of the country have been selected for the present study. The reason for the selection of this study region is many. First it is home for dairy farming activity, with largest consuming market. Second important reasons that this study regions has full of potentialities for the dairy industry.

Geographical Background: Zoba Maekel is one of the six Zobas of Eritrea as its name implies is located in the central part of the country. It shares the border with Zoba Anseba in the North, Zoba Debub in the South, Zoba Northern Red Sea in the East and Gash Barka the West. This Zoba covers an area of 1,079.1 sq. km, with an altitude of 1300 m to 2610 m above sea level. Based on altitude the region can be divided in to three areas, namely highland, midland, and sub-humid escarpment. Based on the rainfall data collected from nine stations, the rainfall is torrential, erratic and distributed ranging from 400-600 mm annually. Most of the rainfalls are in the months of July and August while sometimes with nominal amount in the months of March to May. Rainfall is usually unreliable for agricultural production, hence rain fed agricultural yield is decreasing from time to time due to seasonal change pattern of rainfall and erosion of top soil (fertile soil) etc causes low agricultural harvest per hectare.

Political Structure: Zoba Maekel is divided in to seven sub-Zobas, namely Asmara [North-west, South-west, North East and South East of Asmara], Gala-nefhi, Berik and Serejaka, with 59 administrative regions and 89 villages. Those sub-zobas have offices and staffs that represent the various ministries in the Zoba. Among various ministries' officials and staffs: the Ministry of Agriculture sub-zoba offices represents almost all the disciplines in the zoba MoA office. Furthermore, there are farmers in each village that were given different kind of trainings in different fields of agricultural and livestock production some of them serves as contact farmers at *kebabi* or village levels. The contact farmers are providing different kind of feedback for the constant government policies and their overall level and success.

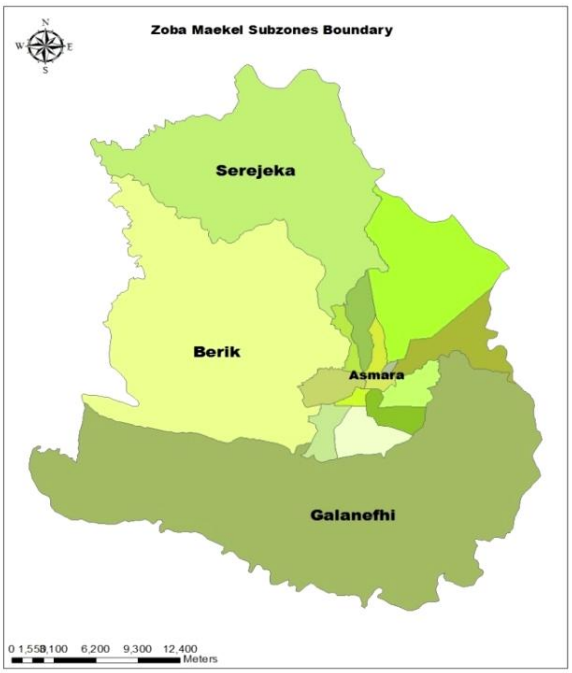
Map-1

Population: The population of central Region is estimated to be 623,694 with a density of 548 people per sq km and average size of 05 persons per household. Out of the above mentioned figure, 27 per cent of the region population is engaged in agriculture or farming activities, 23.5 per cent in trade and service, 18 per cent in manufacturing and handicrafts, 7.5 per cent in civil services and 24 per cent in causal labour.

Agricultural Characteristics : Local government of MoA with collaboration of stake holders have constructed 64 dams with total water holding capacity of 7.8 million^3 of water, 14 pounds with a capacity of 758,000 meter^3 and 2660 wells. Out of the above mentioned 28 dams and 06 ponds have been constructed within twenty-four years of independence of the country from 1992-2014. From 2600 hectares potential irrigable land only of land 756 hectares of land is under irrigation. In the past two years, 121 hectares of land was transformed from furrow to pressurized drip and sprinkler irrigation. The region has skilled to accomplish any type of work according to the desired plan.

Agricultural Problems: Agriculture in the region, like other regions of Eritrea, is mainly primitive-subsistence and rain fed. Low rainfall (both in amount and distribution), poor soil fertility and shortage of input make agricultural production very low. Even though, there are some irrigated lands through dams, downstream and shallow well farms, lack of knowledge on modern technique slower the production in irrigated lands. Besides resource utilization (particularly water and other natural resources) is poor compounding return to labor and capital. Land and water resources degradation have aggravated erosion, deforestation, over grazing, recurrent drought is also a major problems.

Agricultural Harvests : As to report 2012, the region produce 335,555 quintals of grain, 224,540 quintals of vegetables, 17,330 quintals of fruit,168,480 quintals of green feed, 9,599,976 liters of milk, 54,362 quintals of meat ,16,022,972 units of eggs, 15,780 kilograms of honey, 206,343 skin and hides and 2,800,000 seeding of different tree species.



Map 2 Central Region: Administrative Divisions

Significance of the Study

Dairy and its products are the main food items. It is not only improving the nutrition and health among the people but is one of the important sources of employment and income generation in this country. However, this sector is facing a very difficult challenges lack of management, poor health of the dairy animal, lack of storage and processing etc. Financial and administration is the another problem faced by this industry. Therefore, this study will have huge impact to provide basics of the dairy sector in this country in general and in study area in particular. The study will enrich our understanding about the real problem and their solution for the improvement of dairy industry. Moreover, this study will highlight some of the issues which are crucial to improve the conditions of dairy industry. Further, the study will help as a baseline for further research to the researchers. It will help for policy makers of the ministry of agriculture, and ministry of trade and industry.

Dairy Sector in Central Region

Distribution of Diary Cattle- Dairy farming is concerned with production and use of milk and milk products. Unlike most of Eritrea's farmers practicing mixed farming where rearing of animals and crop production is common. Modern way of livestock husbandry and its products is also relatively common in small and large scale in the central region. This Zoba has the largest dairy cattle (exotic and cross bred) population from other Zobas. According to census 2011, the total livestock population was estimated to be 35,872 Central Region which includes cattle in range land and cattle reared under modern conditions. Out of them are 6,127 dairy cattle. The major breed is Holstein-Friesian, followed by Cross Breed and Barka. Farmers manage their dairy-cattle at household and family level, however, there are also some of the dairy farms which are industrial and commercialize in nature. Most of them are the members of Asmara and surrounding dairy farmers' cooperative societies.

Table 1 : Nature of dairy cattle distribution in each sub zoba

Dairy Cattle Types	Asmara	Berik	Serejika	Gala Nefhi
Holstein Friesion	2474	2190	85	444
Cross Breed	209	200	13	399
Barka	71	09	11	22

Source: Ministry of Agriculture 2011

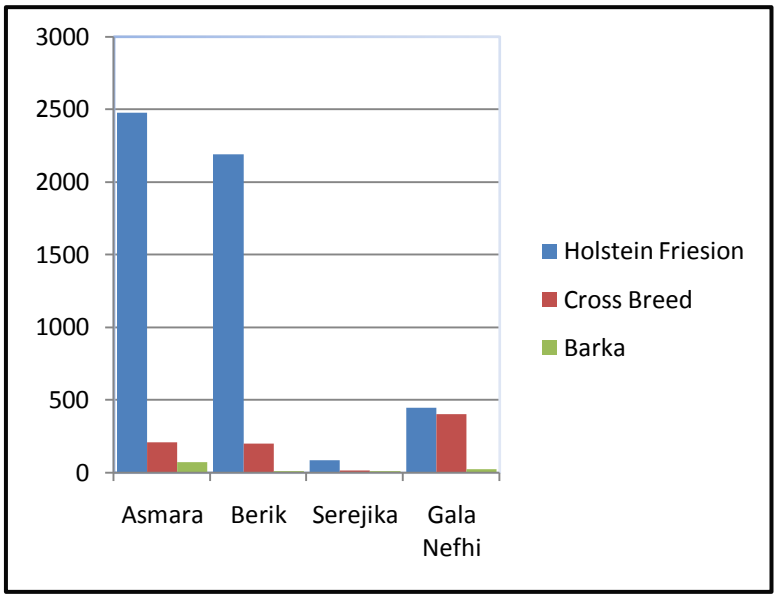


FIG:1

Dairy Processing Industry There are three milk processing plants in the region namely; Asmara Milk Factory, Asmara Milk and Meat Product [p.l.c]and Barka Milk Factory[p.l.c]. The oldest plant is Asmara Dairy (a processing industrial unit). Besides pasteurizing and distributing milk to retailers, it also processes milk into cheese and other dairy products. The second plant Asmara Milk and Meat Plant receives milk and processes it into cheese. The Barka dairy, which is the smallest plant, pasteurizes and distributes packed milk to consumers. In addition, it also produces cheese and butter for local market**.**

Asmara Milk Processing Plants At present dairy industry in the central region is not healthy. There are many reasons, such as, lack of proper fodder management, artificial low milk price. Input costs are quite high in comparison to output price which farmers are getting for their milk. That is why supply of milk is constantly decreasing in all the processing plant. The magnitude of the milk processing operations can be visualized from the production data of Asmara Milk Processing Plant in Tables 2 and Fig-2.

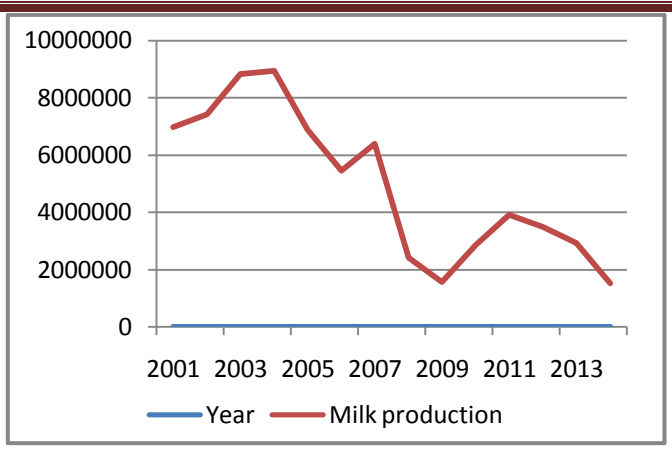


FIG: 2

Table 2. Trends in Milk Production

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Milk Production	6,963.522	7,427,381	8,834,715	8,936,988	6,879,274	5,443,862	6,384,297	2,426,817	1,578,108	2,853,829	3,923,654	3,500,840	2,930,058	1,525,280

Source: from Asmara milk factory *(Unit in liters)*

Table 3 Production at the Asmara Milk Processing Plant

	1995	1996	1997	1998	1999	2000	2001
Dairy products (lt. and kg.)							
Butter	6626	10413	14636	14590	15470	12247	27933
Cream	10325	-	-	-	---	-	12319
Provolone	5277	50258	40674	44170	5384	48717	48976
Affumiccato	-	-	1375	237	647	632	959
Fontana	145	2659	3783	301	1072	296	-166
Grana	-	245	242	-	172	-	-
Ricotta	-	1667	4164	2983	3481	5750	543
Mozzarella	-	802	6604	4701	3556	4893	10088

Source: from Asmara milk factory

Milk Marketing -In most parts of Eritrea milk is sold to consumers as raw milk either directly from farms (which is common in the peri-urban dairies) or in open markets (commonly practiced in the Western lowlands). However, milk marketing in Asmara is strictly controlled by the Asmara City Council where dairy owners are not allowed to sell untreated milk to the public directly without being pasteurized in the Asmara milk factory and controlled by Government veterinarians.

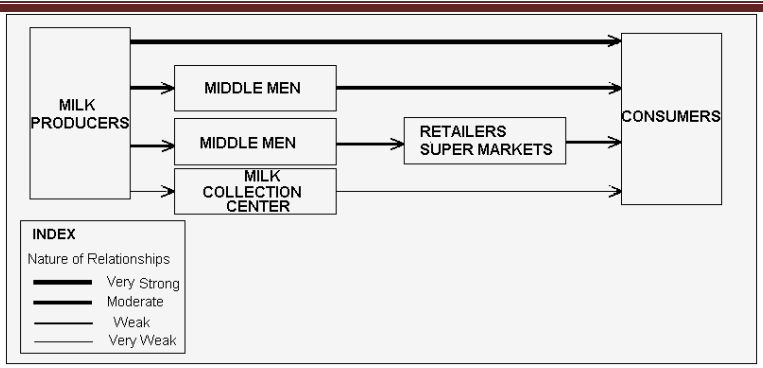


Fig 3 Milk marketing channels

From the study area, the farmers have to sell their milk to the collection centers in Asmara at a price of 15. 75 Nfk, and the collection center after checking its quality (water, soiled, protein, lactose, fat and density) has to sell the consumers in the city at a price of 30 Nkf per litter after pasteurization. However, almost 80% of small milk producer avoid selling to the collection centers because of low price of their milk and high costs of fodder. There is also another reason, as the collection center does not provide any transportation facilities and incentives, so the places which are far away from the center, it is difficult to transport and preserve the milk. Therefore, the farmers are forced to change the raw milk into butter and other milk products due to lack of market in their area. The supply of milk in the area is low and demand is high. This is not because of low price of the milk but due to less supply. Farmers are not encouraged to sell their milk to the collection cooperative centers as they get low price of their product. The relationship between producer and collection centers are remain week in comparison to direct producers and consumers. Majority of the small farmers sell their milk directly to the consumers. The marketing mechanism and system of milk does not motivate the farmers because they spent more input cost and their output is less.

Fodder Supply - Natural pasture is the main source of feed for indigenous livestock. Although crop residues are significant supplementary feeds, ruminant livestock mostly rely on grazing and browsing in the rangelands. However, due to recurrent drought and degradation of the natural grazing lands, there is a critical shortage of green forage in the study area particular and country in general.

Green forage production has been practiced since the time of the Italian colonization in the major dairy producing areas of the country including central region. But presently modern green forage land is very limited because of problems like unavailability of water, population density and social attitude of the people. The people of the region do not permit the dairy farmers to own land privately for production of green pasture as land is controlled by the village community.

Moreover, quantity and quality of the milk has direct relationship with the nutrient supply to the milk cattle (Devendra et, al. 1997). Merely 10% to the total dairy farmers can provide better quality of the food to their cattle. Majority of the dairy farmers do not have proper support mechanism of nutrients food to their cattle. As a result most of the dairy cattle including in cooperative centers have low milk yield per capita.

Hygiene related problems -Dairying is a very sensitive and fast perishable item. If it is not handled in a proper way, it can be contaminated easily and can become a source of different diseases. Most of the farmers are small and they are selling milk directly to the consumers. Only small number of big milk producer follows the standard hygiene guidelines.

Table 4: Hygiene Conditions

Hygiene related issues	% of milk producer who are careful
Milking Preparation	35
Milking Techniques	23
Milk Segregation	52
Standard milk container	70
Use of clean water	37

Source Field Survey 2015

Milking preparation, milking techniques, segregation of infected milk, using standard milk container and use of clean water for the washing of milk equipment and udder etc have been clearly discussed with the milk producer. Study revealed that most of the farmers do not follow the proper care while dealing milk and milking etc.

Milk is contaminated during milking, handling and storing. Drinking contaminated milk is dangerous to human health. During visit to different diary centers the milking process, milking equipment and the milking environment have poor hygiene. There is no enough guideline through which hygiene of dairying and their environment can be maintained. Most of the small and village dairy farmers do not follow the procedure and it can be source of harmful bacteria and infection. They are not following and even do not know the infected animals and infected milks due to some infection in the milking animal. Most of the time farmers do not clean the dairy area and equipment properly because of acute shortages of water in the region.

Housing Environment - A high standard of cleanliness should be maintained at all times in housing areas to decrease soiling of the udder and so protect udder health. The housing area of dairy cattle should be kept clean, dry and designed to provide good drainage, ventilation to avoid animal injury. But in the study region most of the dairy housing environment is not of suitable size and proper ventilation. As a result, it has a negative impact on the dairy cattle health. Most of the dairy farming area is small in size not more than 200 square meters. Only 20 per cent of the dairy centers in the study region occupy covered area more than 600 square meters.

Table 5: Dairy farming area

Area in sq.m	**Percentage**
Below 200	40
200-400	35
400-600	5
Above 600	20
Total	**100**

Source Field Survey 2015

Social and Economic Problems of Dairy Sector

Social and economic profile is one of the important indicators to understand the health and potential growth of dairy sector. Dairy industry is subsistence in nature. Most of the farmers who are engaged in this sector are age-old people. Any kind of technical change will not be accommodated by them and also they are not enough effective in the work. Similarly among them almost one third of are illiterate is another bottleneck problem in the dairy farming activity. Majority of them are part-time producers with a smaller number of dairy cattle. Small farmers usually travel long distance to sell their milk in dairy centers using traditional means of transportation usually horse cart and bicycle. Moreover, majority of them are earning less than 30,000 annually which is quite low income to sustain household requirement.

Table 6 Social-Economic Profiles of Dairy Farmers

Farmers Age Group		Education Levels		Gender	
Age Group	**Percentage**	**Categories**	**Percentage**	**Male**	**Female**
30-40	20	Illiterate	30	70 %	30%
40-50	15	Primary	45	**Nature of Producer**	
50-60	15	Junior	10	**Full time**	**Part-time**
60-70	30	Secondary	10	40%	60%
70-80	20	Higher edu	5	**More than 10 Cow**	**Less than 10 Cow**
Total	100	Total	100	30%	70%

Source: Field survey 2015.

Farmers are facing various problems, especially those who are selling their milk at dairy centre in Asmara. Among the problems faced by the dairy farmers low price of their milk is one of the major problems. Almost 35% ranked it their first problem is low price and followed by 24. 5% high fodder price. In addition to that there is no enough land allocated by the community for the fodder production. About 75 per cent of the dairy farmers ranked all three problems (lack of low price milk, high fodder price and green pasture land) as first, second and third major problems faced by them. These three problems have aggravated the overall other problem in the dairy industry. In fact till 2004, the Asmara milk factory was providing dairy cattle food to the farmers. But after that dairy centers stopped the supply of nutrient fodder. Since then also the price of animal food is constantly increasing. Resulting to this effect dairy sector has become uneconomical in this part of high land. Now it is not a profitable enterprise. Modern dairy farmers are constantly selling their cattle. As a result the production of milk is constantly decreasing.

Table 7 : Social-Economic Profiles of Dairy Farmers

Distance traveled		Mode of Transport		Annual Income in Nkf	
Distance in Km	**%**	**Mode**	**%**	**Categories**	**%**
Below 3	15	Bicycle	20	Below 10,000	20
3-6	20	Horse Cart	50	10,000-30,000	50
6-9	10	Car	30	30,000-60,000	20
Above 9	55	Other	N.A	Above 60,000	10
Total	**100**	**Total**	**100**	**Total**	**100**

Source: Field Survey 2015 15 Nkf = 1 USD

Table 8: Challenges faced by Dairy Farmers

Challenges	%	Rank
Shortages of green fodder	15.7	III
Low milk price	35.3	I
High fodder costs	24.5	II
Transportation problem	12.5	IV
Lack of veterinary services	7.6	V
Distance	4.4	VI

Source: Field Survey 2015

Conclusion

Dairy production has been carried out since the nineteenth century by the Italian settlers in the central region of Eritrea. The commercial dairy industry had much suffered during the long war, however, after

independence dairy activities have restarted with the support of the Asmara Dairy Farmers Co-operative Association (ADFA), which owned milk processing plant, a feed mixing plant, and organized milk collection and feed distribution.

The situation of the Central Region dairy producers is extremely precarious. Most of the dairy farmers are not ensured about the supply of fodder to their cattle. They are paying high costs of fodder to the cattle. As a result this sector is becoming uneconomical to the farmers. Most producers have lost their forage producing farms and retreated to the urban area. The farms now have no forage producing capacity, and operate through the purchase of hay and straw from farmers and some industrial by-products. The nutritional condition of the animals is poor and milk yields low. During a survey on the central region especially peri-urban dairy sector (Kayouli and Assefaw 1999), it was pointed out that poor and inadequate nutrition is the basic cause of low milk production and poor reproduction. Although there is no dairy record keeping on individual milk production, it is obvious that the milk yield per lactation from Holstein Friesian cows is still far below their genetic potential. The total daily milk production from 130 milking cows visited in 7 dairy farms in and nearby Asmara was only 1,173 litres or 9 litres/milking cow/ day.

Among the major constraints limiting the potential development of livestock production, inadequate feed has been identified as the crucial bottleneck. The bulk of livestock feed in Eritrea including central region comes from grazing on pastures, stubble and residues which are often of poor quality. In most areas, especially during the dry period, common daily rations cannot even meet maintenance requirements during several (at least six) months. Most ruminants are consequently submitted to chronic under nutrition. They lose weight in the dry season and early wet season, and this makes them more vulnerable to disease. Poor nutrition affects performance of diary animal.

There is need to overall reorganize the dairy industry not only the fodder sector but market, price of milk, transportation, hygiene and diseases related issues. There is huge potential for diary activities. Dairy is one of the important food commodities. Their demand is constantly increasing due increase in the number of urban population and purchasing power of the consumers. However, the dairy farmers were always discouraged by high fodder price compared to low price of their milk. Dairy farmers must get their output price compared to expenditure incurred in overall production.

Recommendations

The rapid growth of livestock sector as a whole and the dairy sector in particular, in a setting of weak institutions and governance has given rise to risks with potentially large negative implications for livelihoods, human and animal health and the environment. To meet the challenges and constraints it faces, the sector requires renewed attention and investments from the agricultural research and development community and robust institutional and governance mechanisms. The future contribution of dairy and the livestock sector in general will depend on how these issues are addressed by governments and the institutional community.

The following recommendations are important for the dairy development.

- The provision of training related to dairy farming to improve farmers' skill.
- Selected types of breeds should be introduced by the government and distributed to the farmers with affordable cost to increase milk production.
- Traditional cattle herding should be replaced by modern farming.
- Land should be given to farmers who own dairy cows to feed their cattle with green food to improve the quality and quantity of milk.
- Veterinary centers should be equipped with adequate medicine.

- Government should encourage for the establishment of cooperative dairy farmers.
- Experts from the ministry of agriculture should make a continuous contact with the dairy farmers.
- Central market should be established near dairy farming centers.
- Farmers should be supplied with adequate amount of credit at subsidize interest rate from government.
- Concerned institutions should control the safety of the milk.
- Collection and cooling center should established in each sub zoba

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