*Full Length Research Paper*

# Herd composition and characteristics of dairy production in Bishoftu Town, Ethiopia

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A cross sectional study was done to assess the herd composition and characteristics of dairy production in Bishoftu Town using a well structured questionnaire. The farms were categorized the production levels into small (<10 animals), medium (10 to 50 animals) and large (>50 animals) farms based on the number of animals. Significant variation (P=0.000) in the age and purpose related herd composition ration of among categories is shown. However, although large farms have relatively more number of exotic cattle than small holders, the herd composition from blood level point of view was found to be insignificant (P=0.001). Characteristics like use, consumers and labor source for dairy farms of different level significantly differ (P<0.05) that small and medium scale dairy farms chiefly uses their family labor while large farms hire at seasonal employee. Furthermore, owners of all levels of production responded that dairy farms have negative public health impact because of the bad odor and existence of some zoonotic diseases. Among the production level there was significant difference with respect to feed source, housing and floor type, udder health management and insemination means (P<0.05). It is concluded that dairying is an important sector in urban agriculture and different characteristics long intensity of the production. Furthermore, the existing dairy infrastructure should be strengthened. Also, establishment of new ones should be encouraged by government and non-government institution with better technical assistance and recommended capacity building of farm owners.

**Key words:** Dairy, level of production, urban agriculture.

## INTRODUCTION

Several studies on food availability and abundance indicated that the global food reserve is in a state of continuous decline. The distribution of animal production will dramatically change from certain geographical area to another around the world. Some countries are considered the most impacted nations with such problem due to the rapid increase of human population and inadequate agricultural production. The contribution of livestock and livestock products to agricultural economy is 30% (Azage and Alemu, 1998). Furthermore, livestock are closely linked to the social and cultural life of several millions of smallholder farmer for whom animal ownership ensures varying degree of sustainable farming and economic viability (Azage et al., 1994). In addition, high levels of

urbanizations, population growth and expansion of urban areas represent a new dimension for the development and food security in many developing countries. Urban poverty and food security has been growing. Hence, to meet the food needs of urban dwellers, urban agriculture is becoming familiar in the developing world. Urban dairy production systems are among the production, processing and marketing of milk and milk products, channeled to consumers in urban centers. The benefits of urban agriculture are diverse and multifaceted that it is labor intensive and has significant employment generating potential in the areas whose unemployment rates are growing (Ahmed et al., 2003). However, information regarding details of herd composition social and economic significance and related factors at different level of dairy production especially in urban areas of Ethiopia is scarce for further research gaps research, recommendations and technical assistance. Therefore,

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**Table 1.** Herd composition of different production levels.

| Class | Small holder (n = 69) | | Medium (n = 7) | | Large (n = 4) | |
|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Mean | SD |
| Lactating cows | 1.29 | 0 .84 | 6.43 | 2.37 | 44.0 | 17.569 |
| Pregnant cows | 0.9 | 0.926 | 3.86 | 2.116 | 21.75 | 9.179 |
| Breeding bull | 0.13 | 0.38 | 0.86 | 1.069 | 1.00 | 1.155 |
| Heifers | 0.84 | 0.851 | 2.57 | 1.902 | 13.5 | 7.188 |
| Calves | 0.64 | 0.923 | 4.00 | 2.082 | 22.25 | 10.34 |

the objective of this study was done to assess herd composition and characteristics of dairy production in Bishoftu Town, Ethiopia.

**MATERIALS AND METHODS**

**Study area and population**

The study was conducted in dairy farms found in Bishoftu Town which is located in 45 km along South East of Addis Ababa. The area is located at 9°N latitude and 40°E longitude at altitude of 1850 masl with annual rain fall of 866 mm of which 84% is in the long rainy season June to September (NMSA, 2010). The study animals were from 80 dairy farms in Bishoftu Town comprising exotic, cross and local breeds.

**Study design**

A cross sectional study was conducted using well structured questioner, interview and discussions on 80 stratified random selected dairy farms with objective of collecting information characteristics like use and consumption of dairy products, labor source from employment opportunity point of view, farm management and related attributes like herd composition, availability of feed sources, breeding and management practices of dairy production of the area. The farms were classified according to herd size and level of production into smallholder farm (<10 animals), medium farms (10 to 50 animals) and large farms with more than 50 animals.

**Data analysis**

The data collected were entered in Microsoft Excel (MS-Excel, 2007) and analyzed using SPSS (2009) statistical software and the results are explained using descriptive statistics and Pearson Chi square test for possible explanation of statistical significant difference between variables with 95% confidence interval and 5% degree of freedom that is, P value of less than 0.05 is considered to be significant.

**RESULTS**

The average herd composition of the assessed farms in the area is summarized in Table 1. Significant variation (P<0.05) in the age and purpose related herd composition ration of among categories is shown. However, the herd composition from nativity point of view

is found to be insignificant (P>0.05) though large farms have relatively more number of exotic cattle than small holders. As Table 2 shows the use and consumers and labor source for dairy farms of different level significantly differ (P<0.05) that small and medium scale dairy farms chiefly uses their family labor while large farms hire at seasonal employee. The livelihoods of 68.1% of interviewed smallholder dairy farmers solely depend on the income they generate from this sector. Furthermore, owners of all levels of production responded that dairy farms have negative public health impact in relation to bad odor and some zoonotic diseases.

In addition, the majority of smallholder did not process the milk produced due to lack of facility 55.1%, lack of market link (31.8%) and lack of knowledge (13.04%) how and where to submit the milk are. Among the production level there is significant difference with respect to feed source, housing and floor type, udder health management and insemination meanses (P<0.05) while there is no statistical significant difference with regard to risks of production and reasons of poor marketing of milk (Table 3). In addition the study revealed that diseases, lack of management skill and feed shortage are risks that the producers fear. Furthermore, it is shown that concentrate is the most commonly used feed for the dairy cattle.

**DISCUSSION**

An increase in the global population coupled with the increasing demands for milk as an economic and as an industrial raw food product has necessitated an increase in production by dairy farms. The average herd composition of smallholder is in agreement with the findings of Terefe (2003) but the average number of lactating cows was lower for medium but higher for large scale than that was reported by Gebremichael (2008) who found that the herd composition was 8.82 and 25.06 for medium and large scale farms respectively. The relatively higher number of lactating cows followed by pregnant seems logical from economics of efficient farm production point of view. The study reveals that 68.1% of smallholders entirely depend on the income generated from this sector. For some group of smallholder

**Table 2.** Patterns of milk use, consumer and labor sources.

| Variable category | Smallholder (n = 69) | Medium (n = 7) | Large (n = 4) |
|---|---|---|---|
| | No. of farms (%) | No. of farms (%) | No. of farms (%) |
| **Use of milk** | | | |
| Home consumption | 21(30.4) | 1(14.3) | 0(0) |
| Selling | 47(68.1) | 6(85.7) | 3(75) |
| Process | 1(1.4) | 0(0) | 1(25) |
| | | | |
| **Out off home** | | | |
| Consumer neighbor | 10(14.5) | 1(14.3) | 1(25) |
| Milk processing cooperatives | 41(59.4) | 4(57.1) | 2(50) |
| Restaurant/cafeteria | 3(4.3) | 2(28.6) | 1(25) |
| | | | |
| **Labor source** | | | |
| Family part time | 2(2.9) | 0(0) | 1(25) |
| Family full time | 54(78.3) | 3(42.9) | 0(0) |
| Permanent employee | 2(2.9) | 1(14.3) | 3(75) |
| Seasonal employee | 11(15.8) | 3(42.9) | 1(25) |

households it is an additional source of income and household requirements to sustain their family. For others, particularly for large scale producers, it is the area of investment to get profit.

Most of the management activities in the smallholder dairy farms are found to be carried out by family members. The dairy farming household is a unit of mobilizing labor, managing productive resources and organizing consumption. This shows that activities pertaining to dairy cattle management require the attention of family members since cross breed dairy cattle have high value. However, MOA/FINNIDA, (1996) and (Getachew et al., 1993) reported that the activities like milking and barn cleaning were restricted to women while feed preparation and feeding cattle are responsibilities of men. Most of the activities in the medium and large scale farms were run by part time family members, seasonal and permanent employee and this could probably due to the fact that the activities are beyond the capacity of family members and could not handle fully the responsibilities of dairy cattle management (Table 2). On the other hand, since dairying is labor intensive activities, it generates significant employment opportunities in the production, processing and marketing. Smith (1991) also indicated that urban dairy farming can be a part time activity where household members work in other sectors of the urban economy. Perera (1999) reported that part-time farmers appreciated the peace and contentment that comes from physical work and the value of raising children with responsibilities in a family sustaining enterprise. Otherwise, most of the dairy farmers indicate that paid labor is fewer compared to the work done by household members. Also, Kelay (2002) mentioned that

hired labor is also used in the large scale and medium scale farms since the owner can afford labor wages.

Major risk factors play very important role in the maintenance and spreading of the disease among farm animals and their human contacts. Of the dairy farms, most of the farms in all scales of production 78.8% kept their dairy cows under cow shed roofed with corrugated sheets of materials. This finding is comparable with the findings of Gebremichael (2008) (72.6 to 77.4%) in Addis Ababa. This may help to protect from environmental stress such as heat, direct sun light and heavy rain fall. Regarding the floor structure the majority of small, medium and large dairy holder had concrete floor of 52.2, 71.4 and 100%, respectively. This finding is higher than the report made by Gebremichael (2008) which was 43.4, 63.65 and 79.5% for small, medium and large scale dairy farms in Addis Ababa, respectively. The manner in which concrete is finished has significant consequence for foot and hoof health. Smooth concrete reduces hoof wear and may contribute to claw horn over growth that may require frequent trimming of cows. Smooth surface is also slippery and predisposed the animals to injury specially the foreleg (Cook, 2003).

About 33.3% of the smallholder dairy farmers who practice AI also practice natural mating in their farms. Similar reports was made by Tesfaye (2007) at Nazereth 33.7% of smallholder that practice AI also practice natural mating due to some reasons such as failure to conception after repeated service, unavailability of AI service like on weekends, holidays and lack of communication to AI technician. Azage et al. (1995) and FAO, (2000) on the appropriateness, significance and application of individual biotechnologies in the developing

**Table 3.** Depicts farm management and other related attributes.

| Variable | Category | Smallholder (n = 69) | Medium (n = 7) | Large (n = 4) |
|---|---|---|---|---|
| | | No. of farms (%) | No. of farms (%) | No. of farms (%) |
| Housing | With roof | 56(81.2) | 6(85.7) | 4(100) |
| | Without roof | 13(18.8) | 1(14.3) | 0(0) |
| | Leveled (Smooth) | 4(5.7) | 0(0) | 0(0)0 |
| Floor type | Concrete (Rough) | 36(52.2) | 5(71.4) | 4(100) |
| | Simple soil | 29(42.0) | 2(28.6) | 0(0) |
| Grazing system | Free grazing | 17(24.6) | 0(0) | 0(0) |
| | Stall feeding | 52(75.4) | 7(100) | 4(100) |
| | Natural pasture | 17(24.6) | 0(0) | 0(0) |
| Feed source | Forage legumes | 0(0) | 0(0) | 1(25) |
| | Concentrate | 29(42.0) | 4(57.1) | 2(50) |
| | Crop residue | 16(23.2) | 2(28.6) | 1(25) |
| | Beverage by products | 7(10.14) | 1(14.3) | 0(0) |
| Maintenance of udder health | Using CMT | 0(0) | 0(0) | 1(25) |
| | Washing and milking | 40(58.0) | 6(85.7) | 3(75) |
| | Others | 29(42.0) | 1(14.3) | 0(0) |
| Breeding means | Bull | 32(46.4) | 0(0) | 0(0) |
| | AI | 14(20.3) | 2(28.6) | 2(50) |
| | Both | 23(33.3) | 5(71.4) | 2(50) |
| Risk of production | Disease | 17(24.5) | 2(28.6) | 2(50) |
| | Mismanagement | 14(20.3) | 1(14.3) | 1(25) |
| | Feed shortage | 38(55.1) | 1(14.3) | 1(25) |
| Reason not to market | Lack of facility | 38(55.1) | 4(57.1) | 2(50) |
| | Lack of market link | 22(31.8) | 3(42.9) | 1(25) |
| | Lack of knowledge | 9(13.04) | 0(0) | 0(0) |

countries indicated that poor heat detection skills of farmers, poor semen quality, inappropriate semen handling procedures, wrong timing of insemination and inefficiency of inseminators, insufficient means of communication and infrastructure, difficulty to bear costs for the production of liquid nitrogen and purchase necessary equipment and poor management of AI are some of the problems associated with AI. Similarly, Rehkis et al. (2007) reported that small scale farmers are not satisfied on the AI service in different regions of the Tunisia and Ethiopia (Kelay, 2002).

The majority of small (58.0%) and medium holder (85.7%) dairy cow owners in the present study cleaned their dairy cow udder only with warm water and did not perform the cleaning sufficiently and properly. It was reported by Galton et al. (1986) that premilking under

preparation plays an important part in the contamination of milk during milk and disease transmission. The feeding system of dairy cattle (78.8%) of the interviewed households were stalls feeding on concentrate, crop residues, combined with natural pasture for few smallholder dairy farmers and other supplements during morning and night. This result is higher than that of Terefe (2003) (48%) that was depending only on grazing in the central highlands. The principal feed available in the study area were concentrates (noug cake and wheat bran), crop residues, stored hay, some forage legumes, vegetable and fruit wastes. This finding is in agreement with the finding of Zinnesh et al. (1996) and Terefe (2003). Similar records had been made by (Yoseph et al. 1999) who declared that these feed are cheap and have a far reaching impact on the completing the dairy needs of

animals in the urban dairy farms. Also, Wondossen (1998) observed that the main diseases problems of dairy production comprises of mortality, reduced production, lower quality animal products and the risk of zoonotic diseases to human beings like Brucellosis and Salmonella. Alemayehu (1999) also indicated that lameness is an important disease among dairy animals in the urban and peri-urban production systems and the significance of the disorder increase with the level of intensification. In addition, understanding characteristics and associated risk factors is very essential in the advancement and improvement of the production level and intensity.

According to this study, almost all farmers dare to say that dairy practices have social, psychological and public health importance due to zoonotic diseases transmitted from animals to human kind. Furthermore, marketing risks to sell milk which is bulky and highly perishable, the price of milk and other dairy products and lack of refrigeration facilities to keep milk cool as soon as possible after milking were serious concerns indicated by smallholder producers.

## Conclusion

The global as well as national demand of milk is high and can be expected to grow because of fast growth rate of the population, high income elasticity of demand of milk and development of social values favors the development dairy sector. It is also practiced with view of by wide socio-economic spectrum by farmers in the area ranging from subsistence production to fully commercialized agriculture as it creates full and part- time employment for households' members and the community at large. Diseases, unavailability of feed of adequate quantity and quality, lack of marketing facilities and technical assistance are serious concerns indicated by producers. Therefore, understanding the characteristics of dairy production is one step forward for improving for better performance and improvement and the existing dairy infrastructure should be strengthened and establishment of new ones should be encouraged by government and non-government institution, with technical assistance and capacity building of producers is recommended.

## REFERENCES

Abay T, Tefera G, Alemu G, Beruk Y, Philip C (1989). Status of Dairying in Ethiopia and Strategies for Future Development. Proceedings of the 3rd National Livestock Improvement Conference. 24-26 May, 1989, Addis Ababa.

Ahmed MAM, Ehui S, Yemesrach A (2003). Dairy development in Ethiopia. Paper presented at the 'Successes in African agriculture' conference In: WEnt, IFPRI, NEPAD, CTA conference Paper No. 6. 1–3 December, 2003, Pretoria, South Africa.

Alemayehu L (1999). Lameness as a Disease of Intensification in Dairy Cattle under Urban and Peri-Urban Production Systems in Addis Ababa Milk shed. Ethiopian Veterinary Association Proceedings of the 13th Conference, Addis Ababa.

Azage T (2003). Financing market-oriented dairy development. The

case of Ada'a-Liben Woreda Dairy Association. Urban Agriculture Magazine (the Netherlands) 9: 2527.

Azage T, Alemu G (1998). Prospects for periurban dairy development in Ethiopia. In: Fifth national conference of ESAP (Ethiopian Society of Animal Production). Addis Ababa, Ethiopia.

Azage T, Geleto A, Osuji P, Kassa T, Franceschini R (1994). Influence of dietary supplementation and partial suckling on body and on lactation and performance of primiparous boran (Bos indicus) cows in Ethiopia. J. Agri. Sci.Cambridge, 123: 267-273.

Azage T, Lahlou-Kassi A, Mukassa-Mugrwa E (1995). Biotechnology in animal production development opportunities in livestock agriculture; In: proceedings of the 2nd annual conference of the Ethiopian society of animal production, May 26 - 27, 1993, Addis Ababa, Ethiopia. pp. 49-80.

Cook NB (2003). Prevalence of lameness among dairy cattle in Winconsin as a function housing type and stall surface. J. Am. Vet. Med. Assoc. 223: 1324-1328.

FAO (2000). Appropriateness, significance and application of biotechnology options in the animal agriculture of the developing countries. In; Electronics forum on biotechnology in food and Agriculture, June 12-August 25, htt/www.fao.org/biotech/c3/doc.htm.

Galton DM, Peterson LG, Merrill WG (1986). Effects of premilking udder preparation practices on bacterial count in milk and on teat. J. Dairy. Sci. 69: 260-266.

Gebremichael G (2008). A study on dairy cattle production and associated constraints in Addis Ababa, Ethiopia. Msc Thesis. Addis Ababa University, FVM. Debre Zeit, Ethiopia.

Getachew A, Hailu B, Workneh N, Gezahedn A (1993). A survey of the farming system of verttisol area of the Ethiopian high lands. In; Improved management of vetisol of sustainable crop-livestock production in the Ethiopian highlands; synthesis report. Addis Ababa, Ethiopia.

Kelay B (2002). Analysis of dairy cattle breeding practices in selected Areas of Ethiopia. PhD Thesis, Humboldt university of Berlin, Department of Breeding in the tropics and sub-tropics, Berlin, Germany.

MOA/FINNIDA (1996). Selale peasant dairy development pilot project Ethiopia. A report of evaluation study in blue series.

Netting RM (1993). Smallholders, Householders: Farm Families and the Ecology of Intensive, Sustainable Agriculture, California, Stanford University Press. pp. 1-3.

NMSA (2010). National Metrological Agency, Addis Ababa, Ethiopia.

Perera O (1999). Management of reproduction. In: Falvey L and Chantalakhana C (eds), smallholder dairying in the tropics. ILRI (International Livestock Research Institute), Nairobi, Kenya. pp. 241–264.

Rehkis J, Saaldane F, Laamouri M, Hamida K, Mabrouk W, Slimane N (2007). Participatory rural appraisal in smallholder dairy systems in Tunisia. Trop. Anim. Hlth. Prod. pp. 622-623.

Smith DD (1991). Urban Food Distribution in Asia and Africa. Geograph. J. 157: 51-61.

Terefe M (2003). Study on urban agriculture: The case of small- scale urban dairy farming in selected areas in Addis Ababa. Msc. Thesis. Addis Ababa University, Addis Ababa, Ethiopia.

Tesfaye A (2007). Small scale farming and cross-sectional study of mastitis in, Nazereth East Shoa. Msc Thesis, Addis Ababa University, FVM, Debre Zeit, Ethiopia.

Wondossen A (1998). Ruminant Livestock Development Objectives and Strategy. In Proceedings on the Role of Village Dairy Cooperatives in Dairy Development: Prospects for Improving Dairy in Ethiopia. 22-24 April, 1998, Addis Ababa, MOA.

Yoseph M, Azage T, Alemu Y, Umunna N (1999). Feed resources and nutritional management of dairy herds in urban and peri-urban dairy production systems in Ethiopia. In: ESAP (Ethiopian Society of Animal Production), the complementarity of feed resource for animal production in Africa. Proceedings of the joint feed resources networks workshop held in Gaborone, Botswana, 4–8 March 1991.ESAP, Addis Ababa, Ethiopia. pp. 77–88.

Zinnesh S, Seyoum B, Hailu G, Daniel K (1998). Aspects of varietals development and release in forage and pasture crops in Ethiopia. In; proceedings of the 4th national Livestock Improvement conference of Ethiopia society of animal production, Addis Ababa. pp. 57-68.