

Profitability and Factors Affecting Milk Supply: An Empirical Study on Dairy Farms in Chittagong District of Bangladesh

ABSTRACT

It was an attempt to examine the profitability and factor affecting milk supply of dairy farms in selected areas in Chittagong district. Primary data were collected from both milk producers and traders during the months of August to September 2015. Simple descriptive method and stepwise multiple regression models were used to analyze the data. The return over investment indicates that dairy farming is a profitable business in Chittagong district. Stepwise multiple regression models were specified and estimated to identify the factors affecting of milk supply of dairy farmers. Marketed surplus of milk was found to be an important element in the study of raw milk marketing. Regression analysis revealed that three variables i.e., Number of milking cows, theage of household head and experience of dairy farming, as important factors affecting sale volume of milk. The survey result identified that the supply of milk trading was predominantly traditional, fragmented and only one cooling plant which has limited capacity but no other formal agreement either collectors or farmers. As a result, most of the surplus milk absorbs by the sweetmeat shops.

Keywords: Profitability, Marketing costs, and margin, Milk Supply

1. INTRODUCTION

Dairy farming is an integral farming system in Bangladesh. It is an activity involving investment for milk production and marketing. Dairying plays a vital role in respect of nutrient, generation of income and employment. It is more efficient and intensive system in terms of nutrient and protein production for human consumption from a given quantity of resources than beef or sheep farming. Dairy farming also supports substantial employment in production, processing, and marketing [1]. Bangladesh is a country of rural based subsistence agriculture. About 47.6% of total labour force is engaged in this sector [2]. Livestock sector contributes 1.78% of GDP out of the 16.33% contribution of the agriculture

28 sector in the economy [3]. The total production of milk in Bangladesh in 2006-07 was 2.28 million tons
29 which were increased to 60.90 lac tons in 2013-14 [2]. In this context as dairy farming stands a
30 profitable business everywhere in the world, so dairying in the recent decades has been considered a
31 vital component in the diversification in Bangladesh.

32 Dairying in Bangladesh has been practiced for a long time at a small scale. Some noticeable
33 development has also taken place in breed improvement. In Bangladesh cross-breeding of local cows
34 with Australian, Sahiwal, Holstein-Friesian, Jersey, etc. are often seen in the rural areas. These cross
35 breeds are found as higher in terms of milk and meat. Milk is also considered as an ideal and a
36 completed food for the people of the whole world. There is no more complete food than milk yet known
37 to mankind. Moreover, milk today is a rare commodity even for many children. Both population growth
38 and rising income are contributing to rapid expansion in the demand for milk and its products as it has
39 the high-income elasticity of demand [4]. As a result of the development of modern civilization and
40 culture, particularly the emergence of high-income urban population group has changed the pattern of
41 milk consumption. They prefer packaged milk over ordinary raw milk. With the alarming growth of
42 population, the demand for milk and dairy products rises faster than the demand for crops both in
43 developing and developed countries. Due to the fact that production of milk and milk products has also
44 reportedly increased in Bangladesh in the last decade, though it is much more or less than the original
45 demand. There are some milk pocket areas in the country where dairy farming has been traditionally
46 an important and major component as mixed farming system. These areas are particularly located in
47 Pabna, Sirajgonj, Manikganj, Faridpur, Kishoreganj, Rangpur, Tangail districts and now it is extended
48 to Chittagong districts, as one of the dairies producing emerged areas. The numbers of cross breed
49 private dairy farms have been increasing in the study area over the last few years. As it is labour
50 intensive farming and support employment in production, processing, and marketing, so, development
51 of a dairy enterprise is essential to create the employment opportunity of the people in the country in
52 general and Chittagong region in particular. Development of this sub-sector may be considered as an
53 important strategy for poverty alleviation which is an objective of the government of Bangladesh.
54 Several studies conducted by different researchers [5, 6, 7, 8, 9, 10, 11] influenced to analyze the
55 profitability and factors affecting of milk supply on dairy farms in Chittagong district. The present study
56 was undertaken with the specific objectives of examining the profitability of dairy farms, estimating the

57 marketing cost and margin of milk traders and analyzing the factors affecting of milk supply to the
58 market.

59 2. METHODOLOGY

60 On the basis of specific objectives of the study and taking into consideration with associated
61 limitations, two Upazilas (Patiya and Banskhal) and Chittagong metropolitan city in Chittagong district
62 were purposively selected as the study area because of that comparatively higher concentration of
63 high yielding cross breed dairy cow. A sample of 55 milk producers and 35 milk traders were selected
64 by using simple random and convenience sampling technique respectively. Required data were
65 collected through the direct personal interview during the month of August to September 2015. The
66 collected raw data was carefully checked to detect errors and omissions and to avoid irrelevant
67 information. In order to achieve the objectives, descriptive statistics and the following analytical
68 techniques were used.

69 **Net Profit of Milk Producer:** To analyze the costs and returns of the milk producers or dairy farms by
70 tabular analysis following profit equation were used.

$$\pi = (P_m \times Q_m) + P_c + V_{bp} - \sum (P_{xi} \times X_i) - TFC$$

71 Where,

72 Π = Profit of milk producer per cow per year

73 P_m = per unit price of milk (Tk/litre)

74 Q_m = Quantity of milk (Litre/year)

75 P_c = Price of the calf (Tk/year)

76 V_{bp} = Value of by-product (cow-dung) (Tk. /year)

77 TFC = Total fixed cost of milk producer per cow per year

78 P_{xi} = per unit price of i-th inputs (Tk. /kg)

79 X_i = quantity of the i-th inputs per cow per year (kg)

80 $i = 1, 2, 3, \dots, n$ (number of input)

81 The BCR (undiscounted measure) was calculated by using the following formula:

82 Benefit cost ratio (BCR) = $\frac{\text{Gross revenue}}{\text{Gross cost}}$

83 The marketing margin and net margins of milk traders were estimated by using following
84 formula:

85 i) Gross marketing margin (Tk./litre) = Sale price (Tk. /litre) – purchase price (Tk. /litre).

86 ii) Net margin (Tk. /litre) = Gross marketing margin (Tk. /litre) - marketing cost (Tk. /litre)

87 **Market Supply Model:** Following multipleregression models were used to analyze the factors affecting
88 farm level milk supply [12].

$$Y = X'\beta + U$$

89 Where,

90 Y = quantity of milk supplied/marketed volume to market

91 X'= a vector of explanatory variables (Number of milking cows, theage of household head, thegender
92 of household head, education of household head,family size, experience, distance to market, market
93 information, theprice of milk, veterinary training and off-farm income.)

94 β = a vector of parameters to be estimated,U = disturbance term.

95 **Hypothesis, Variable Selection, and Definition:**

96 The marketable surplus may differ from region to region, within the same region, and even from
97 commodity to commodity. In order to identify determinants or factors influencing milk marketable
98 supply both continuous and discrete variables were hypothesized based on economic theories and
99 the findings of different empirical studies. Accordingly, in order to investigate the determinants of milk
100 supply, the following variables were constructed.

101 **Dependent variable**

102 **Total volume of Milk sale (litres)**

103 It is a continuous variable that represents the marketable supply of milk by individual farm-
104 households, which is measured in litres per day per farm.

105

106

107

108

109 **Independent/explanatory variable**

110 The explanatory variables expected to influence the dependent variable are the following;

111 **Age of Household Head (Age of HHH)**

112 It is a continuous variable and measured in years. Age of household head is believed to be wise in
113 resource use, on the other hand, young household heads have long investment horizon and it is
114 expected to have either positive or negative effect on the volume of milk sales.

115 **Sex of the Household Head (SEX of HHH)**

116 A dummy variable taking value zero if female and one if male is considered. It is expected to have
117 either positive or negative effect on the volume of milk sales.

118 **Education of the Household Head (EDU of HHH)**

119 It is a dummy variable measured in terms of whether the household has a formal education (literate) or
120 not (illiterate) which takes a value one if a household has formal education and zero otherwise.
121 Education broadens farmers' intelligence and enables them to perform the farming activities
122 intelligently, accurately and efficiently. Moreover, better-educated farmers tend to be more innovative
123 and therefore more likely to adopt the marketing systems. Formal education enhances the information
124 acquisition and adjustment abilities of the farmer, thereby improving the quality of decision making
125 [13]. Therefore, this variable is hypothesized to influence the volume of milk sales positively.

126 **Total Milk Production (TMP)**

127 It is a continuous variable that represents the production of milk by individual farm-households, which
128 is measured in litres per day.

129 **Family Size**

130 Family size is a continuous variable measured in terms of a number of family members in the
131 household. As dairying is labour intensive activities, dairy production in general and marketable
132 surplus of dairy products, in particular, is a function of labour. It is expected to have either positive or
133 negative effect on the volume of milk sales.

134 **Dairy Farming Experience (DFEXP)**

135 It is the total number of years a farmer stays in the production of milk. A household with a better
136 experience in dairy farming is expected to produce more amounts of milk and, as a result, he is
137 expected to supply more amounts of milk to market. Farmers with longer farming experience are
138 expected to be more knowledgeable and skillful [14]. Therefore, this variable is hypothesized to
139 positively influence milk marketable surplus.

140 **Number of milking cows/herd size (NMC)**

141 This variable is continuous and is measured in a number of milking cows owned. The marketable milk
142 volume of dairy farming is assumed to be positively influenced by the number of milking cows owned.

143 **Access to Extension Training (ACEXT)**

144 This variable is measured as a dummy variable taking a value of one if the dairy household has
145 access to dairy production extension service and zero otherwise. It is expected that extension service
146 widens the household's knowledge with regard to the use of improved dairy production technologies
147 and has positive impact on milk market participation decision and sale volume of milk. A number of
148 extension visits improve the household's intellectual capitals, which improves milk production and
149 divert dairy production resources. Therefore, a number of extension visits are hypothesized to impact
150 dairy household milk market entry decision and marketed volume of milk positively.

151 **Distance to Market (DMKT)**

152 This is the location of the dairy household from the nearest milk market and is measured in a kilometer.
153 The closer the dairy market to the dairy household, the lesser would be the transportation charges,
154 loss due to spoilage and better access to market information and facilities. This improves return to
155 labour and capital; increases farm gate price and the incentives to participate in the economic
156 transaction. In that case, distance from nearest milk market is hypothesized to be negatively related to
157 market participation decision and marketable milk surplus. On the other hand, distance from the dairy
158 household to market might be positive that indicates a direct relation of distance with a marketed
159 surplus. In a sense that, when lucrative prices are offered by some of the agencies than farmers are
160 ready to travel longer distances in order to sell their surplus amount. So, it is expected to have either
161 positive or negative effect on the volume of milk sales.

162 Market Information (MIF)

163 Farmers marketing decisions are based on market information, and poorly integrated markets may
164 convey inaccurate information, leading to inefficient product movement. Therefore, it is hypothesized
165 that market information is positively related to the marketable surplus.

166 Off-farm income (OFFI)

167 It is a continuous variable and measured in taka. This variable hypothesized a positively related to
168 sale volume of milk.

169 Table 1: Descriptions of the dependent and independent variable

Variables	Types	Values
Total Milk Marketed /Sales Volume(TMMV)	Continuous	liters
Age of Household Head(AHH)	Continuous	Number of years
Sex/Gender of Household Head(SHH)	Dummy	Male=1,Female=0
Education of Household Head(EHH)	Dummy	Literate=1, illiterate=0
Total Milk Production(TMP)	Continuous	liters
Family Size(FS)	Continuous	Number of Family Member
Experience(EXP)	Continuous	Number of years
Number of Milking Cows(NMC)	Continuous	Number of Cows
Veterinary Training(VT)	Dummy	Yes=1, No= 0
Price of Milk(PM)	Continuous	Taka per liter
Distance to Market(DMT)	Continuous	Kilometer
Market information(MIF)	Dummy	Yes=1, No=0
Off-farm income(OFFI)	Continuous	Taka

170

171 3. RESULT AND DISCUSSION

172 3. 1 Costs and Revenue of Rearing Cross-breed Dairy Farm

173 The gross annual costs and revenue per farm per cow of rearing cross-breed milching cows are
174 presented in Table 2. The gross cost per year per cow was estimated at Tk. 74, 208.54. The feed was
175 one of the major cost items (60.18 percent) of rearing cross-breed milching cows. The cost of feed

176 included expenses on paddy straw, green grass, rice bran, salt, vitamin, maize bran, pulse bran,
 177 molasses, oil cake, and wheat bran and others. The total feed cost per year per farm was estimated at
 178 Tk. 44,657.71. The gross revenue of dairy farm consisted of revenue from milk production, cow dung,
 179 and calf. The total gross revenue was Tk. 1,04,470.58 and the net margins per cow per year were Tk.
 180 30,262.08. The BCR (undiscounted) is a relative measure is used to compare benefits per unit of cost.
 181 The table shows that benefit-cost ratio of the dairy farm was 1.41 (this result conformity with the
 182 references number 8), which indicates that investment in dairy farming was profitable for individual
 183 producers' point of view (Table 2).

184 Table 2: Profitability analysis of raising Cross-breed dairy farms (per cow per year)

Items	Tk./year
Variable Costs:	
Feed cost	44,657.71 (60.18)
Labour cost	14,180.19 (19.11)
Electricity charge	795.92 (1.07)
Veterinary Cost	1,552.78 (2.09)
Miscellaneous cost	269.20 (0.36)
Fixed Costs:	
Housing Cost	5,257.79 (7.09)
Costs of capital	4,461.96 (6.01)
Interest on operating capital	3,032.99 (4.09)
Gross cost	74,208.54 (100)
Gross Revenue:	
Milk	91,530.61
Cow dung	1,408.63
Calf	11,536.49
Gross Revenue	1,04,470.58
Net Profit	30,262.08
BCR	1.41

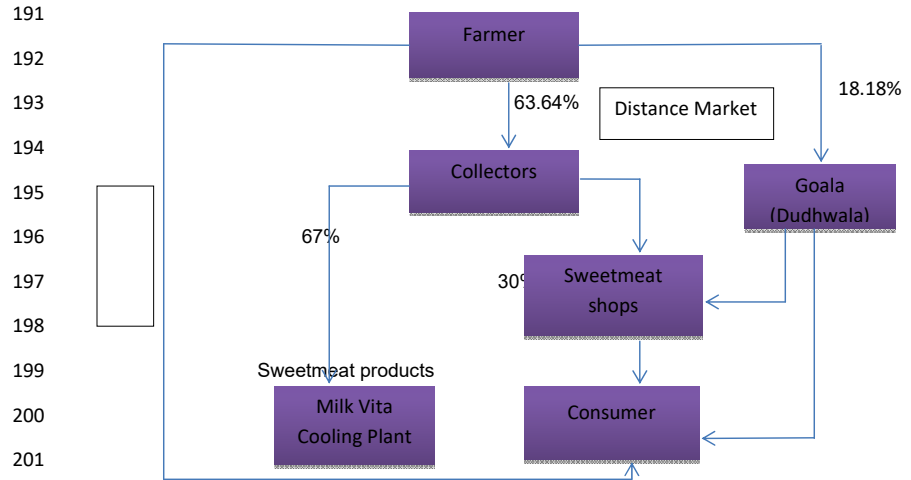
185 Source: Field survey (2015)

186 Note: Figures within parenthesis indicate percentage of total costs

187 1 US\$ = BDT 81.20 (Bangladesh Bank, July 15, 2017)

188 3.2 Milk Marketing Channels

189 In the study areas, a number of marketing channels were observed. A sketch of overall milk marketing
190 channels for the study area is shown in the following figure;



202 Figure 1: Marketing channels of raw milk in the study area

203 Marketing channels of raw milk in the study area moves from the producer to the ultimate consumer
204 through direct and indirect marketing channel. The main and most important two marketing channel,
205 which accounts for 63.64% of total milk marketed. This was the case reason this two channel can
206 absorb a large amount of surplus milk in the region while the local demand for milk is much less than
207 supply in the study area. The study found that most of the surplus milk absorbs by the sweetmeat
208 shops because Milk Vita has only one cooling plant which has limited capacity (5,000 litres). The
209 percentage of total supplied milk to the sweetmeat shops was varied during the month of May to
210 August because of summer or fruits season. So, the main and most important two marketing channel
211 are shown in below;

212 Farmer-Collector-Sweetmeat shops-Consumer

213 Farmer-Collector-Milk-Vita cooling plant

214 3.3 Marketing Cost and Margin of Milk traders (Collectors)

Marketing cost of milk collectors (i.e., that middleman who purchase the large quantities of milk from the producers and also they maintain their good relationship with the dairy plant and sweetmeats shops.) includes labour, transportation, milk container, spoilage, rent, electricity and personal expenses etc. The average estimated marketing cost per litre of milk incurred by the milk collector was 3.39. The gross margin was Tk. 6. So the net margin by milk collector was Tk. 2.61 per litre (Table 3). The total marketing costs of milk collectors were low because of that, per day raw milk transaction of collectors was 1371.4 litres (on average) and market concentration ratio of milk collector was highest in sampled area.

Table 3: Marketing costs and margin of milk traders (collectors)

Particulars	Tk./litre
Labour	2.28
Transportation	0.56
Milk container	0.02
Spoilage	0.01
Rent	0.12
Electricity	0.17
Mobile costs	0.09
Personal Expenses	0.14
Total Marketing Cost	3.39
Average purchase price	45
Average sales price	51
Gross margin	6
Net margin	2.61
Volume of milk trading per day (liters on an average)	1371.4

Source: Field survey (2015)

3.4 Marketing Cost and Margin of Goala (Dudhwalla)

Marketing cost of Goala (farmer called dudhwalla i.e., that middleman who purchase the small quantities of milk from the producers and sells their commodity to consumer and sweetmeat

shop.)includes labour, transportation, milk container and personal expenses etc. the average estimated marketing cost per litre of milk incurred by the milk traders was 12.39. The gross margin was Tk. 18. So the net margin by milk traders was Tk. 5.61 per litre (Table 4).

Table 4: Marketing costs and margin of milk traders(Goala)

Particulars	Tk./litre
Labour	6.52
Transportation	3.64
Milk container	0.13
Spoilage	0.59
Personal expenses	1.51
Total marketing cost	12.39
Average purchase price	46
Average sales price	64
Gross margin	18
Net margin	5.61

Source: Field survey (2015)

3.5. Econometric Analysis

Before running the regression of the study, the correlation was tried to find out the relationship between total production of milk and number of milking cows for the best-fitted model. Correlation coefficient shows that this two variable is strongly positively correlated with statistically significant ($r = 0.94$, $P=0.00$) and reject the null hypothesis. According to the result and review the several studies [15, 16, 17, 18] the study used the number of milking cows for avoiding the multicollinearity problem and autocorrelation.

3.5.1 Regression Results of Factors Affecting Milk Supply

The results of the econometric analysis (stepwise multiple regression models) examine the characteristics of milk producers and its impact on marketed supply of milk to the market. Different variables were expected to influence the volume of marketed surplus of milk like age of household

head, sex of household head, education level of household head, family size, experience of dairy farming, Number of milking cows, access to extension services (veterinary training), market information, price of milk, off-farm income and distance from the market. Stepwisemultiple regression models were employed to analyze the factors that affect the supply of milk. A VIF for continuous variables and contingency coefficient values for discrete variables were computed to check the existence of multicollinearity problem. The results revealed that no significant problems of multicollinearity and the high degree of association among continuous and discrete variables were detected. Durbin-Watson (2.17) test used to detect the autocorrelation. The result reveals there is no autocorrelation among the variables. Among the eleven hypothesized factors affecting marketed surplus of milk, three variables (Number of milking cows, Age of household head and experience of dairy farming) were found significant. The coefficient of multiple determinations (R^2) was estimated 0.91 and adjusted R^2 was 0.90. This means that 91% of the variation in the dependent variable is explained by the explanatory variables included in the model. Furthermore, the adjusted R^2 of 90% which is significant has further consolidated the goodness of the model, hence, its econometrics significance and reliability (Table5).

Table 5: Stepwise Regression Results of Factors Affecting of Marketed Surplus of Milk

Independent variable	Coefficients	t	Sig	VIF
Constant	-6.67	-3.42	0.001	
Number of milking cows	6.24***	15.29	0.000	1.88
Age of house hold head	0.08**	2.34	0.024	1.02
Experience of dairy farming	0.21**	2.14	0.037	1.90
F-statistics	180.33***			
R Square	0.91			
Adjusted R Square	0.90			
Durbin-Watson	2.17			

Dependent Variable: Total Volume of milk supplied per day per dairy farms (litres)

, * indicates significant at the level of 5% and 1% respectively.

As hypothesized number of milking cows (MCO) has a positive effect on marketed milk volume and is significant at 1% probability level. The model output predicts that the addition of one dairy milk cow causes the marketable cow milk surplus of the dairy household to rise by 6.24 liters per day per

dairyhousehold. This result is plausible and suggests that marketable milk surplus of the household in the study areas are more responsive to a number of milk cows. Furthermore, this result illustrates that marketable milk surplus per day increases in responses to the increase in a number of milking cow. In addition to that, the age of household head had a positive and significant impact on milk marketed volume of sampled dairy farms. The positive and statistically significant relationship between two variables indicates that older dairy household head could have more milking cows increasing the possibility of household milk marketed volume. The result also elaborates that when the household age increases by one year, the probability of milk marketable volume increases by 0.08 litres per day per dairy household.

The experience of dairy farming has a positive effect on milk sales volume per household and is statistically significant at 5% probability level. The result suggests that as farmers have high dairy farming experience the amount of milk supplied to the market increased through its effect on milk production. The model also confirms that every one year of experience in dairy production leads to a rise in daily milk sales volume by 0.21 litres per day per dairy household.

4. CONCLUSION

Dairy farming is an economic activity involving investment for milk production and marketing. The study aimed to determine the profitability and factors affecting milk supply of dairy farmers. The calculated net profit and the benefit-cost ratio (BCR) indicate that dairy farming is a profitable business in Chittagong district. Econometric results also indicate that number of milking cows, the age of household head and experience of dairy farming, significantly associated with marketed supply of milk. Dairy farming is a profitable business although it has been facing problems in relation to the production and supply of milk. Though the study areas only one cooling plant which has limited capacity but has no formal contract with either collectors or dairy farmers. As a result, most of the surplus milk absorbs by the sweetmeat shops.

If proper remedial measures could be taken and formal institutional arrangements could be established, then milk production and supply could be a viable and more extend in a commercial enterprise which in turn would play a vital role to overcome the problems of low income, unemployment, undernutrition and unfavorable balance of payment situation of the country. Therefore, the government should provide necessary assistance for the establishment of feed mills in the private sector for making the quality feed available. The DLS (Department of Livestock

295 Services)and NGOs (Non-Government Organizations) should strengthen their programs to train the
296 dairy farmers on dairy management, animal health care, sanitation, and marketing techniques of milk
297 on a priority basis. In order to improve preservation facilities provision should be made for the supply of
298 isolated containers to the farm owners at an affordable price.

299

300 REFERENCES

- 301 1. Michael J.Dairy Development in Sub-Saharan African- A Study of Issues and Options.World Bank
302 Technical Paper, Number 135, The World Bank, Washington, D.C., U.S.A.1991. Cited From Pandit
303 (1993).
- 304 2. BER. *Bangladesh Economic Review*. Economic Advisors Wing, Finance Division, Ministry of
305 Finance, Government of People's Republic of Bangladesh, Dhaka,2015.
- 306 3. BBS.Bangladesh Bureau of Statistics. *Statistical Yearbook of Bangladesh*, Ministry of Planning,
307 Government of the People's Republic of Bangladesh, Dhaka, 2014.
- 308 4. Mellor JW, Bruno DP. Estimate and Projection of Milk Production and Use of Concentrate Feeds,
309 Cornell International Agricultural Development Bulletin 6.India,1996.
- 310 5. Shahinur M. An Economic Analysis on Dairy Cow Rearing In Selected Areas of Bangladesh. MS
311 thesis submitted to the Department of Agricultural Economics, Bangladesh Agricultural University,
312 Mymensingh,2009.
- 313 6. Kuddus MA. Production and consumption aspects of milk in some selected areas of Mymensingh.
314 Bangladesh Journal of Agricultural Economics. 2006; 29:39-52.
- 315 7. Chowdhury S. Profitability of Dairy Farming under "Bangladesh Milk Producer Cooperative Union
316 Limited" in Sirajgonj District. MS thesis, submitted to the Department of Agricultural Economics,
317 Bangladesh Agricultural University, Mymensingh,2005.
- 318 8. Mandal AK. Supply Chain Analysis of Wholesale Milk Market in Selected Areas of Dhaka district.
319 M.S. thesis submitted to the Department of Cooperation and Marketing, Bangladesh Agricultural
320 University, Mymensingh, 2006.

- 321 9. Pathan F, Miah TH, Hossain M. Prospects and Problems of Small-holders Dairy Farming: A Case
322 of Bhaluka Upazila in Mymensingh District of Bangladesh. Bangladesh Journal of Political Economy,
323 2011. 27. 1(2): 253-264.
- 324 10. Amin KMR. A Study on Marketing of Milk in Selected Northern District of Bangladesh. M.S. thesis
325 submitted to the Department of Cooperation and Marketing, Bangladesh Agricultural University,
326 Mymensingh, 2000.
- 327 11. Gizachew G. Dairy Marketing Patterns and Efficiency: The Case of Ada' Liben District, eastern
328 Oromia. M.Sc. Thesis presented to Alemaya University, Ethiopia, 2005.
- 329 12. Greene, W. Econometric Analysis. 4th edn. NJ: Prentice Hall, Englewood Cliffs, 2000.
- 330 13. Fakoya OM, Agbonlahor, Dipeolu A. Attitude of women farmers towards sustainable land
331 management practices in South-Western Nigeria. World Journal of Agricultural Sciences, 2007.3(4):
332 536-542.
- 333 14. Ayelech T. Market chain analysis of fruits for Gomma woreda, Jimma zone, Oromia National
334 Regional State. M.Sc thesis presented to School of Graduate Studies, Haramaya University. 2011.
335 p110
- 336 15. Nga BT, Cuong THHa, LTT, Lebailly P. Milk Production and Marketing in Small Dairy Holders in
337 The Northern Area of Vietnam: A Case Study in Phudong. Vietnam's Socio-Economic
338 Development. 2012. ISSN 0868-359X, A quarterly review.
- 339 16. Demissie B, Komicha HH, Kedir A. Factors Affecting Camel and Cow milk Marketed Surplus: the
340 case of eastern Ethiopia. African Journal of Agricultural Science and Technology (AJAST). 2014.2(2).
341 54-58.
- 342 17. Altarawneh M. Estimating Supply and Demand Functions for Dairy Cows Milk Production. Asian
343 Journal of Agricultural Extension, Economics & Sociology. 2015. 7(3):1-5.
- 344 18. Balagtas JV, Coulibaly JY, Jabbar M, Negassa A. Dairy Market Participation with Endogenous
345 Livestock Ownership: Evidence from Cote d'Ivoire. Selected Paper prepared for presentation at the
346 American Agricultural Economics Association Annual Meeting, Portland, 2007.
- 347