IMPACT OF COMMERCIAL DAIRY FARMS FOR THE DEVELOPMENT OF LIVELIHOOD IN RURAL AND URBAN SELECTED AREAS OF DHAKA DISTRICT IN BANGLADESH

MOHAMMAD ABDUR RAHMAN NURI

DEPARTMENT OF ANIMAL PRODUCTION AND MANAGEMENT
SHER-E-BANGLA AGRICULTURAL UNIVERSITY
SHER-E-BANGLA NAGAR, DHAKA-1207
BANGLADESH

DECEMBER, 2019

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BY

MOHAMMAD ABDUR RAHMAN NURI
REGISTRATION NO.:18-09079

A Thesis

Submitted to the Faculty of Animal Science & Veterinary Medicine,
Sher-e-Bangla Agricultural University, Dhaka-1207,
in partial fulfillment of the requirements
for the degree of

MASTER OF SCIENCE (MS)
IN
ANIMAL SCIENCE

SEMESTER: JULY - DECEMBER, 2019

Approved by:

Prof. Dr. Md. Jahangir Alam
Supervisor

Dr. Nasrin Sultana
Co-Supervisor

Prof. Dr. Md. Jahangir Alam
Chairman
Examination Committee
Department of Animal Production and Management
Sher-e-Bangla Agricultural University
Dhaka-1207

Department of Animal Production and Management

Sher-e-Bangla Agricultural University

Sher-e-Bangla Nagar, Dhaka-1207

CERTIFICATE

*This is to certify that thesis entitled, "**IMPACT OF COMMERCIAL DAIRY FARMS FOR THE DEVELOPMENT OF LIVELIHOOD IN RURAL AND URBAN SELECTED AREAS OF DHAKA DISTRICT IN BANGLADESH"** submitted to the faculty of Animal Science & Veterinary Medicine, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE (MS) in ANIMAL SCIENCE,** embodies the result of a piece of bona fide research work carried out by **MOHAMMAD ABDUR RAHMAN NURI** Registration No. 18- 09079 under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.*

I further certify that such help or source of information, as has been availed of during the course of this investigation, has duly been acknowledged.

Dated : 01-12-2019
Dhaka, Bangladesh

Prof. Dr. Md. Jahangir Alam

Supervisor
Department of Animal Production and Management
Sher-e-Bangla Agricultural University
Dhaka-1207

DEDICATED TO

**MY BELOVED LATE MOTHER MAHBUBA ALAM AND MY FATHER
A.N.M. NOOR ALAM WHO LAID THE FOUNDATION FOR MY EDUCATION**

ACKNOWLEDGEMENT

ABSTRACT

Dairy farming is an important and potential agricultural sector in Bangladesh. Nearly 85% populations of the country are engaged in agriculture and livestock sector. In Bangladesh, cows are the main source of milk and play a significant role in maintaining a strong agricultural economy. This study conducted to 1 Thana, out of 41 thanas for Urban and 1 Upazila out of 5 Upazilas for Rural commercial dairy farms of Dhaka district were selected purposively. A total of sixty (60) commercial dairy farms were randomly selected of which 30 from Khilgaon thana and 30 from Keranigonj Upazila. Interviewed the farm owner's from August 2019 to October 2019 using the structured questionnaire prepared for this study purpose. It appeared from the study that Majority (60%) of the selected urban farm owner's age ranged from 41 to 50 years. On the other hand, Majority (47%) of the selected rural farm owners' age ranged from 31 to 40 years. Study revealed that majority farmers of both urban and rural areas were male and minority was female. Majority (45%) farmers of both rural and urban areas have Primary education followed by self-educated which was 25%, while 20% had Secondary education and remaining 10% was graduated. The average number of animals per farm was 8 in urban while it was 12 in rural areas. Both the farmers of urban and rural areas had majority (83%) Friesian cross and others Jersey cross & indigenous cattle. Both the urban and rural farmers used 90% artificial insemination, while the rest of 10% used both artificial and natural services. The estimated cost of rearing urban and rural dairy cow was Tk.165/cow/day and Tk. 120/cow/day, respectively, while the return from them was Tk.330/cow/day and Tk.235/cow/day, respectively. The cost and benefit ratio both of urban and rural dairy cow was 1: 2. Although the commercial dairy cow owners face problems, the study observed that there were possibilities and positive impact, particularly for the commercial dairy farms, in developing their livelihood. The commercial dairy farms having minimum 10 no. of Friesian cross or Jersey cross dairy cows and give minimum 12 liter milk per cow would make the farm profitable and sustainable, which would help the quality farmer's life. Through overcoming the problems and supply all kinds of facilities, commercial dairy farming can play an important role in the improvement on livelihood of urban & rural peoples and also the development of agro-based economy.

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LIST OF ABBREVIATIONS

AI	-	Artificial Insemination
BBS	-	Bangladesh Bureau of Statistics
BDT	-	Bangladeshi Taka
BQ	-	Black Quarter
CF	-	Crude Fiber
CP	-	Crude Protein
DLS	-	Department of Livestock Services
DM	-	Dry Matter
EE	-	Ether Extract
et.al	-	And others
etc.	-	Etcetra
FAO	-	Food and Agriculture Organization
FMD	-	Foot and Mouth Disease
GDP	-	Gross Domestic Product
HS	-	Hemorrhagic Septicemia
IFAD	-	International Fund for Agricultural Development
ILRI	-	International Livestock Research Institute
M.S.	-	Master of Science
NGOs	-	Non Governmental Organizations
No.	-	Number
SAU	-	Sher-e-Bangla Agricultural University
SPSS	-	Statistical Package for Social Sciences
UHT	-	Ultra High Temperature
UNDP	-	United Nations Development Programme
WHO	-	World Health Organization
%	-	Percentage

CHAPTER: ONE

INTRODUCTION

Cattle, buffalo, and goat are mainly considered as dairy animals in Bangladesh. Dairy farming is an important and potential agricultural sector in our country. Nearly 85% of populations of the country are engaged in agriculture and livestock sector (Raha, 2000). In Bangladesh, there are about 23.78 million cattle, 1.47 million buffaloes, 3.34 million goats, and 25.77 million sheep (BBS 2017). Among the total of 6 million milking cows, 85–90% of them are indigenous and 10–15% are crossbred (DLS 2013). The crossbreds and purebreds are mostly Sindhi, Sahiwal, and Holstein Friesian breeds (Miazi *et al.*, 2007). In Bangladesh, cows are the main source of milk. About 90% of the produced milk in the country comes from cows, 8% from goat, and the remaining 2% from buffalo (DLS 2013). Annual milk production was 3.97 million tons during 2005–2016 with an average annual growth rate of 13.5% (dairy animal and milk production trend of Bangladesh in last decade). Smallholder producers dominate the dairy sector in Bangladesh. More than 70% of the dairy farmers are smallholders and produce around 70–80% of the country's total milk (Uddin *et al.*, 2012). It is estimated that there are about million dairy farms with an average herd size of 1–3 cows (Hemme *et al*., 2008).

The dairy cow plays a significant role in maintaining a strong agricultural economy of Bangladesh. It can play a leading role to reduce malnutrition of the country's people, mostly the children. According to (Rahman *et al.*, 2003), dairy farming is a business, way of life and 365 days-a-year job. Dairy farming is marginally profitable and farmers have ample opportunities to increase output by using more of aggregate feed and hired labor inputs (Sikder et al., 2001). The priority of milk in the diet is widely recognized and it has a very high elasticity of demand as compared to other food item (Jabbar and Raha, 1984).

Development of livelihood by commercial dairy farm development in developing countries has played a major role by increasing milk production, improving income level in rural and urban areas, generating employment opportunities and improving the nutritional standards of the people, especially for small and marginal farmers. The economics of dairying can be made more profitable by improving the productivity of dairy cows. A greater number of family labors are used in commercial dairy cows' care, management and milk marketing. It has been contributed to provide year-round working opportunities to utilize family labor and unemployed person effectively and provide a place of milk market. Milk production in Bangladesh increased and current national production of milk is inadequate to meet country's protein demand.

Many socio-economic studies revealed that socio-economic parameters are playing great role in development of commercial dairy production and the study might help in understanding their social impact. In order to achieve a regular income and a more market-oriented production pattern in commercial dairy farming, it is necessary to analyze the socioeconomic conditions of dairy farmers in rural and urban area and their effects on income in Bangladesh. Laborious farmer is one of the most important resources in commercial dairy farming. The results of labor utilization study will help to incorporate the available scientific knowledge and makes the best use of available time in management of a dairy farm (Sreedhar and Ranganadham, 2009). The knowledge on the efficiency of the labor use can be increased to a considerable extent. Proper management of labor is a must by the laborious farmer for earning profits in commercial dairy farming in the present day competitive market.

However, commercial dairy farmers in rural and urban areas are still facing to take decisions on how best to produce milk and how much to produce within their limited resources. Thus, one objective of this study is to assess the developmental status of farmers on the basis of commercial dairy farming and to determine their livelihood. Another objective of this study is to assess the number of commercial dairy farm within the selected area and to compare the utilization of farm bi-product i.e. milk, cow dung and urine in urban and rural areas of Bangladesh.

Objectives

General objective:

> To asses and compare the development of livelihood through commercial dairy farm in the selected rural and urban areas of Bangladesh

Specific objectives:

a. To assess the developmental status of farmers through commercial dairy farm in the selected rural and urban areas of Bangladesh

b. To compare the income level of commercial dairy farm within selected urban and rural areas of Bangladesh

c. To compare the utilization of farm bi-product i.e. Milk, Cow dung and Urine in urban and rural areas of Bangladesh

CHAPTER: TWO

REVIEW OF LITERATURE

Dayanandan (2011), studied at Ethiopia where Farms owning 1-3, 4-10 and greater than 10 dairy cows were classified as small, medium and large farms, respectively. Only small and medium size farms were considered for data collection. The results indicate that the regression coefficients with respect to concentrate for medium and small size cross breed farms are positive and significant at 10% level. The coefficient of dry fodder for medium size cross breed and local breed are positive and significant at 10% level. The marginal value products (MVPs) and the ratio with price for concentrate were higher for medium size than small size cross breed farms. The MVP for dry fodder, the return is higher in medium size cross breed and local breed farms. Cross breed farms were profitable than local breed farms. Both medium and small categories of cross breed farms were profitable. Among local breed, medium size farms are profitable.

Lwelamira *et al.* (2010), studied in Kayanga ward, Karagwe district in Tanzania with the aim of evaluating contribution of small scale dairy farming in improving household welfare. The specific objective was to compare annual profits from various enterprises including dairy cattle farming by smallholder dairy cattle farmers. Results from the study indicated that small scale dairy farming contributed substantially to household welfare. Average annual profit per household from small scale dairy farming by small scale dairy farmers was approximately 1 million Tsh, meaning that it is equally profitable as with other main enterprises by dairy farmers.

Uddin *et al.* (2010) found that, Small-scale farmers of extensive and traditional farming system had a negative entrepreneur's profit (-0.93 and -0.27 US-$/100 kg ECM, respectively), and were not able to cover their full economic costs from dairying. The high opportunity cost for own factors of production (land, family labour and capital), the differences in economies of scale and institutional support (infrastructure, provision of support services such as artificial insemination and veterinary services) are the key drivers for differences in costs of production in different systems and low profitability.

Hossain *et al.* (2005), conducted the study at 8 thanas in Rangpur district and four months-long survey was diminished on thirty small dairy owners. Major percentage of farm owner education level that was Higher Secondary level (60%) and the average number of animal per farm was 13.01. The average monthly income of farm owners found in the study area was Tk. 4387. Daily milk yield/cow/farm was 4.27 and 1.78 liters for a crossbred and indigenous dairy cow, respectively. It was estimated that the rearing cost of dairy cow was Tk. 67.5/cow/day and return from rearing dairy cow was Tk. 85.2/cow/day. The net return was Tk. 17.7/cow/day from crossbred in the study area and cost benefit ratio was 1: 1.26. The study showed that there were significant (P<0.01) differences within the dry period, service per conception, calving to first service, highest and lowest milk production and lactation period of crossbred and indigenous dairy cows.

Tozer et al. (2003) used a variety of feeding treatments (pasture, pasture + TMR, TMR) to determine a number of income and expense measures. These authors found that, while expenses were lower for the pasture-only scenario ($2.38 vs. $4,16 per cow per day – with the PTMR treatment intermediate), confinement feeding of TMR yielded the greatest herd net

income over cost ($55, 728 vs. $58, 884 –with the PTMR treatment intermediate). Finally, although the TMR treatment yielded $2.76 more income per cow per day than the pasture treatment, this advantage shrank to $0.30 when calculated as income minus costs per day per cow. White et al. (2002), found no statistically significant difference in income over feed costs when comparing pastured cows vs. confined cows.

Urassa and Raphael conducted a socio-economic survey in Morogoro Municipality to study the contribution of the small-scale dairy farming to the welfare of the community. The main focus was on the identification of the production level of milk from dairy cows, amount of income earned by the dairy farmers. A total of 37 smallholder dairy farmers from Morogoro Municipality were selected at random and were interviewed using structured questionnaire. Results from the study show that about two thirds of the respondents had some formal employment and about quarters (24.3) were involved in business. The average milk yield for the respondents ranged between 6-10 litres per cow per day. Average milk production per farmer per day was 22 litres whereas the average daily income earned by the respondents was 3,950/= Tshs. The major constraints experienced by the respondents in this study were lack of land and high costs of supplementary feeds as reported by 32.4% and 21.6% respectively.

Rajapurehit (1979) showed that the cost of milk per litre was 0.95 rupee for crossbred cows. The total milk yield per lactation was 2077 for cross breed cows. They also observed that the net returns from crossbreed cows were higher.

Karim and Begum (1988) conducted a study to know the prevalent situation of women's involvement in milch cow rearing in two villages of Comilla district. They found that 42% of the total number of cattle owned by all the households was milch cow of which only 14% was of improved type. Average quantity of milk yield per milch cow was 2.77 litres. The average annual cost of feed, treatment and AI per cows Tk. 3972 of which feed cost constitutes about 98%. The annual gross return per milch cow from milk, cow dung and ploughin was tk. 6674 while the net return was estimated at tk. 2763.

Rahman and Raman (1991) conducted a study on economic analysis of dairy enterprise in four selected villages of Mymensingh district in Bangladesh. The findings showed that feed cost was higher in the urban and milk pocket areas than in the rural and semi-urban areas. In Buffalo area (Ahmen Bari) feed cost is highest. The gross return per animals was positive for all types of cow. Net returns were also positive and higher for the HYV of cows and Buffaloes.

Alam *et al.* (1994) conducted a broad based socio-economic survey in Bangladesh and found that the proportion of cross breed cattle was 11.69%. The returns were higher by 91% for cross breed cows. Return over cash cost per lactation for cross breed cows were 158% higher than local ones.

Rahman (1993) conducted as tudy at Kalihati and Takerhat areas under Tangail and Madaripur districts to quantify the costs and returns, to explore the interrelationship of factors affecting yield and to examine the rural employment and income generation potentials of dairy enterprise. The gross cost per cow per day was tk. 20.22 at Kalihati and tk. 29.34 and 4.91 at Takerhat areas.

Rahman and Akteruzzaman (1994) showed that the milk yield per animal per day in small, medium and large herd size were 3.87, 3.37 and 2.38 litres respectively while the cost of production per liter amounted to tk. 8.70, 9.22, and 12.33 respectively. The net returns per cow per day were tk. 8.07 and tk 4.65 respectively for small and medium herd size and the net loss estimated was tk. 3.14 in case of large herd size.

Ashrafuzzaman (1995) conducted a study to investigate the socio-economic characteristics of indigenous and cross breed dairy cows owners to analyze the relative profitability. The per day total cost of raising a cross breed cow (tk. 35.05) was a little higher over an indigenous cow 6.65 litres for a cross-bred cow which was about double the average milk yield per day of 3.62 litres tk 15.64 and tk. 45.83 for indigenous and cross-bred dairy cow respectively indicating about three times higher net return from a cross bred dairy over indigenous cows.

Kabir (1995) conducted a study to analyze the economic performance of subsidized dairy farming in Tangail districts. The net return per farm was found Tk 14463, tk 21773 and tk 58173 annually for local, cross and cross-bred farm respectively. The investments per taka return were tk. 1.19, tk. 1.27 and tk. 1.37 respectively for local, and cross and cross-bred farms. Overall performance of cross bred dairy cattle was higher than local bred cows.

Hussain (2013) found dairy farms an average yield 200–250 per 305-day lactation, i.e., 0.66–0.82 liter per cow per day having 3.5 head of cattle. Low herd yields generally reflect poor management practices and inadequate investment in genetics and veterinary services. But in recent year, local milk production increased from 2.27 million metric tons in 2005– 2006 to 7.28 million metric tons in 2015–2016 (BBS 2017). Demand expressed as consumption of milk and milk products increased at a faster rate, annually

5% compared to increase in milk production at 4% from cow, buffalo, sheep, and goat (Hemme 2012). This instigates to expand dairying much faster than before. Still, domestic supplies are lagging to meet the FAO recommended per capita daily consumption of 250 ml. Dairy cattle rearing have been increasingly viewed as a source of alleviating poverty in Bangladesh. It is also turned as a means of improving the livelihood of landless and small households and acts as a critical cash reserve and steady cash income for many landless and marginal farmers (Saadullah, 2001).

In the year 2015–2016, livestock sector contributed 2.01% to the national GDP and contribution on agricultural sector GDP was 17.45%, among which the GDP of milk and milk product was BDT 26,533 million (BBS 2017). This sector meets the demand for animal protein partially in the form of meat, milk, and milk products (Miazi *et a*l., 2007). The dairy sector, offers good opportunities for on-farm and off-farm employment, especially at the rural level. The livestock sector generates 20% of full-time employment in Bangladesh (DLS 2013).

Generally, dairy farms in Bangladesh follow traditional production and farm management especially in feed management, disease management, adoption of AI, etc. Farmers follow traditional feeding systems, around 59% of the farmers feed their cattle in the traditional way (Quddus 2013), even they feed concentrates only to the lactating animals (Khan *et al.*, 2009), rather provide all the cows following recommended ration. Sathiadhas *et al.,* (2003) found that about 54% of farmers fed their cattle with concentrate considering the standard daily amount and following recommended mixing ratio.

Dairy farmers are not aware of using modern disease management as well as the use of improved insemination for cows. Only 25.6% farmers adopted artificial insemination method for breeding their cow (Quddus 2013); in some pocket area, high adoption of AI (87%) was observed by Khan et al. (2013). Poor adoption of vaccination and de-worming measures are in practice, only 50% of farmers have taken these preventive measures, and 30% farmers treated their cows by veterinary doctors (Quddus 2013). Though commercial dairying has been turned into a profitable business in recent years, farmers are not aware of the key factors affecting the dairy productivity, farm profitability and modern technology. Development of livelihood from commercial dairy farming depends on different factors like feed management, disease management, vaccination, de-worming of dairy cow, dairy farm size, breed of a cow and others factors.

According to FAO (1996) livestock play an important role in food security by helping to alleviate seasonal food availability in many different ways. For example, liquid milk whose production is seasonally processed during periods of surplus into products such as butter, curd, milk powder and cheese can be used throughout the year. Similarly, meat can be processed into various products such as dried, cured or smoked meat that can be used when other food sources are scarce. In a household, milk and other dairy products including manure, meat and live animals can be sold and the income from those may be used to purchase food and other household items. Increase in the ability to purchase food and consumption of milk at household level would improve the malnutrition that is contributed by lack of access to adequate calories, protein, vitamins and minerals.

Similarly, Mwakalobo and Shively (2001) noted that increase in income increases the ability to purchase food for the family to curb the food insecurity situation in more than 40% of the poor families in the tropics. Smallholder dairy cattle production is regarded as one of the best means of providing resource poor farmers with regular income to pay for children's education and other family necessities such as food and health services.

CHAPTER: THREE

MATERIALS AND METHODS

3.1 Location of the study area

The study was conducted at two thanas (namely Khilgaon and Keranigonj) of Dhaka district in Bangladesh. Dhaka is located in central Bangladesh. It is bounded by the districts of Gazipur, Tangail, Munshiganj, Rajbari, Narayanganj and Manikganj.

Map 1. Khilgaon thana (Urban) and Keranigonj Upazila (Rural) of Dhaka District

3.2 Research design

A cross-sectional design was used in collecting data. This allows collection of data at one point in time (Babbie, 1990). Because of limited time and resources for data collection, information on developmental status of livelihood were obtained from a randomly selected sample of commercial dairy farmers; in this case the treatment/intervention was dairy farming.

3.3 Sampling

One thana out of forty one thanas for Urban commercial dairy farming and One Upazila out of five upazilas for Rural commercial dairy farming of Dhaka district were selected purposively, because they are the ones with large number of dairy cattle.

3.4 Population and sampling procedure

Commercial dairy farms having minimum 5 dairy cows were considered to be the population of the study. A total of 60 (sixty) commercial dairy farms out of which 30 from 3 wards no. 1, 2 & 3 of Khilgaon thana i.e. 10 from each ward and 30 from 3 unions namely Konda, Ruhitpur & Hazratpur of Keranigonj Upazila i.e. 10 from each union were randomly selected from the entire population for this purposes.

Map 2. A map of selected areas of ward no. 1, 2 & 3 of Khilgaon Thana

Map 3. A Map of Konda, Ruhitpur & Hazratpur union of Keranigonj Upazila

Figure. Data collection from Khilgaon thana and Keranigonj upazila of Dhaka district

3.5 Data collection method

Data were collected by a designed survey schedule according to objectives from August to October, 2019. The survey schedule was prepared based on the following key items: owner's general information, cattle population, sources of fund, housing system, feeds and feeding system, breeding system, over all management system, utilization of bi-products (i.e. milk, cow dung, urine), costs and returns of raising dairy cows, problems in commercial dairying and impact of livelihoods in urban and rural area etc. Both primary and secondary data were collected as detailed below.

3.5.1 Primary data collection

Data were collected through direct interviews and personal visits to the farm of selected farmers. Before beginning the interview, each respondent was given a brief description about the nature and purpose of the study. To ensure validity the first draft of the interview schedule was pre-tested in the study area. Necessary changes were made to the schedule based on the pre-testing results before administering it. Responses of farmers were recorded directly on the interview schedules. Collected data from the farmers were compiled and tabulated. Tabulated data were arranged as percent value.

3.5.2 Secondary data

Secondary data related to the records of milk production, marketing, consumption, achievement and problems were involved during reviewing of literature from books, journals, websites, thesis, and unpublished reports at Sher-e-bangla Agricultural University library. The data were useful to identify the trend and status of milk production in the study area.

3.6 Data processing and analysis

Data collected were sorted, coded, compiled, tabulated and statistically analyzed. The local units were converted into standard units. The qualitative data were transferred into quantitative data by approximate scoring techniques. Microsoft office excel worksheet was used for data processing and analyzing.

CHAPTER: FOUR

RESULTS AND DISCUSSION

Overview

This chapter presents the results of the study. It consists of six sections; the first section describes the socio-economic characteristics of the commercial dairy farmers. The second section describes the farm animal and their management of commercial dairy farm which includes breeds of farm animal, housing system of the farm, feeding and breeding of commercial dairy farms. The third section presents the levels of milk production, number of cows milked and amount of milk produced and consumed at market level per day. The fourth section explains how milk is marketed and the problems faced in selling it. The fifth section presents the health care, management and treatment practices commercial dairy farms. Lastly in sixth section, the study presents the impact of commercial dairy farm production (milk, cow dung & urine) in development of livelihood i.e. income derived from farm, food security and assets, by showing expenditure derived from farm, expansion of farms, employment generation, social value, status of food security and the assets purchased by using income derived from farm.

4.1 Socio-economic Characteristics of the commercial dairy farmers

4.1.1 Age

Table 1 presented the age distribution of respondents where major percentage 60% of commercial farm owner's age within the selected urban areas ranged from 41 to 50 and remaining 23% fall within the age of 31 to 40, 13% fall within the age of 51 to 60 and only 3% fall within the age of 21 to 30. On the other hand, major percentage (47%) of rural farm owners' age within the selected urban areas ranged from 31 to 40 years

and remaining 30% fall within the age of 41 to 50, 13% fall within the age of 21 to 30 and only 10% fall within the age of 51 to 60 respectively. Age can affect speed, experience, wealth and decision making which in turn affects how one works and hence can influence individual productivity. Indeed the age of an individual has an influence on productivity as well as milk consumption (Singh *et al*., 2003). According to Basnayake and Gunaratne (2002), the age of a person is usually a factor that can explain the level of production and efficiency. A very old individual is likely to be less productive than one in the active age.

Table 1. Age distribution of respondents   Respondents (N=30+30=60)

Age (years)	Frequency		Percentage	
	Urban	Rural	Urban	Rural
21-30	1	4	3.33	13.33
31-40	7	14	23.33	46.67
41-50	18	9	60.00	30.00
51-60	4	3	13.34	10.00
Total	30	30	100	100
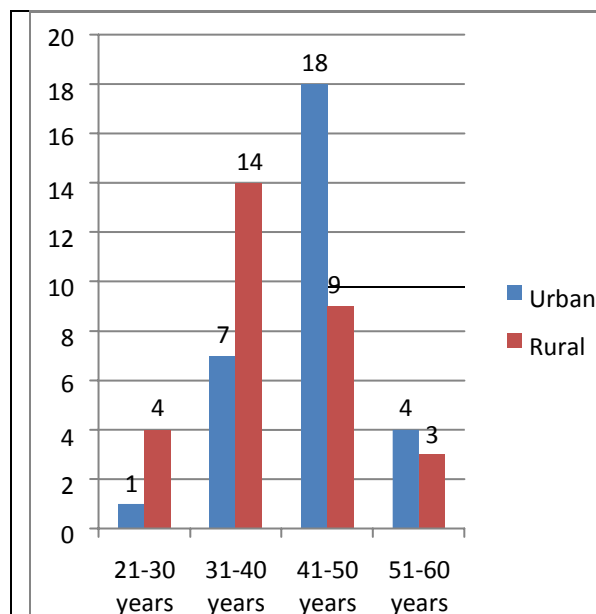
Figure 4. Comparison on the basis of Age (number of respondents)	**Figure 5.** Comparison on the basis of Age (percentage of respondents)
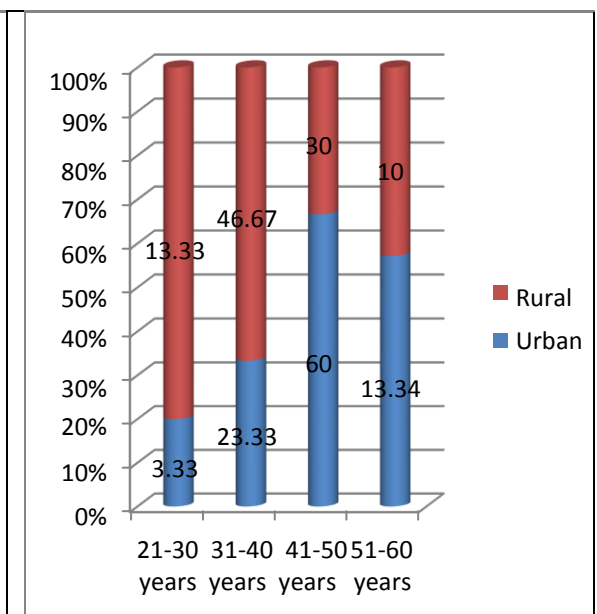
4.1.2 Sex

In the present study, both male and female commercial dairy farmers were interviewed. The higher population of male respondents shows that they are actively engaged in commercial dairying than female respondents. In rural area, educated women are engaged in commercial dairying due to the gradual development of farm and care about nurturing.

Table 2. Sex of respondents   Respondents (N=30+30=60)

Sex	Frequency		Percentage	
	Urban	Rural	Urban	Rural
Male	29	22	96.67	73.33
Female	1	8	3.33	26.67
Total	30	30	100	100

Figure 6. Comparison on the basis of Sex (number of respondents)	**Figure 7.** Comparison on the basis of Sex (percentage of respondents)

4.1.3 Marital status

Table 3 presents the marital status of the respondents. According to the table, major percentages 93% of commercial farm owner's were married within the selected urban areas and remaining 7% were single. On the other hand, 83% of rural farm owners' were married and remaining 17% were single respectively. Novart (2005) asserts that married couples are likely to be more productive than single ones because married women or men provide extra labour in accomplishing farm and non-farm activities.

Table 3. Marital status of respondents   Respondents (N=30+30=60)

Status	Frequency		Percentage	
	Urban	Rural	Urban	Rural
Single	2	5	6.67	16.67
Married	28	25	93.33	83.33
Total	30	30	100	100
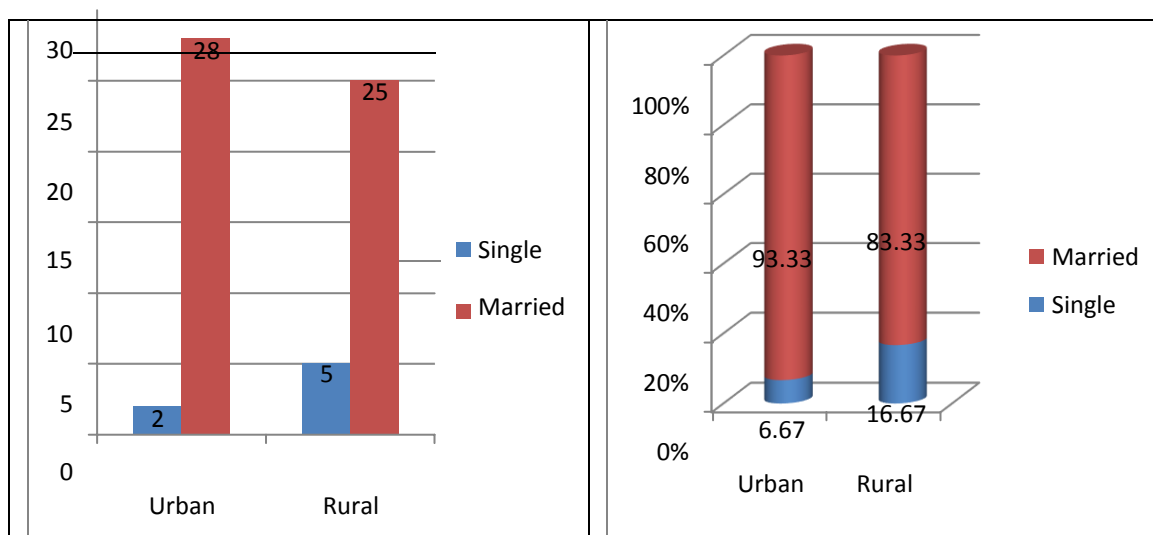
Figure 6. Comparison on the basis of marital status (number of respondents)	**Figure 7.** Comparison on the basis of marital status (percentage of respondents)

4.1.4 Level of education

According to Table 4, the major percentage 43.33% of commercial farm owner's were primary level of education, while 30% were self educated, 20% were secondary level of education and only 6.67% were college & university level of education within the selected urban areas. On the other hand, 50% of commercial farm owner's were primary level of education, while 23.34% were self educated, 13.33% were secondary level of education and only 13.33% were college & university level within the selected urban areas (Table 4). Level of education of farmers is very important as it influences their ability to utilize efficiently the advice and information offered by the extension services and development agents (Regnar *et al.,* 2002).

Table 4. Level of education of respondents   Respondents (N=30+30=60)

Status	Frequency		Percentage	
	Urban	Rural	Urban	Rural
Self educated	9	7	30.00	23.34
Primary school education	13	15	43.33	50.00
Secondary school education	6	4	20.00	13.33
College/ University	2	4	6.67	13.33
Total	30	30	100	100

Figure:8. Comparison on the basis of level of education (number of respondents)
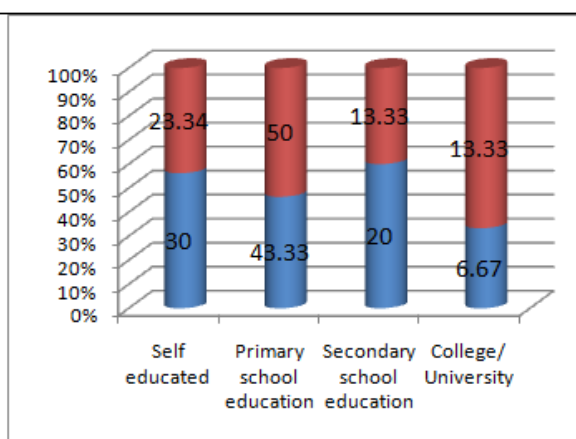
Figure:9. Comparison on the basis of level of education (percentage of respondents)

4.1.5 Family size

Table 5 presents the family size of the respondents. According to Ministry of family planning, family size of the farmers were classified into three categories considering no. of members: 'Small family' member upto 4, 'Medium family' member from 5-7 and 'Large family' member above 7. According to the table, major percentage 53.33% of commercial farm owner's had small family, 36.67% were medium and remaining 10% were large family within selected urban areas. On the other hand, 63.34% of commercial farm owner's had large family, 23.33% were medium and remaining 13.33% were small family within the selected urban areas.

Table 5: Family size of respondents   Respondents   (N=30+30=60)

Family size	Frequency		Percentage	
	Urban	Rural	Urban	Rural
Small family member upto 4	16	4	53.33	13.33
Medium family member from 5-7	11	7	36.67	23.33
Large family member above 7	3	19	10.00	63.34
Total	30	30	100	100

Figure 10. Comparison on the basis of family size (number of respondents)

Figure 11. Comparison on the basis of family size (percentage of respondents)
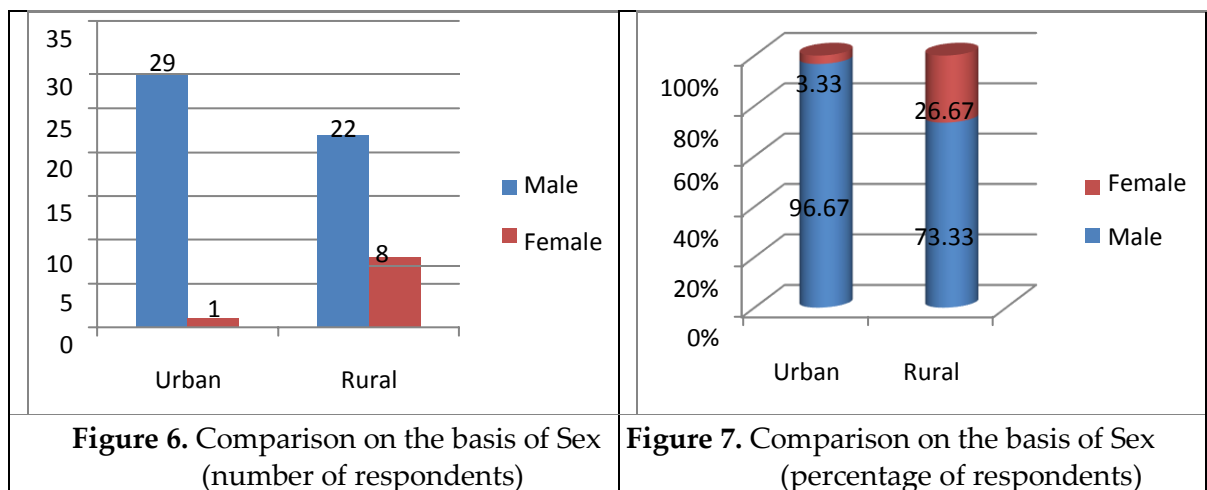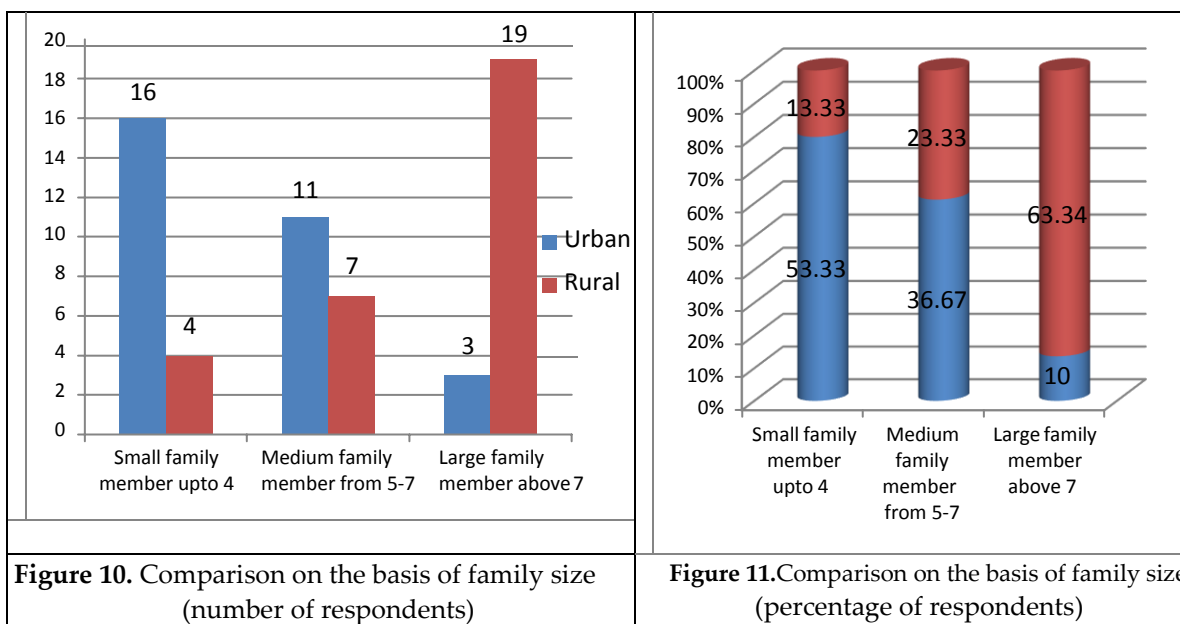
4.1.6 Occupation

Table 6 presents the occupational status of the respondents. According to the table, major percentage 87% of commercial farm owner's were only dairy farmer and remaining 13% were mixed agro farmer within the selected urban areas. On the other hand, 83% of rural farm owners' were mixed agro farmer and remaining 17% were only Dairy farmers respectively.

Table 6: Occupational status of respondents   Respondents (N=30+30=60)

Occupational status	Frequency		Percentage	
	Urban	Rural	Urban	Rural
Only Dairy farming	26	5	86.67	16.66
Mixed Agriculture farming	4	25	13.33	83.34
Total	30	30	100	100

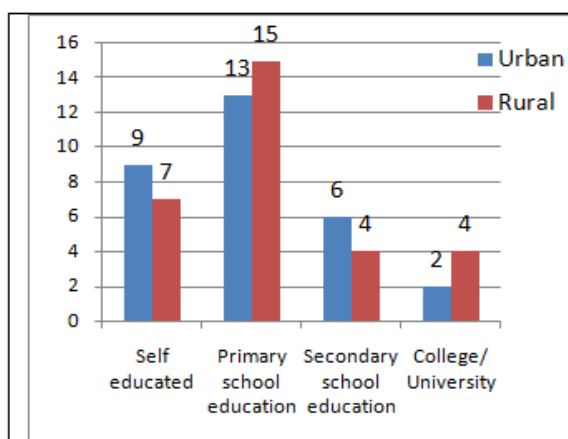**Figure12.** Comparison on the basis of occupation (number of respondents)

Figure 13. Comparison on the basis of occupatio (percentage of respondents)

21
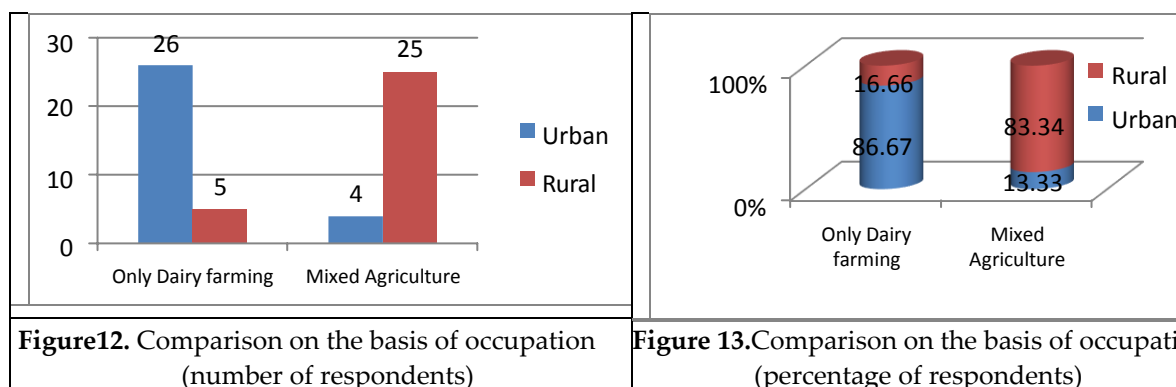
4.1.7 Purchasing ability

Table 7 presents the purchasing ability for expansion of the farms of the respondents. According to the table, major percentage 80% of commercial farm owner's had the ability to purchase more than one dairy cows and remaining 20% had the ability to purchase only one dairy cow within the selected urban areas. On the other side, 83% of rural farm owners' had the ability to purchase only one dairy cow and remaining 17% had the ability to purchase more than one dairy cows respectively within the selected rural areas.

Table 7. Purchasing ability of respondents   Respondents (N=30+30=60)

Purchasing ability	Frequency		Percentage	
	Urban	Rural	Urban	Rural
Only one Dairy cattle	6	25	20	83.34
More than one Dairy cattle	24	5	80	16.66
Total	30	30	100	100
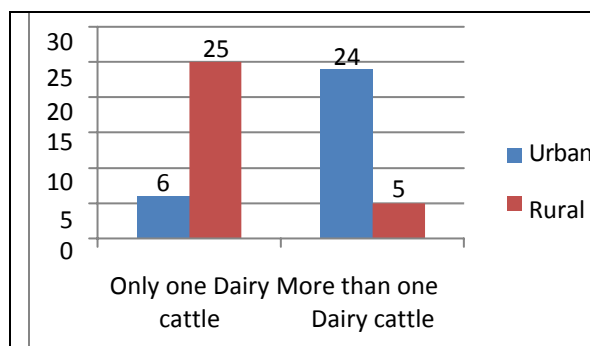
Figure 14. Comparison on the basis of purchasing ability (number of respondents)	**Figure 15.** Comparison on the basis of purchasing ability (percentage of respondents)
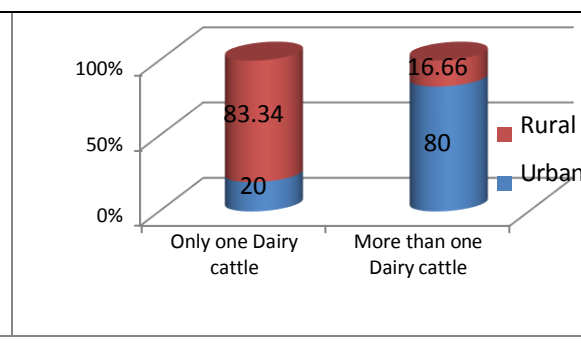
4.2 Farm animal and their management

4.2.1 Breeds of cow of the commercial dairy farm

Table 8 presents the dairy breeds of cow of the respondents. According to the table, major percentage of the urban farm owners had 83.00% Friesian cross, 10% Jersey cross and others 7.00% of indigenous cattle contrariwise rural farmers had 67% Friesian cross, 23% Jersey cross and others 10.00% of indigenous cattle. Most of the commercial dairy farmers prefer Friesian and Jersey cross for dairying.

Table 8: Breeds of dairy cow of the respondents   Respondents (N=30+30=60)

Dairy breeds	Frequency		Percentage	
	Urban	Rural	Urban	Rural
Frisian cross	25	20	83.33	66.67
Jersey cross	3	7	10.00	23.33
Others	2	3	6.67	10.00
Total	30	30	100	100

Figure 16. Comparison on the basis of dairy breed (number of respondents) **Figure 17.**Comparison on the basis of dairy breeds (percentage of respondents)
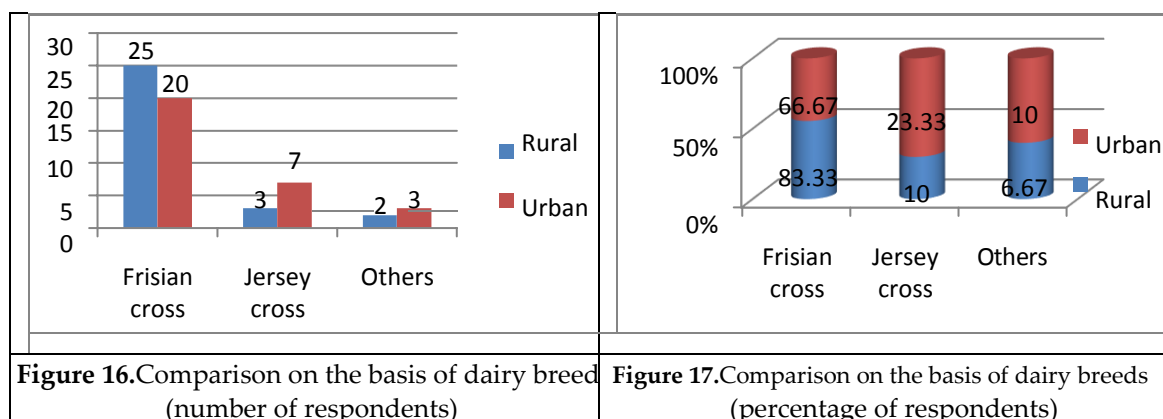
4.2.2 Housing management system of the respondents

Table 9 presents the housing management of commercial dairy farms. According to the table, major percentage of the farms were tinshed, close house in nature, pacca floor, had adequate ventilation, had drainage system and summer & winter management practiced.

Table 9: Housing management of the respondents   Respondents (N=30+30=60)

Particulars	Frequency		Percentage	
	Urban	Rural	Urban	Rural
Location of the shed				
i. Inside owner shelter	28	4	93.33	13.33
ii. Outside owner shelter	2	26	6.67	86.67
Total	30	30	100	100
Type of shed				
i. Building	8	2	26.67	6.67
ii. Tinshed	22	28	73.33	93.33
Total	30	30	100	100
Floor : Pacca in both urban and rural commercial dairy farms.				
House pattern: Close pattern in both urban and rural commercial dairy farms				
Ventilation: Major percentage of the commercial dairy farms had adequate ventilation.				
Drainage facilities: All the farms had drainage facilities.				
Summer& winter management practices: Both in urban and rural dairy farms practiced.				

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4.2.3 Feeds, fodder production and feeding of the respondents

Feeding is a very important aspect in keeping dairy animals as it gives energy and nutrients necessary for body maintenance and for milk production. Fodder production for the dairy farms are most important for the dairy farming and it's the main source of animal feeds under the intensive (zero-grazing) dairy production in the surveyed area (Table 10).

According to the table, major percentage 80% of the urban farm owners purchased green fodder and remaining 20.00% were produced fodder both their farm & rented areas. The table also shows that 100% rural dairy farms instead of only 20% in urban farms are based on fodder production and grazing on their own and rented land. Proper feeding when combined with other factors such as proper management will enable the farmer to optimize the genetic qualities of the dairy animals translating into optimum productivity (Ngongoni *et al.* 2006).

Table 10: Fodder production for dairy cattle   Respondents (N=30+30=60)

Status	Frequency		Percentage	
	Urban	Rural	Urban	Rural
Fodder production in farm area	3	25	10	83.33
Fodder production in rented area	3	5	10	16.67
Fodder purchase	24	-	80	-
Total	30	30	100	100
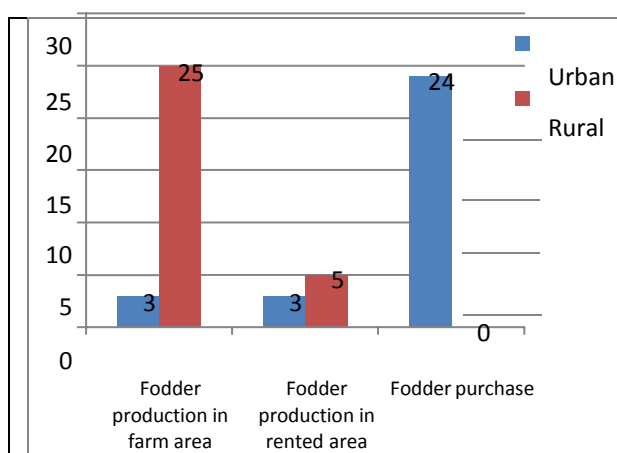
Figure18. Comparison on the basis of fodder production (number of respondents)	**Figure19.** Comparison on the basis of fodder production (percentage of respondents)
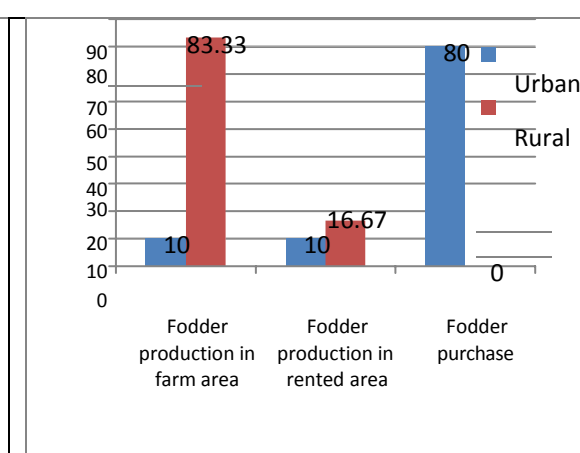
Despite the use of fodder and pastures, supplementary feeds (concentrates) such as maize, bran, polish etc. are given to the cows under zero-grazing. The survey shows that all (100%) the respondents give supplements to their cows. However, when asked about availability of concentrates about 90% said that concentrates are available but at high price, while only 10% said that concentrates are not readily available. Although dairy farmers know the importance of supplements to their dairy animals, cash and labour limit the amount and frequency of feeding supplementary feeds. According to the study these were mostly obtained from farm inputs shops. These were found to be important sources of dairy meals, salts, concentrates, milking buckets, and milk utensils. They were practiced two times feeding and watering within both urban and rural areas.

4.2.4 Breeding management practices of the respondents

Breeding management practices is the most important factor for successful commercial dairy farming. According to the table 11, major percentage 90% of commercial dairy farmers of both urban and rural areas used artificial insemination and rest 10% used both artificial and natural services. In case of heat detection, both urban and rural dairy farmers were concerned. The symptoms of heat detection, majority of the respondents were in favour of mucus discharge, mounting & urination.

Table 11: Breeding management practices   Respondents (N=30+30=60)

Particulars	Frequency		Percentage	
	Urban	Rural	Urban	Rural
Breeding methods				
i. Artificial insemination	27	26	90.00	86.67
ii. Artificial and natural	3	4	10.00	13.33
Total	30	30	100	100
Heat detection: Practiced in both urban and rural commercial dairy farms.				

4.2.5 Health care and treatment practices of the respondents

Incidences of diseases are the most constraints for successful commercial dairy farming. According to the table 12, major percentage 50% of the dairy cows infected with Foot and Mouth Disease (FMD), 40% Mastitis, 10% Anthrax and Black Quarter (BQ) etc. Helminths were also occurred hazards i.e. Fascioliasis, Hump sore etc.

. Table 12. Incidence of diseases of the respondents   Respondents (N=30+30=60)

Incidence of diseases	Frequency		Percentage	
	Urban	Rural	Urban	Rural
FMD	11	15	36.67	50.00
Mastitis	13	11	43.33	36.66
Anthrax	4	2	13.33	6.67
BQ	2	2	6.67	6.67
Total	30	30	100	100

An established quote "Prevention is better than cure' so the vaccination is must for the farming to keep the animal free from diseases. Vaccination schedule, Anthelmentics schedule for external and internal parasites, Medication and pro-biotic schedules should be done in every farm like commercial dairy farms in both urban and rural areas.

Table 13. Vaccination and de-worming schedule practices

Respondents (N=30+30=60)

Particulars	Frequency		Percentage	
	Urban	Rural	Urban	Rural
Vaccination schedule maintain				
i. Yes	28	25	93.33	83.33
ii. No	2	5	6.67	16.67
Total	30	30	100	100
De-worming schedule				
i. Yes	22	16	73.33	53.33
ii. No	8	14	26.67	46.67
Total	30	30	100	100
Sources of vaccines, drugs and medicine: Most of them collected from local market.				
Treatments of sick animal: Advised by the Veterinary doctor with in selected urban areas and by the Market representative of a medicine company, quack & pharmacist with in the rural selected areas.				

Milk Production in commercial dairy farms

4.3.1 Experience in dairy farming

The results of the study shows that, major percentage 67% of the respondents of the urban areas have been keeping dairy cattle for a period between 6-20 years and remaining 33% for a period of 1-5 years. The table 14 also shows that the major percentage 70% of the respondents of the rural areas have been keeping dairy cattle for a period between 1-5 years and remaining 30% for a period of 6-20 years. So, its clear that the growth of dairy farming in rural area is higher than the urban areas due to the available land for forage and fodder cultivation.

Table 14. Experience in dairy farming   Respondents (N=30+30=60)

Experience (Years)	Frequency		Percentage	
	Urban	Rural	Urban	Rural
0-1	2	11	6.66	36.67
2-5	8	10	26.67	33.34
6-10	9	7	30.00	23.33
>10	11	2	36.67	6.66
Total	30	30	100	100

Figure 20. Comparison on the basis of farming experience (number of

Figure 21. Comparison on the basis of farming experience (percentage of

27
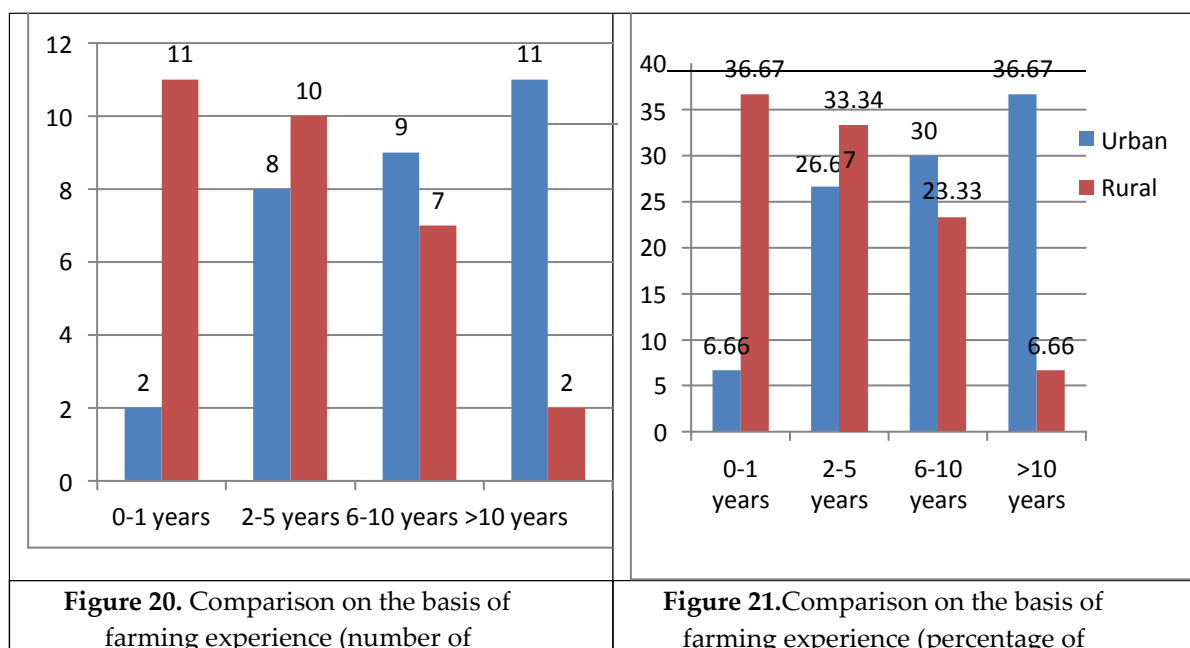
4.3.2 Milk production level in dairy farms

According to the table 15, average annual milk production ranging from 1050 litres to 2950 litres per cow per year. Distribution of the respondents in the survey shows that, 37% of the respondents produced between 2000-2500 litres, followed by 30% who produced 1501-2000 litres, 26% of the respondents produced between 2501-3000 litres and only 7% of the respondents were produced between 1000-1500 litres per lactation period within the urban rural. On the other side, 43% of the respondents produced between 1501 - 2000 litres, followed by 30% who produced 2001 – 2500 litres, 20% of the respondents produced between 1000-1500 litres and only 7% of the respondents were produced between 2501 – 3000 litres per lactation period within the rural farms.

Table 15: Average annual milk production per animal from July 2018 to June 2019

Respondents (N=30+30=60)

Milk production (liters)	Frequency		Percentage	
	Urban	Rural	Urban	Rural
1000 - 1500	2	6	6.66	20.00
1501 - 2000	9	13	30.00	43.33
2001 - 2500	11	9	36.67	30.00
2501 - 3000	8	2	26.67	6.67
Total	30	30	100	100

Figure 22. Comparison on the basis of milk production (number of respondents)

Figure 23. Comparison on the basis of milk production (percentage of respondents)
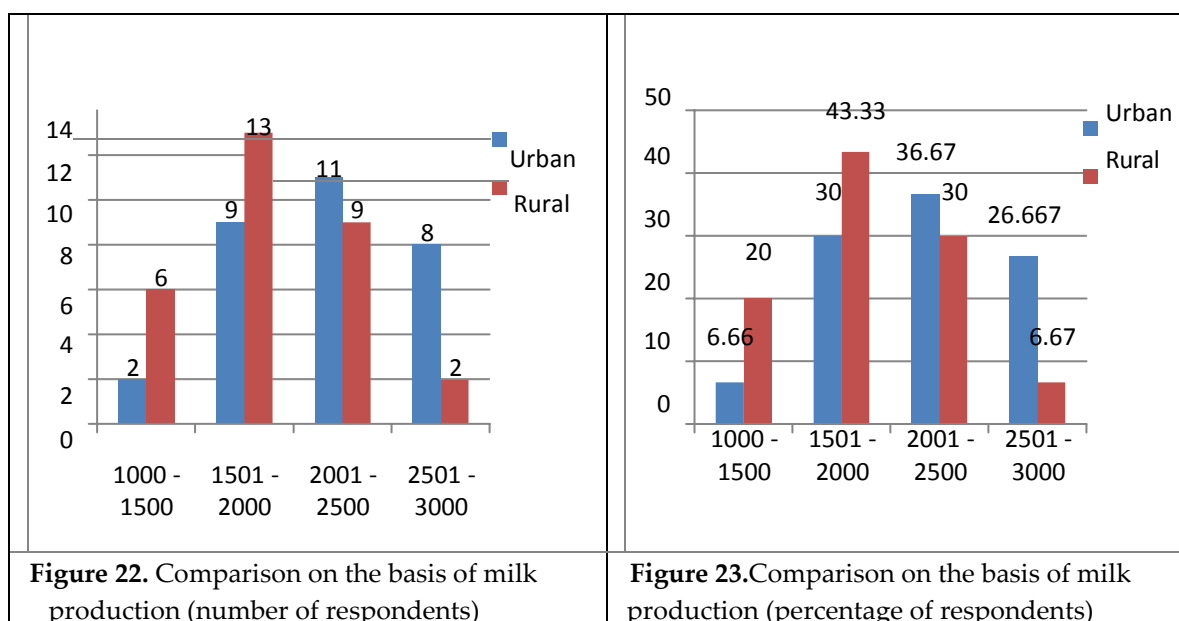
4.3.3 Constraints affecting milk production

Table 16 presents that major percentage (43%) of the respondents of the urban areas livestock diseases & parasites, 27% mentioned high price of feed, medicine and vaccine and rest 30% were faced fodder, labour and modern technology. On the other side the respondents of the rural areas lack of technical knowledge, livestock diseases & parasites, High Price of Feed, medicine & vaccine, low price & lack of Storage facility of Milk, AI and transport problems to dairy production.

Table 16: Constraints on milk production   Respondents (N=30+30=60)

Major constraints	Frequency		Percentage	
	Urban	Rural	Urban	Rural
Lack of technical knowledge to manage	**2**	8	6.67	26.67
Low price of Milk and Milk products	**-**	3	-	10.00
Diseases	13	5	43.33	16.67
High Price of Feed, medicine & vaccine	8	5	26.67	16.67
Lack of enough fodder and pasture	3	-	10.00	-
Lack of laborious farmer and services	1	3	3.33	10.00
High investment for construction	3	1	10.00	3.33
Lack of Storage facility of Milk	-	3	-	10.00
Transport problems	-	2	-	6.66
Total	30	30	100	100
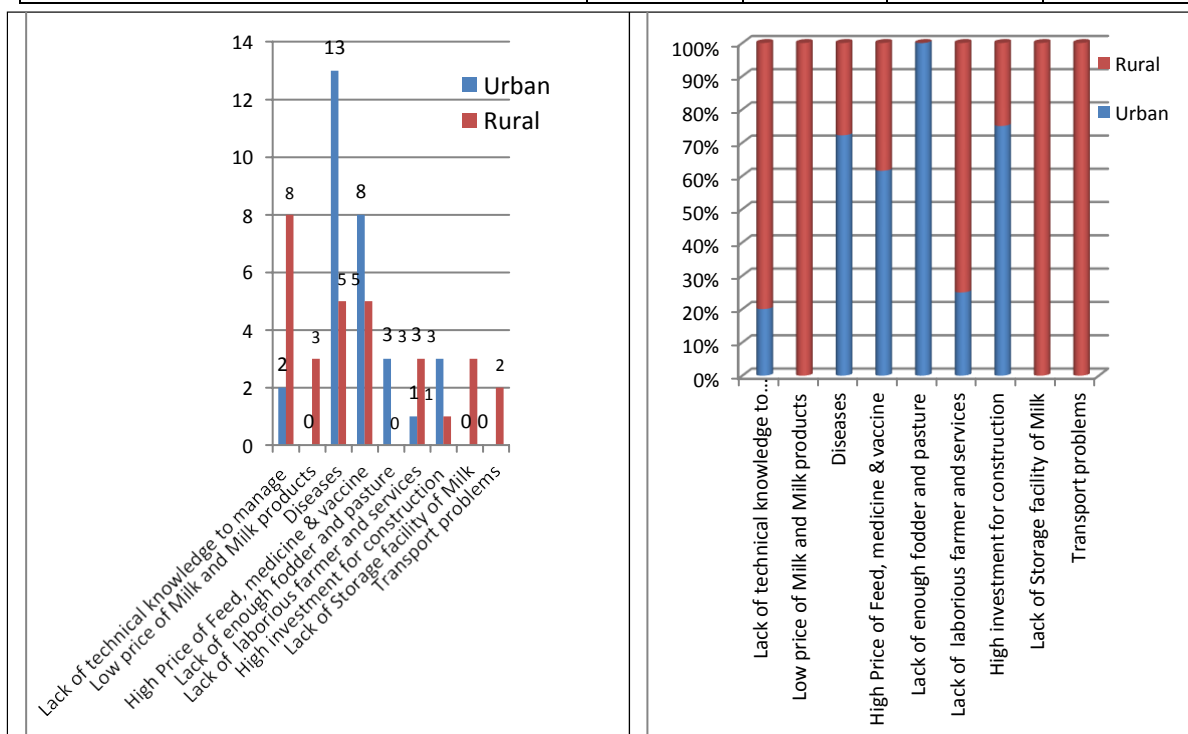
Figure 24. Major constraints of milk production (number & percentage of respondents)

4.4 Marketing of milk and others dairy farm production i.e. cow dung & urine

4.4.1 Milk marketing

Table 17 reveal that major percentage (57%) of the urban respondents sold their milk to the local consumer and 27% sold their milk at farm level, 17% to the local producer, vendor & sweetmeat shop. On the other side rural respondents sold their milk 43% of the rural respondents sold their milk to the local producer, vendor & sweetmeat shop, 33% local consumer, 17% sold milk collection center of different Cooperatives & company and only 7% sold their milk at farm level. Those who sell milk to the local customer at farm premises are paid daily, sweetmeat shops are paid next day, local customer receiving from homes and cooperatives are being paid monthly. The others farm production i.e. cowdung & Urine used by the rural farmers as a rich fertilizer for personal agriculture, fuel stick and biogas plant. On the other hand most of urban farmers thrown in the sewerage and remaining used as a fertilizer for personal vegetable & fodder production.

Table 17: Milk marketing of commercial dairy farms   Respondents (N=30+30=60)

Marketing area	Frequency		Percentage	
	Urban	Rural	Urban	Rural
Individuals purchase from farm	8	2	26.67	6.67
Local customer	17	10	56.66	33.33
Local producer and sweetmeat shop	5	13	16.67	43.33
Dairy Cooperatives and milk company	-	5	-	16.67
Total	30	30	100	100
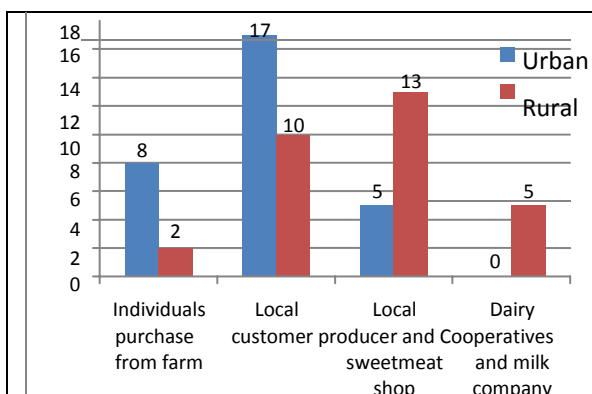
Figure 25. Comparison on the basis of milk marketing (number of respondents)	**Figure 26.**Comparison on the basis of milk marketing (percentage of respondents)
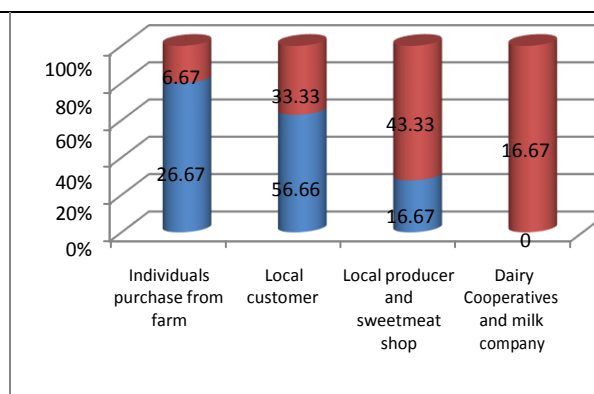
4.4.2 Problems in selling milk of commercial dairy farms

Problems faced in selling milk Table 18 showed that, the most of the urban respondents indicated staffs of the farms who are engaged in selling about 80% and remaining 20% were distance from the marketplace (10%), lack of buyers (3%) and lack of transport (7%) contrariwise major percentage 67% were lack of buyers and remaining 33% were distance from the marketplace (17%), lack of transport (13%), lack of selling staffs (3%) respectively. These findings partly support the study conducted in Mbeya by Bayer and Kapunda, (2006) which showed that, distance to markets in major towns, limited number of customers and impassable roads were identified as constraints in rural dairy production.

Table 18. Problems in selling milk of commercial dairy farms

| | | | Respondents (N=30+30=60) | |
| Problems in selling milk | Frequency | | Percentage | |
	Urban	Rural	Urban	Rural
Lack of buyers	1	20	3.33	66.67
Distance from the marketplace	3	5	10.00	16.67
Selling staffs	24	1	80.00	3.33
Transport problems	2	4	6.67	13.33
Total	30	30	100	100
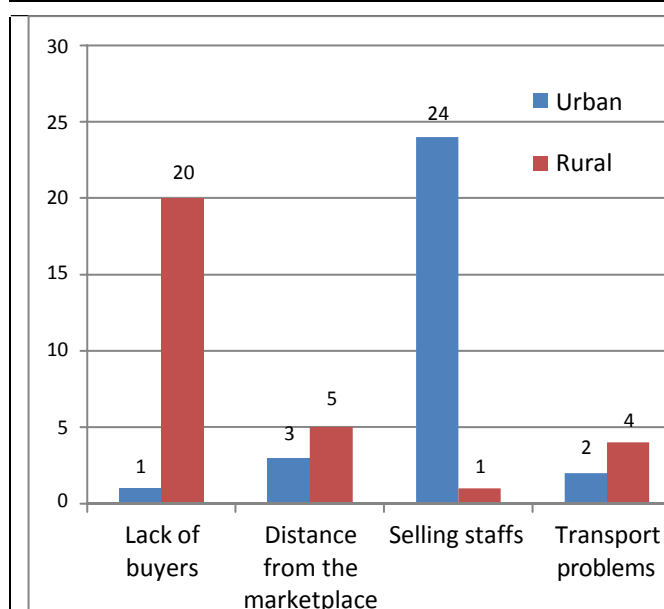
Figure 27. Comparison of problems in selling milk (number of respondents)
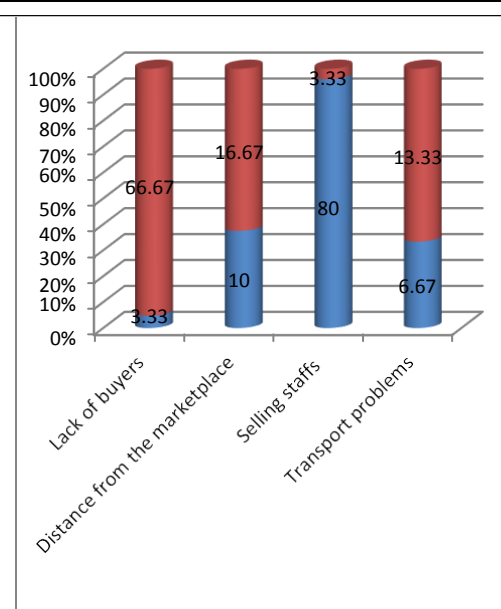
Figure 28. Comparison of problems in selling milk (percentage of respondents)

4.5 Cost and income from the commercial dairy farms

The cost of feeding, breeding, housing, equipment and treatment is presented in Table 19. To analyze the cost-return it is necessary to describe the feed cost, breeding cost, cost of housing and equipment and also treatment cost of cow rearing. The average cost of labour was higher than the average cost of housing & equipment, breeding, veterinary doctor, medicine & vaccine. It was estimated that the rearing cost of urban dairy cow was Tk.165/cow/day and return from rearing dairy cow was Tk.330/cow/day contrariwise rural dairy cow was Tk.120/cow/day and return from rearing dairy cow was Tk.235/cow/day. The net return of urban dairy cow was Tk.165/cow/day and only Tk.115/cow/day from rural dairy cow in the study areas and cost benefit ratio of urban dairy cow was 1: 2 and 1: 2 for rural dairy cow. The average monthly income per dairy animal of urban farm owners was Tk.5000/- and the rural farm owners was only Tk.3500/- in the study areas.

Table 19: Cost of feeding, breeding, housing, equipment and treatment

Respondents (N=30+30=60)

Category	Cost/Cow/day BDT	
	Urban	Rural
Average housing and equipment cost	5	5
Average feed cost	120	95
Average breeding cost	5	5
Average labour & staff cost	25	10
Average treatment cost	10	5
Total rearing cost/cow/day	165	120
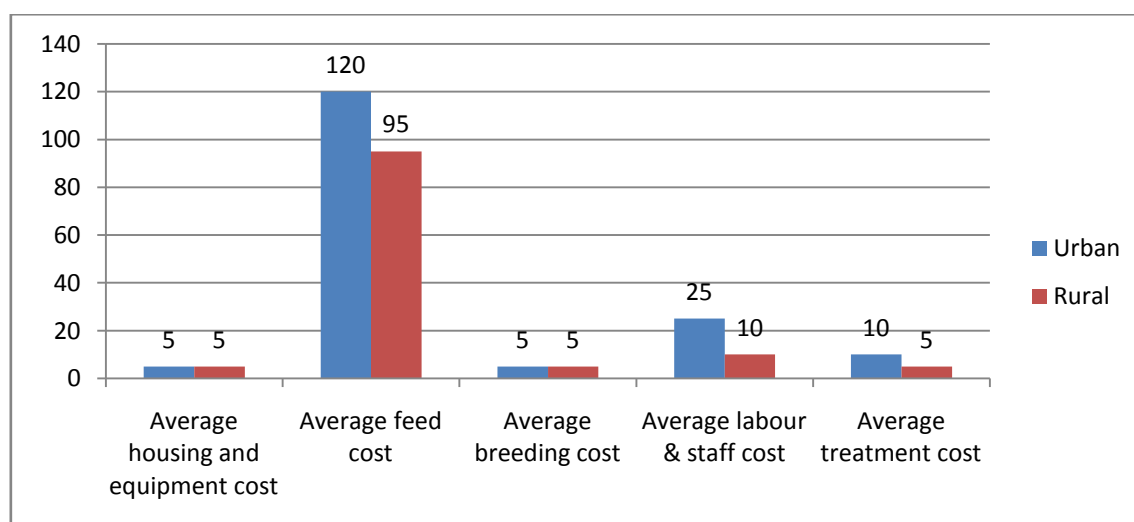
Figure 29. Cost of feeding, breeding, housing, equipment and treatment/cow/day

4.6 Impact of Milk Production on Livelihood

The following sub section presents the results and discussion on the impact of milk production on livelihood of the commercial dairy farmer with specific reference to income, food security and assets.

4.6.1 Impact on income

For most farmers, the assurance of a daily income from milk sales is an important feature in their livelihood (Utiger *et al.*, 2000). In a similar study conducted in Morogoro Municipality by Urassa and Raphael (2002) it was found that income or profit from the dairy enterprise is mainly used on the following activities: furnishing houses, house, construction/ rehabilitation, investing in other income generating activities, education and on other things (such food, health services). Thus, there are many advantages that commercial dairy farming brings to a community, but the most measurable is its impact on the income.

Commercial dairy farmer's income from milk sales helped their families to acquire additional land, improve their houses (and cattle sheds), finance other businesses, send their children for education and expand their dairy business. Utiger (2000) established that, in two districts in Kenya, dairy cattle farming was cited as the most valued source of livelihood in terms of its profit, dependability and utility. The highest ranked advantage associated with dairy farming was milk for home consumption and income, followed in order of importance by manure production, direct income from the sale of livestock, meat, and self employment, resource for bride wealth and prestige, and bio-fuel. In essence, the advantages of dairy farming are tied to its dependability and reliability as a source of income.

Results in Table 20 indicate that majority (53%) of the urban respondents acknowledged that their income had increased as a result of keeping commercial dairy cattle, 27.00% reported that their income had remained the same while 20% indicated that their income had decreased. On the other hand, majority (70%) of the rural respondents acknowledged that their income had increased as a result of keeping commercial dairy cattle, 23.00% reported that their income had remained the same while only 7% indicated that their income had decreased.

Table 20: Impact of commercial dairy farms on income

Respondents (N=30+30=60)

Status of income	Frequency		Percentage	
	Urban	Rural	Urban	Rural
Increased	16	21	53.33	70.00
Stable or same	8	7	26.67	23.33
Decreased	6	2	20.00	6.67
Total	30	30	100	100
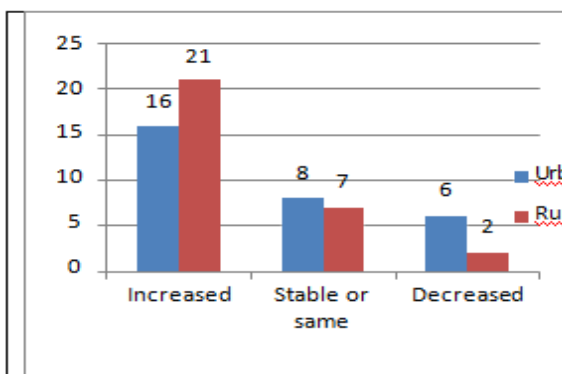
Figure 30. Comparison of household income (number of respondents)
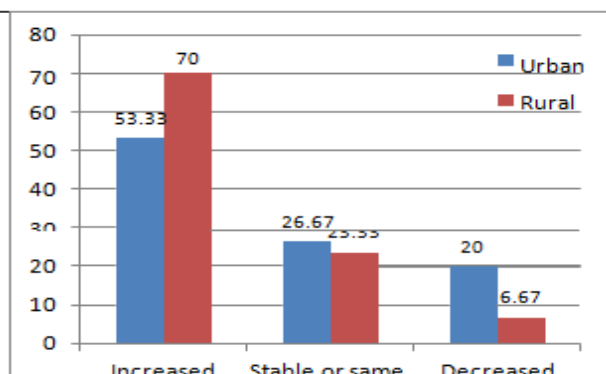
Figure 31. Comparison of household income (percentage of respondents)

4.6.2 Increase the number of dairy cows and expansion of farms

Results in Table 21 indicate that majority (40%) of the urban respondents acknowledged that their income had increased and expansion of farms, 40.00% reported had remained unchanged number of dairy cows while 20% were not willing to expand their farms. On the other hand, majority (77%) of the rural respondents willing to expand the farms and dairy cows and remaining 23% were not willing to expand their farms.

Table 21. Increase the of number of dairy cows and expansion of farms

Respondents (N=30+30=60)

Expansion of farms	Frequency		Percentage	
	Urban	Rural	Urban	Rural
Increased	12	23	40.00	76.67
Stable or same	12	5	40.00	16.66
Decreased	6	2	20.00	6.67
Total	30	30	100	100
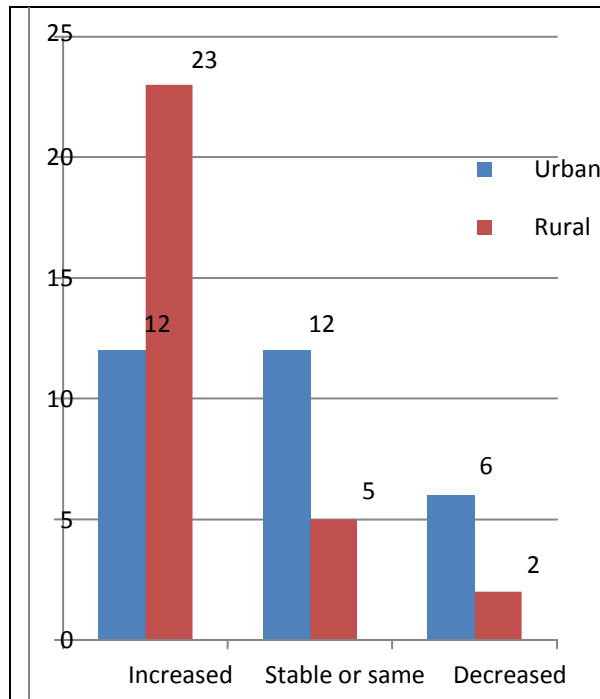
Figure 32. Comparison of farm expansion (number of respondents)	**Figure 33.** Comparison of farm expansion (percentage of respondents)
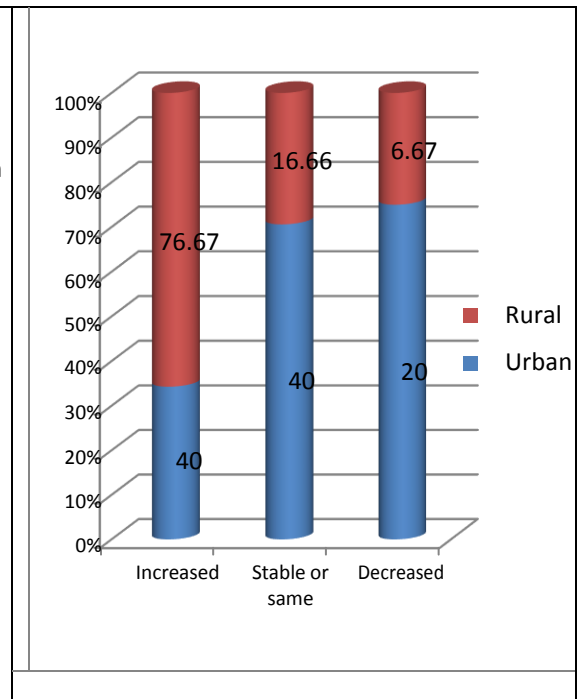
4.6.3 Distribution of annual income from milk

Table 22 showed that the income from the sale of milk per animal per year, majority (37%) of the urban respondents obtained a minimum of BDT 100001 to 150000, 27% obtained BDT 150001 – 200000, 30% obtained BDT 75001 to 100000 and remaining 7% obtained BDT 50001 to 75000. On the other hand, 43% of the urban respondents obtained a minimum of BDT 75001 to 100000, 30% obtained BDT 100001 – 150000, 20% obtained BDT 50000 – 75000 and remaining 7% obtained BDT 150001 to 200000 per animal per year.

Table 22. Average annual income per animal

Respondents (N=30+30=60)

Average annual income/cow (BDT)	Frequency		Percentage	
	Urban	Rural	Urban	Rural
50000 - 75000	2	6	6.66	20.00
75001 - 100000	9	13	30.00	43.33
100001 - 150000	11	9	36.67	30.00
150001 - 200000	8	2	26.67	6.67
Total	30	30	100	100

4.6.4 Expenditure of income derived from milk

Commercial dairy farms income mainly from milk which is spent for different items/services as indicated by the respondents (Table 23).

Table 23. Expenditure derived from milking income

Respondents (N=30+30=60)

Expenses	Frequency		Percentage	
	Urban	Rural	Urban	Rural
Buying animal feed and new animal	10	8	33.33	26.66
Treatment/vaccination of animals	3	2	10.00	6.67
Household expenses (eg. food, clothes)	9	10	30.00	33.33
Building/ rehabilitation of house	2	3	6.67	10.00
Education purposed	2	2	6.67	6.67
Health services	1	1	3.33	3.33
Household assets	1	2	3.33	6.67
Expansion of business expenses	2	2	6.67	6.67
Total	30	30	100	100

The table also showed that majority of the respondents spent their income from milk on meeting household expenses such as food and clothes. Other expenditures in order of importance were buying animal feeds and new animal and treatment/vaccination of animals, health and education services, building/rehabilitation of house and expansion of business expenses.

CHAPTER: FIVE

SUMMARY AND CONCLUSIONS

The study mainly describes the socio-economic characteristics of the commercial dairy farmers and their management which includes breeds of farm animal, housing, feeding and breeding of commercial dairy farms. It also presents the number of cows milked, milk production and consumed at market level per day. It also explains the marketing and problems of selling of the milk. It also presents the health care and treatment practices of commercial dairy farms. The study presents the utilization of cow dung and urine in rural and urban areas. Lastly, the study presents the impact of commercial dairy farms for the development of livelihood i.e. income, food security and assets derived from farm, employment generation, social value etc.

Study results conclude that both Rural and Urban farmers play significant role in the agricultural sector development by emphasizing on commercializing the dairy subsector in Bangladesh. Developments initiatives over the last few decades clearly showed that sustainable improvements in productivity played by the commercial dairy farmers, production, processing and marketing of the milk and milk product in dairy sector of the country. Finally, it can be concluded that the commercial dairy production was found to be an important and have the potential towards food security, improve family nutrition, farmers income and employment generation. However, disease, high price of concentrate feed, unavailable of pasture land, high price of medicine, high price of vaccine, low price of milk, inadequate veterinary service, insufficient field worker for dairy farm & AI, lack of credit and modern technology were main constraints to limit commercial dairy production in the study area. In can also be concluded that by eliminating the above mentioned problems and also by supplying all kinds of facilities, commercial dairy farming, specially in the rural areas, can play important role in developing our economy.

Based on the study results, the following recommendations can be made for the commercial dairy farmers to developed countries economy:

(i) Government might facilitate to improve milk production by providing better dairy breeds, adequate extension services, training, short courses, study tours, innovative fair, attending farmers show and adequate inputs supply.

(ii) Well organized marketing channels and storage facilities for milk & milk products would be needed.

(iii) Dairy farmers are to encouraged, motivated, educated, trained to form their own cooperatives, societies and communities that will contribute effectively to the market efficiency which would play important role in developing agro-based economy.

CHAPTER: SIX

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Map 4: Divisions of Bangladesh

Map 5: Dhaka Division

Department of Animal Production and Management
Sher-e-Bangla Agricultural University
Dhaka-1207

Title: Impact of commercial dairy farms for the development of livelihood in rural and urban selected areas of Dhaka district in Bangladesh

Interviewing schedule No…………….
Date……………

<div align="center">Nature of area: Rural [   ]   Urban [   ]</div>

A: Socio-economic characteristics of the commercial dairy farmers:
Please tick or write the appropriate answer where applicable.
A1: Personal information of the farmer
    i.   Name   :
    ii. Owner of farm :
    iii. Village/ Ward :
    iv. Upazila/Thana:
    v. District   :
    vi. Phone/Mobile :

A2. Age of the respondent
    i.   20 to 30 years :   [   ]
    ii. 30 to 40 years :   [   ]
    iii. 40 to 50 years :   [   ]
    iv. 50 to 60 years :   [   ]
    v. 60 and above :   [   ]

A3. Sex of respondents
    i.   Female   :   [   ]
    ii. Male   :   [   ]

A4.What is your marital status
    i.   Single   :   [   ]
    ii. Married   :   [   ]
    iii. Divorced   :   [   ]
    iv. Widowed   :   [   ]

A5. Level of education
    i. No read and write :   [   ]
    ii. Self-educated   :   [   ]
    iii. Primary education :   Number of years attended…………….
    iv. Secondary education :   Number of years attended…………….
    v. College/University :   Number of years attended…………….

A6. Family type
    i.   Single   :   [   ]
    ii. Joint   :   [   ]

A7. Family size
    i. Small (<4)   :   [   ]
    ii. Medium(5<7) :   [   ]
    iii. Large(>7)   :   [   ]

A8. Earning member of the family
    i. Self   :   [   ]
    ii. Spouse   :   [   ]
    iii. Offspring   :   [   ]

A9. Agricultural land of the farmer
    i. Small (<1 hector):   [   ]
    ii. Medium(1<3 hec):   [   ]
    iii. Large(>3 hector):   [   ]

A10. Percentage of Agricultural land utilization
    i. <20%   :   [   ]
    ii. >20<50%   :   [   ]
    iii. >50<75%   :   [   ]
    iv. 100%   :   [   ]

A11. Farm land of the farmer
    i. Own   :   [   ]
    ii. Rental   :   [   ]
    iii. Lease   :   [   ]
    iv. Khash   :   [   ]

A12. Occupation of the farmer
    i. Primary   :   [   ]
    ii. Secondary   :   [   ]
    iii. Recreational :   [   ]

A13. Nature of the business
    i. Primary   :   [   ]
    ii. Secondary   :   [   ]

A14. Experience in farming
    i. <1 years   :   [   ]
    ii. >1<5 years :   [   ]
    iii. >5<10 years :   [   ]
    iv. >10 and above :   [   ]

A15. Training/Expertise of the farmer *(If trained, Indicate number of days/month)*
    i. Trained   :   [   ]
    ii. Un-trained :   [   ]

A16. Loan facilities of the farmer
    i. Yes   :   [   ] , if yes a. Personal b. Bank c. NGO/Cooperatives
    ii. No   :   [   ]

A17. Loan purposes of the farmer
    i. Business   :   [   ]
    ii. Housing   :   [   ]
    iii.Others   :   [   ]

B: Dairy cattle production

B1. Housing
B1.1. Location of the Commercial dairy farm
    i. Rural area   :   [   ]
    ii. Urban area   :   [   ]
    iii. Semi-urban :   [   ]

B1.2. Infrastructure of the Commercial dairy farm
    i. Satisfactory   :   [   ]
    ii.   Good   :   [   ]
    iii.   Better   :   [   ]

B1.3. Sanitation of the Commercial dairy farm
    i. Satisfactory   :   [   ]
    ii.   Good   :   [   ]
    iii.   Better   :   [   ]

B1.4. Provision of light and ventilation of the farm
    i.   Satisfactory: [   ]
    ii. Good   :   [   ]
    iii. Better   :   [   ]
    iv. Poor   :   [   ]

B1.5. Pattern of the farm shed
    i.   Open   :   [   ]
    ii. Closed   :   [   ]
    iii. Controlled :   [   ]

B1.6. Summer shed management
    i. Practiced   :   [   ]
    ii. Not practiced :   [   ]

B1.7. Winter shed management
    i. Practiced   :   [   ]
    ii. Not practiced :   [   ]

B2. Animal of the farm
B2.1. Types of cow of the Commercial dairy farm, if Cross-breed
    i. Dairy Breed: [   ]
    ii. Cross-breed: [   ]
    iii. Variety   : [   ]
    iv. Local   : [   ]

B2.2. Breeds of cow of the Commercial dairy farm, if Cross-breed
    i. Frisian   :   [   ]
    ii. Jersey   :   [   ]
    iii. Sindhi   :   [   ]
    iv. Others   :   [   ]

B2.3. Beside dairy cattle what other type of livestock do you keep? Indicate number of livestock   kept as appropriate.

No	Types of livestock	Number
1		
2		
3		
4		

B2.4. How did you get your first dairy cattle?
    i.   Buying from market   :   [   ]
    ii.   From neighbor   :   [   ]
    iii.   Gift   :   [   ]
    iv.   From farms/projects   :   [   ]

B2.5. What is your main source of capital invested in dairy production?
    ……………………………………………………………………………
B3. Feeding of the commercial dairy farm
B3.1. Frequency of feeding/day
    i. Once daily   :   [   ]
    ii. Twice daily   :   [   ]
    iii. Thrice daily :   [   ]
    iv. Adlibitum   :   [   ]

B3.2. Frequency of watering/day
    i. Once daily   :   [   ]
    ii. Twice daily   :   [   ]
    iii. Thrice daily   :   [   ]
    iv. Adlibitum   :   [   ]

B3.3. Feeding methods
    i.   Extensive :   [   ]
    ii.   Intensive :   [   ]
    iii.   Semi-intensive: [   ]
    iv.   Others   :   [   ]

B3.4. What types of feed do you provide
    i.   Roughage
    ii.   Concentrate
    iii.   Both

B3.5. Are these concentrates readily available?
    i.   Yes [   ]
    ii.   No [   ]

B3.6. Availability of feed ingredients in farming area
    i.   Roughage
    ii.   Concentrate
    iii.   Both

B3.7. Feed price in farming area
    i.   Low
    ii.   Medium
    iii.   High

B3.8. Do you provide mineral supplement to your dairy cow?
    i.   Yes [   ]
    ii.   No [   ]

B3.9. What type of mineral supplement do you feed your animals?
    i.   ……………..
    ii.   ……………..
    iii.   ……………..

B3.10. Are this mineral supplement available?
    i.   Yes [   ]
    ii.   No [   ]

B3.11. What are the major constraints which affect feeding in order of importance.
    i. ………………………………………
    ii. ………………………………………
    iii. ……………………………………….
    iv. ………………………………………

B4. Breeding of the commercial dairy farm
B4.1. Nature of Breeding
    i.   Natural insemination
    ii. Artificial Insemination (AI)
    iii. Both

B4.2. Age at puberty (month)
    i.   12 months
    ii. 18 months
    iii. 24 months

B4.3. Heat detection in the farm
    i.   Yes [   ]
    ii.   No [   ]

B4.4. Symptoms of heat detection in the farm
    i.   Mucus discharge
    ii. Mucus discharge & bellowing
    iii. Frequent urination
    iv. Mounting
    v.   Others

B4.5. Age at first calving (month)
    i. 24 months
    ii. 30 months
    iii. 36 months

B4.6. Birth weight (Kg)
    i. 20
    ii. 30
    iii. 40
    iv. 50

B4.7. Calving interval (month)
    i. 12 months
    ii. 18 months
    iii. 24 months

C. Milk and Milk production in a commercial dairy farm

C1. How many cows are being milked at present (in percentage)

   i. <20%   :   [   ]
   ii. >20<40%   :   [   ]
   iii. >40<60%   :   [   ]
   iv. >60<80%   :   [   ]

C2. Average milk production (Litter/day)

   i. 5 Kg
   ii. 10Kg
   iii. 15 Kg
   iv. 20 or more

C3. Fat % of milk

   i.   3.0
   ii.   3.50
   iii. 4.00
   iv.   more than 4.00

C4. Lactation length (months)

   i. 6 months
   ii. 7 months
   iii. 8 months
   iv. 9 months

C5. Choice of Dairy breeds in the farming area

   i. Friesian
   ii. Jersey
   iii. Sindhi
   iv. Variety or Others

C6. What are the major constraints which affect milk production in order of importance?

   i. ……………………………………………
   ii. …………………………………………
   iii. ………………………………………….
   iv. …………………………………………

D. Milk and bi-product (cow dung and urine) marketing

D1. Customer of milk in a commercial dairy farm

   i. Local consumer
   ii. Local producer
   iii. Dairy product producer agencies
   iv. Milk collection center

D2. Nature of marketing in a commercial dairy farm
    i. Self
    ii. Co-operative
    iii. Company
    iv. Others

D3. Besides milk, do you sell any milk by- products?
    i.   Yes [   ]
    ii.   No [   ]

D4. If Yes, what type of product?
    i.   …………………
    ii.   …………………
    iii.   …………………

D5. Challenge of Marketing in a commercial dairy farm
    i.   Easy
    ii.   Difficult
    iii.   More difficult

D6. Processing of Bi-product (cow dung and urine)
    i.   Bio-gas
    ii.   Compost
    iii.   Dung Fuel

D7. Bi-product (cow dung and urine) marketing
    i.   Sell
    ii.   Thrown
    iii.   Personal agriculture

D8. When do you get paid after selling your milk?
    i.   Daily
    ii.   Weekly
    iii.   Monthly
    iv.   Product adjustment with concentrate feed

D9. Please provide information about milk sold during 1st January 2018 to 31st December 2018

Period	Number of milking cow	Average milk produced per day (liter)	Average milk sold per day (BDT)	Average Length of milking	Average price per liter	Average total income
Wet season						
Dry season						
Total						

D10. What problems do you face in selling your milk?
  - i.   Lack of buyers   [   ]
  - ii.   Lack of transport   [   ]
  - iii. Distance from the market [   ]
  - iv.   Low price   [   ]

D11. Provide the following information on sources of income other than milk

No	Source of income	Value in BDT
1		
2		
3		

E. Health care and treatment practices

E1. Incidence of diseases
  - i.   FMD
  - ii.   Mastitis
  - iii. Anthrax
  - iv.   HS

E2. Isolation of sick animal
  - i.   Isolated
  - ii.   Not Isolated

E3. Do you follow vaccine schedule in the farm
  - i.   Yes [   ]
  - ii.   No [   ]

E4. If yes, what types of vaccine
  - i.   Live
  - ii.   Attenuated
  - iii.   Killed

E5. Do you follow Deworming schedule in the farm
  - i.   Yes [   ]
  - ii.   No [   ]

E6. Practice to control Ecto-parasites in the farm
  - i.   Yes [   ]
  - ii.   No [   ]

E7. Sources of vaccines and medicine
  - i.   Local market
  - ii.   Livestock office
  - iii.   MR of medicine company

E8. Do you have any Veterinary services
  i. Yes   [   ]
  ii. No   [   ]

E9. If yes, what types of Veterinary services do you provide
  i.   Private Veterinarian
  ii.   Government Veterinarian
  iii.   Local Quack
  iv.   Pharmacist

F. The Impact of commercial dairy farm on livelihood i.e. income, food security and assets

F1. On average, would you say your income has increased, remained more less the same or decreased after getting involved in dairy production?
  i.   Increased   [   ]
  ii.   Remain the same   [   ]
  iii. Decreased   [   ]

F2. On average, would say household food security, Clothing, Housing etc. have increased, remained more less the same, or decreased over the past 3-5 years?
  i.   Increased   [   ]
  ii.   Remain the same   [   ]
  iii. Decreased   [   ]

F3. Impact Commercial dairy farm on livelihood activity

Sl.	Category	Initial value (BDT)	Final value (BDT)
1	Food purchasing		
2	Cloth purchasing		
3	Health care		
4	Education		
5	Housing		
6	Social status		

F4. Please provide information on assets

Sl.	Type of the assets	Number	Value (BDT)
1	Land and building		
2	Furniture and Fixture		
3	Car		
4	Motorcycle/Bicycle		
	Total		

F5. Of the above assets which one did you purchase using income derived from dairy farm?

Sl.	Type of assets	Number	Value (BDT)
1			
2			
3			
	Total		

F6. Cost of rearing one dairy cow/year in commercial dairy Farm

Sl.	Cost Items	Cost/unit	Total Cost	Remark s

F7. Income from one dairy cow/year in commercial dairy Farm

Sl.	Items of Production	Quantity	Price/unit	Total Income
i.	Milk			
ii.	Calf			
iii.	Meat			
iv.	Cow dung			
v.	Urine			
	Total			

G. Constraints of Commercial dairy farming

G1.Lack of technical knowledge to manage

  i. Yes   [   ]
  ii. No   [   ]

G2. Low price of Milk and Milk products

  i. Yes   [   ]
  ii. No   [   ]

G3. Incidence of diseases (*If yes, mentioned..)*

  i. Yes   [   ]
  ii. No   [   ]

G4. High Price of Feed, medicine & vaccine
   i. Yes   [   ]
  ii. No   [   ]

G5. Lack of enough fodder and pasture
   i. Yes   [   ]
  ii. No   [   ]

G6. Lack of AI services
  i. Yes   [   ]
  ii. No   [   ]

G7. Bank loan and investment **for farm** construction
   i. Yes   [   ]
  ii. No   [   ]

G8. Lack of Storage Facility of Milk
  i. Yes   [   ]
  ii. No   [   ]

G9. Transport problems
  i. Yes   [   ]
  ii. No   [   ]

H. Suggestions
i.
ii.
iii.
iv.
v.

Signature of the interviewer

THANK YOU FOR YOUR COOPERATION