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Dairy Production System and Constraints in *Ezha* Districts of the *Gurage* Zone, Southern Ethiopia

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Abstract: This study has assessed dairy production and constraints facing the rural dairy producer in Ezha districts of Gurage zone, southern Ethiopia. Formal survey was used to collect data from four kebeles in the district, which were selected from two agro-ecological zones namely, Dega and Woina Dega. A total of 120 respondents (60 from each agro-ecology) that have at least one local milking cow were randomly selected. Mixed crop-livestock production system was found to be the feature of farming system. The major feed includes natural grazing, cereal crop residue and Ensete-ventricosum. Cut and carry feeding systems were employed by the majority of the interviewed households (72%). The overall average daily milk production per cow per household, lactation length and calving interval were 1.83±0.08 liter, 10.6.87±0.2 and 24.03±0.4 months, respectively. However, the overall daily milk yield, calving interval and lactation length were not significantly differing between agro-ecologies. Among milk and milk product produced, only butter and Ayib were supplied to local markets. The sale of fresh whole milk was not a common practice, due to, inefficient milk production (78.3%) and cultural restrictions toward selling fresh whole milk (53.3%) followed by lack of market (20%). Lack of land (45%), shortage of feeds (41%), artificial insemination (AI) services (10%) were reported to be the major constraints to the milk production in the study area. In order to alleviate the aforementioned constraints increasing efficiency of AI services, improvement of veterinary services, introduction of improved forage crops and fodder trees are important.

Key words: Constraints · Dairy production · Ezha · Marketing · Ethiopia

INTRODUCTION

Ethiopia holds a substantial potential for dairy development mainly due to its large livestock population coupled with the relatively suitable environment for livestock production [1]. In 2011, Ethiopia was home for an estimated 53.4 million cattle, 22.8 million goats, 25.5 million sheep, 49.3 million chicken and 1.1 million camels [2]. However, the productivity of the livestock resources and the benefits obtained from the sector does not commensurate with the high livestock population. Dairy sector is a major contributor to economic development, especially among the developing countries. As an engine of growth, it provides increased income, employment, food and foreign exchange earnings as well as better nutrition. As income increases with economic development, the share of animal products in total food budget increases faster than that of cereals. This occurs because of the relatively high-income elasticity of demand for animal products [3].

Like most dairy production systems found in the tropics, the Ethiopia dairy production system includes large number from small to large sized and subsistence to market oriented farms. Based on climate, landholdings and integration with crop production criteria, three production systems are recognized in Ethiopia [4]. Among the

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existing production systems, the traditional dairy production systems, is the one involving from smallholder dairy farms. The traditional (smallholder) milk production system, which is dominated by indigenous breeds, accounts for about 97-98% of the total annual milk production in the country [5]. Over 85% of the milk produced by rural households is consumed within the producer households with the proportion marketed being less than 7% [2]. The small amount of milk produced by a large number of producers but the low marketable output in Ethiopia posses limitations on the possibilities of exploiting distant but rewarding markets due to high transaction costs arising from transportation and high opportunity costs of labor involved. As reported earlier [6] the vast majority of milk produced outside urban centers in the country is processed into milk products at household level using traditional technologies.

The potential role of small-scale dairy farmers and organizations in meeting current and future consumer needs is recognized as vital to the development of dairying in Ethiopia in general and study area in particular. Nowadays, many investors are interested in participating in the development of the dairy industry throughout the country. Therefore, the availability of information on the development of milk production, productivity, constraints and marketing network is vital if proper and steady dairy development is expected in Ethiopia [7]. The aim of current study was to assess dairy production system and constraints in Ezha districts of the Gurage zone, Southern Ethiopia.

MATERIALS AND METHODS

Study Area: The study was conducted between February and March 2012 in Ezha district of the Gurage zone, which is located at 200 km south west of Addis Ababa. The altitude of the district ranges from 1800 to 3098 meters above sea level and receives an annual rainfall of 900-1600 mm with the mean minimum and maximum annual temperatures of 5 and 38°C, respectively. The district comprises 28 Kebeles (lowest administrative units) and has a total area of about 59,096 hectares out of which 29.607 ha is crop land, 9.502 ha grazing land, 4.513 ha forest, 1.800ha uncultivable land, 12,100 ha set potentially cultivable and the remaining 1.574 ha occupied by church, mosques and institution.

Sampling Procedure: A random sampling procedure was employed to select sample kebeles and households for the study. The district was first stratified as Dega (cold highland) and Woina Dega (medium temperature and altitude) agro-ecologies.

From a total of 28 Kebeles located in the district 2 Kebeles were randomly selected from each of the two agro-ecologies. A total of 30 households per Kebele that own at least one local milking cow were randomly selected. Thus, a total of 120 households were interviewed. A semi-structured questionnaire was used to gather the required information focused on the household characteristics; milk production; animal feed; and major constraints of dairy production in the area.

Data Analysis: Both qualitative and quantitative data collected at household level was analyzed and summarized using both mean and frequency procedures using SPSS statistical package for Social Science version 13.

RESULTS AND DISCUSSION

Household Characteristics: The average family size of the studied households was 6 persons per household (Table 1). The family size reported in this study was similar with CSA [8] which reported the average family size of 6 person per household in Wolayta Zone. Higher average family size of 8.2 and 7.2 in Bahir Dar zuria and Mecha districts, respectively [9]. However, this value was greater than both the Regional and National estimated values of SNNPR (5.2) and 5.1 CACC [10], respectively. This higher average family size in the area is important for availability of family labour for different dairy activities. As labour intensive activity, dairy needs labour force engaged in routine activities such as feeding, herding, cleaning and milking and processing. The average age of the interviewed respondents was about 42 years.

Generally, the educational level attained by the majority of the household heads was low (Table 1) which falls between illiterate and primary school. As reported [9] the low level of education of households can have a negative effect on the development of the dairy sector. This is evidenced by the low level use of dairy innovations such as artificial insemination, cultivation of improved forage crops and access to veterinary services in the current study area. Thus, farmers need to be given training on modern dairy farming practices.

The overall average landholding per household for the surveyed area was 0.9 ha (Table 1). The average land holding per household from the study area is much less than the national average land holding size (2.5 ha).

Table 1: Household characteristics of the interviewed respondents

Parameter	Over all mean (n=120)
Education (%)	
Illiterate	56.7
Primary school	37.50
Junior school	4.97
Secondary school	0.82
Mean age (SE) (years)	41.8±0.8
Mean family size (SE)(N)	6±0.18
Average land holding (SE) (ha)	0.9±0.05

n= Number of observations, SE= Standard error

Table 2: Cattle herd structure - holdings/household (means ±S.E)

Type of cattle	Over all mean(n=120)
Calves	1.29±0.53
Heifers	0.96+0.06
Bull calves (6 month – 1st service)	0.33±0.48
Bulls	0.11±0.03
Steers for fattening	0.42±0.18
Oxen	0.42±0.18
Dry cows	0.93±0.07
Lactating cows	1.4±0.52

n= Number of observations, SE= Standard error

This has negative implications on household income and livestock production. In Ethiopia studies indicated that landholdings differ from place to place and from household to household. For example, reported a mean landholding of 3.5 (2.5-4.9) ha per household in central highlands of Ethiopia [11]. An average land holding of 2.7 ha was reported in North western highlands of Ethiopia [9].

Cattle Herd Structure: Cattle are the only important source of milk in the district. On average, sampled respondents own 1.4 lactating cows (Table 2). The average number of lactating cows per household is comparable with the one reported (1.22) in Wolayta zone [12]. The reported average milking cows in the current study was lower than the means reported in earlier works in the central highlands of Ethiopia (2.7, 2.7 and 1.7 for Holetta, Selale and Debre Zeit, respectively) [11] and) in East Shoa Zone of Oromia; Adami Tulu (3.20), Arsi Negelle (3.10) and Lume (2.20) [13]. However, among cattle groups lactating cows consists the highest proportion in current study area, which might be attributed to choice made to keep more cows mainly to their multipurpose use: production of milk, replacement stock and other products such as manure. These lower average milking cows and male animals in the current study could be attributed to the critical land shortage to produce sufficient feeds that satisfy the demand of quality and quantity requirement of their animals.

Table 3: Proportion of utilization of major feed resources as reported by the respondents

	Agro-ecology			
	Dega (n=60)		Woin Dega (n=60)	
Feed sources	Dry season	Wet season	Dry season	Wet season
Crop residues	100	3.3	56.7	16.7
Natural grazing	100	100	100	98.3
Enset ventricosum	98.3	21.7	100	46.7
Conserved hay	68.7	38.3	46.7	56.7
Stubble grazing	83.3	0	40	0
Cut and carry	45	78.3	76.7	91.7

n= Number of observations

Feed Resources and Feeding of Dairy Cattle: In Ethiopia, natural pasture (grazing) and browsing fallow lands, *Enset ventricosum* and stubble grazing following the crop harvest was the major feed resources [14]. The major feed sources for dairy cattle in the study area include natural grazing, crop residues and conserved hay (Table 3). The majority of the respondents in the study area use combinations of different feed resources based on availability. As observed from current finding the dominant feeding system was natural grazing whereas the majority of the respondents (99%) used *Ensete ventricosum* as major source of feed mainly during the dry season where availability of green feed is limited due to very low or no rainfall. Majority of the respondents did also practice cut and carry system of feeding (green grass) during the dry and wet seasons (Table 3). The effort made to improve the utilization of crop residues and cultivation of improved forage crops on private lands was not practiced. All of the dairy producer kept their cattle under extremely simple management conditions and receive little supplementary feed and health care similar to earlier reports [11] in central highlands of Ethiopia.

Cattle Productivity

Milk Production: The survey area can be characterized by small dairy herd holdings as a part of integrated crop-livestock production systems. The overall mean daily milk yield per cow was 1.4 liters (Table 4). Cattle productivity in terms of milk yield is generally low in Ethiopia under smallholder management conditions due to lack of proper supplementary feeding for the dairy cattle, poor nutritive

Table 4: Mean (±S.E) production and reproduction of cows

	Agro-ecology		
Parameter	Overall (n=120)	Dega (n=60)	Woina Dega(n=60)
Daily milk yield/HH (lit.)	1.92±0.1	1.74±0.1	1.83±0.8
Lactation length (month)	10.3±0.3	10.8±0.3	10.6±0.2
Calving Interval (month)	24.1±0.6	24±0.5	24.03 ±0.4

n= Number of observations, SE = Standard error

value of pastures and forages offered to the animals. Moreover, the majority of the farmers keep indigenous animals that are generally low producers of milk [11,15].

The overall daily milk yield per cow in the present study was comparable with 1.8 liters/cow/day for Horro cattle in eastern Wollega reported by Alganesh [16]. A similar result was reported for local cows in the central highland of Ethiopia (1.59 liters/day) [12]. Moreover, the value of daily milk yield per cow obtained in the current study is comparable with earlier report [17] for national level (1.3 liters). The quantity and quality of feed resources available to dairy animals is the primarily requirement to exploit their genetic potential for milk production [18]. More feeds, better management and long term commitment are required to maximize the production [19]. Therefore, applicable means should be sought to alleviate the feed shortage in the study area to exploit the genetic potential of the dairy cattle for milk production.

Lactation Length: The average lactation length reported in the present study was 10.6 month (Table 4). Current finding is similar with most modern dairy farms; a lactation length of 10 months is commonly accepted as a standard. However, the average value of lactation length observed in the present study is markedly longer than that reported at national level (6 months) for indigenous cattle [17]. Studies [20, 21] showed similar average lactation length of local cow to be 9.8 and 10.5 months, respectively.

This long lactation length probably indicates that farmers in the study area milk cows until they are quite dry. However, this milking practice has negative effect on calving interval, next season milk and productive efficiency of the cow. An extended lactation period has practical significance for the smallholder dairy farmer as it provides compensation for the usually extended calving interval [22]. On another hand numerous studies have documented that additional days in which cows are not pregnant beyond the optimal time post calving are costly [23, 24].

Table 5: Marketing of milk and milk products

	Agro-ecology		
Variables	Overall mean (n=120)	Dega (n=60)	Woina Dega(n=60)
Butter selling practice (%)	60	35	47.5
Ayib selling practice (%)	76.7	65	70.8
Milk selling practice (%)	0	0	0
Reasons for not selling milk (%)			
Cultural restriction	60	46.7	53.3
Lack of market	28.4	11.7	20
Scarcity of milk	85	71.7	78.3

n= Number of observations

Calving Interval (CI): The calving interval is a period between two consecutive parturitions and should ideally be in the region of 12 to 13 months. However, the mean values for CI found for dairy cows of current study were 24 months (Table 4). However, the observed calving interval is in agreement with Groenendaal, Galligan and Mulder [23] and Ike *et al*. [24] who reported 20.6 and 22.1months, respectively, in Ethiopia local cows. Long calving interval reduce yearly production cycle and the amount of milk a cow likely to produce in given period of time, which might be associated with environmental factors, poor nutrition, poor housing, lack of sufficient bull and AI services and poor health and reproductive management [25]. The calving interval needs to be shortened for improved reproductive and productive performances [26]. Thus, the results of the present study regarding calving interval calls for appropriate intervention.

Marketing of Milk and Milk Products: As observed during the current study, dairy farmers in the districts practice the informal marketing system where they sell their products to neighbors or in the local markets. However, the sale of fresh whole milk was not a common practice (Table 5). Among different multiple reasons, inefficient milk production (78.3%) and cultural restrictions (taboos) toward selling fresh whole milk (53.3%) followed by lack of market (20%) are the most common reasons reported (Table 5). A similar situation was reported in Eastern Wollega where about 21.3% and 19% of the women did not sell fresh milk mainly due to scarcity and cultural reasons, respectively [16]. However, fresh whole milk was most saleable products in north western high lands of Ethiopia [27]. Among the dairy products most commonly marketed by smallholder dairy farmers in current study area were Ayib and traditional butter.

Table 6: The major constraints to milk production in the study area (n=120)

Factors	% of total respondents	Rank
Land shortage	45.0	1st
Feed shortage	40.80	2nd
Inefficient AI service	10.80	3rd
Water shortage	0.80	4th

n= Number of observations

Constraints of Milk Production: Cattle productivity in the study area is affected by a number of factors. The most important constraints associated with milk production as prioritized by the respondents in the study area were indicated in Table 6. The major constraints facing dairy farmer was lack of land as reported by 45 % of the respondents. The result from the present study is in agreement with reports in Jimma zone [28] and in central high lands of Ethiopia [11]. Moreover, feed shortage (41%), inefficient artificial insemination (AI) service (11%) and water shortage (0.8%) was the constraint in the area. Unavailability feed probably limit the milk production potential of cows with good milk producing ability more than any other single factor and is the most serious constraint to improve dairying [15]. As indicated by the respondents, milk production is constrained primarily by shortage of land for grazing and cultivation of improved forage crops. The problem of feed shortage is associated with small land holdings to produce sufficient quantities and limited knowledge on the conservation of seasonally available feed.

The inefficient AI service reported in the current study is associated with lack of sufficient facilities and trained AI technicians in the area. According to the respondents, due to the aforementioned reason coupled with shortage of breeding bulls for natural mating in their surrounding, cows and heifers pass a series of estrus cycles without being served. This represents a substantial production and reproductive wastages critically affecting the expected life time productivity of the cows. The problem of AI service provision seems to be a critical issue at national level. AI service in Ethiopia has not been successful to improve reproductive performance of the country's dairy industry [29]. From the results of this study, it could be suggested that access to quality feed, artificial insemination services, adequate land are vital enabling farmer to improve milk production in the study area.

CONCLUSIONS

Generally milk production and reproductive performance of cattle in the study area was low. Shortage of land and feeds are among the major constraints limiting dairy production.

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