Livestock Products Consumption Pattern in Selected Areas of Bangladesh

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Abstract

This study investigated consumption of livestock products in Bangladesh by utilizing the raw data of Household Income and Expenditures survey conducted from January to December 2012. A total of 300 household's food expenditure were analyzed with regards to income of producer as consumer, urban consumer and rural non- livestock producer as consumer. Livestock products constituted about 13.15 percent of the total food expenditure. This was the highest (17.21 percent) in the Dhaka city corporation and lowest (11.08 percent) in Sirajgonj. Among the different products of livestock expenditure, milk and chicken (as individual products) topped the list constituting respectively 6.62 and 2.18 percent of all consumption expenditures. Taking all areas together, rice cost (monthly/household) occupied about 40.13 percent of the food basket. For all areas, mean monthly household livestock consumption was the lowest i.e., 6.79 kg for the lowest income group while it was 49.96 kg for the highest income group. Milk has the highest proportion of consumption (50.73 percent) followed by, chicken (16.36 percent), beef (11.16 percent) and mutton (4.46 percent). Urban consumers' monthly livestock products consumption on average income groups was 17.80 kg. Since they were higher income groups, their consumption was supposed to be higher than any other types of consumers due to they were more conscious to take animal protein and health care. Both the models estimates dependency ratio had negative affects on household calorie intake significantly, whereas land holding, mother's education and location dummy positively influence on caloric intake. The location dummy suggesting that in urban area (D=1) calorie intake was respectively higher than that of rural area by about 41.51 kcal/AE.

Keywords: Consumption, Livestock products, Caloric intake

1. Introduction

During the 20th century, world consumption expenditures have increased at an unprecedented rate; consequently, living standards have improved, and more people are better fed and housed than ever before (United Nations Development Program, 1998).There is a strong positive relationship between the level of income and the consumption of animal protein, with the consumption of meat, milk and eggs increasing at the expense of staple foods. Developing countries are embarking on higher meat consumption at much lower levels of gross domestic product than the industrialized countries did some 20-30 years ago. Urbanization is a major driving force influencing global demand for livestock products. Urbanization stimulates improvements in infrastructure, including cold chains, which permit trade in perishable goods. Compared with the less

diversified diets of the rural communities, city dwellers have a varied diet rich in animal proteins and fats, and characterized by higher consumption of meat, poultry, milk and other dairy products. Per year per capita consumption of milk and meat in south Asia 67.5kg and 5.3kg in 1997-1999 which is projected to increase 106.9kg and 11.7kg respectively by 2030 (FAO, 2003).

Although Bangladesh has also achieved much progress, according to World Bank advancement on most human development indicators have been even more impressive (WB, 2007). Americans spend only 7.4% of their personal consumption expenditure on food eaten at home, whereas over 50% of a household's budget in India or the Philippines is spent on at-home food consumption (Putnam and Allshouse, 1999; Diamond and Moezzi, 2010). In Bangladesh 2005; 58.5% consumption expenditure accounted to food and beverage in rural area, where as the same was 45.1% in the urban area (Ghosh, 2010).

The consumption basket in rural areas is occupied mostly by rice the main food item (Deb, 1986).According to the report of the Directorate of Livestock Services (2006-2007) average per capita availability of meat is 21 gm per day, milk is 45 ml per day and egg is 38 (No.) per year whereas per capita requirement of meat is 120 gm per day, milk is 250 ml per day and egg is 104 (No.) per year. Foods of animal origin such as milk, eggs and meat of various kinds provide certain nutrients for well-balanced growth of children, women and industrial workers. Foods of animal origin have higher nutritional value because of protein, minerals and vitamins in addition to the energy they provide. In this context, it is essential to examine the answers relating to questions concerning livestock products consumption growth: How income has contributed to the growth of consumption expenditure by types of income groups? What have been the differences between urban and rural people caloric intake? The estimation of the consumption model of different socio-economic indicators like dependency ratio, income, fathers and mother's education, age and land holding would help to point the weakness and strength by formulating suitable policy. With the above objectives, the present study was carried out to find the consumption pattern of livestock products.

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II. Methodology

A consumer survey was undertaken to study the consumption pattern of livestock products. The necessary primary data were obtained from the sample consumers through personal interview with the help of pre-tested and structured schedules during January to December, 2012. Sirajgonj and Gazipur districts and Dhaka City Corporation were selected purposively and two Upazilas from each district were selected on the basis of concentration of livestock production. The selected Upazilas were Sreepur and Joydevpur in Gazipur district, Shahajadpur and Ullahpara in Sirajgonj district. Total sample for this study was 300 consumers and distributed homogenously among two districts and one city corporation (Newbold, 1994). Descriptive technique was used to analyze the data: sum, average and percentage were calculated to present the results and also used the consumption model.

Conceptual model of consumption

A calorie consumption model following Tschirley and Weber (1994), Subrahmanian and Deaton (1996), and Babatunde and Qaim (2010) was developed to determine the food consumption. The model is as follows:

(I) $C_i = a_0 + a_1 X_{1i} + a_2 X_{2i} + ----------+ a_k X_{ki} + \varepsilon i$

where, Ci is the per capita daily caloric intake for the ith household adjusted by the adult equivalent (AE) ratio (kcal); $X_{1i}.....X_{ki}$ are different household level characteristics of the ith household those may influence caloric intake; $a_0,.....a_k$ are the parameters to be estimated; and εi is the error term. All the household level variables are converted into adult equivalent (AE), in order to obtain numbers that are comparable across households of different sizes.

Model specification

From the general function (I), the caloric consumption model in the study area can be specified in actual variables as:

$$\ln C_i = a_0 + a_1 \ln X_1 + a_2 \ln X_2 + a_3 \ln X_3 + a_4 \ln X_4 + a_5 \ln X_5 + a_6 \ln X_6 + \beta_1 D_1 + \varepsilon i$$

Where, X_1 = Dependency ratio (Ratio of children/old person to total members AE)

X_2 = Total income per day /(AE)

X_3 = Fathers education (Years of formal schooling)

X_4 = Mothers education (Years of formal schooling)

X_5 = Age of household heads

X_6 = Land holding [Households total land ownership (ha/AE)]

D_1 = Location dummy (Urban = 1, Rural = 0)

i = 1, …….. n observations

$\beta_1$and β_2 = Parameters.

In order to obtain the depended variable caloric intake (Ci) of the caloric regression, households were asked during the survey about the quantity of different food items they consumed in the last seven days. Information was gathered for both home and market-supplied food items. Food quantities consumed at the household level were converted into calories using the locally available food composition table. Resulting calorie values were divided by the number of AEs in the respective households. Two different models were constructed by using linear and log from of the caloric intake. Household food expenditure was estimated including different food items such as rice, bread, meat, milk, egg, vegetables, pulses, oil, fruits, fish, spices, sugar and salt. Dependency ratio to total family members was another exogenous variable. Household members who were below ten years were considered children. Both the numerator and denominator were converted into Adult Equivalent (AE) units. For households where the mother was absent, the education of the women (in most cases the grandmother or elder sister) who carry out the responsibility of the mother was used.

III. Results and Discussion

Household food consumption pattern

Food consumption includes livestock (different products), rice, flour/wheat, fish, vegetables, pulses, oil, spices and fruits. Almost all of the food items are covered. Table 1 presents information on expenditure (in percentage terms) on each of food items consumed. The table 1 shows that livestock constituted about 13.15 percent of the total food expenditure. This was the highest (17.21) percent in the Dhaka City Corporation and lowest (11.08) percent in Sirajgonj. Among the different products of livestock expenditure, milk and chicken (as individual products) topped the list constituting respectively 6.62 and 2.18 percent of all consumption expenditures. The third important products in the livestock basket were egg accounting for 2.04 percent of the total food expenditure. Mutton cost was also very negligible constituting about 0.59 percent of all expenditure. Among the non-livestock expenditure, rice cost (monthly/household) accounts for the highest of all food expenditure. This rages from a minimum of 30.23 percent in Dhaka City Corporation to a maximum of 49.18 percent in Sirajgonj. Taking all areas together, rice cost (monthly/household) occupied about 40.13 percent of the food basket. Consumption of fruits and sugar/Gur was very negligible. Monthly vegetables and fish costs account for about16.48 and 13.64 percent respectively of all food cost. Percentages of cost of pulses, oil and spices to total food cost were estimated to be 1.49, 3.08 and 1.16. Proportion of non-livestock expenditure to total expenditure of the food basket was lowest in Dhaka City Corporation (82.79) followed by Gazipur (88.84) and Sirajgonj (88.92), respectively.

Table1 Monthly Pattern of household food consumption expenditure by areas

Commodity	Expenditure (in percent)			
	Sirajgonj (n=100)	Gazipur (n=100)	Dhaka City Corporation (n=100)	All areas (n=300)
Livestock products:	11.08	11.16	17.21	13.15
Beef	0.93	1.03	2.73	1.56
Mutton	0.34	0.41	0.83	0.59
Chicken	1.18	2.29	3.08	2.18
Egg	1.28	2.63	2.19	2.04
Milk	8.98	4.59	8.27	6.62
Meat (Duck, sheep and Buffalo)	0.17	0.21	0.11	0.16
Other Food :	88.92	88.84	82.79	86.85
Rice	49.18	40.97	30.23	40.13
Wheat/Flour	7.22	9.94	10.03	9.03
Vegetables/potatoes	13.21	17.21	19.02	16.48
Pulses	1.62	2.11	0.74	1.49
Oil	2.84	3.19	4.98	3.08
Fish	12.19	12.61	16.11	13.64
Fruits	0.31	0.83	2.81	1.32
Spices	1.74	1.28	0.46	1.16
Sugar/Gur	0.56	0.41	0.32	0.43

Source: Author's calculation based on field survey, 2012.

Household livestock products consumption pattern

Livestock products consumption pattern of the sample household is presented in Table 2. The table shows that, as a single product, milk occupied the top position accounting for 50.73 percent of the total livestock consumption. This is followed by chicken (16.36 percent), egg (15.98 percent), beef (11.16 percent) and meat (1.35 percent). The table suggests that consumption of milk dominate the livestock consumption basket as independent products. Every household needs more milk due to their children and also adults. Milk consumption

was higher in Sirajgonj for the availability of fresh and pure milk and cheaper price than other areas.

Table2 Proportion of livestock products consumption to total livestock consumption (%)

Livestock products:	Areas			
	Sirajgonj	Gazipur	Dhaka City Corporation	All areas
Beef	8.39	9.23	15.86	11.16
Mutton	4.87	3.67	4.83	4.46
Chicken	10.65	20.52	17.89	16.36
Egg	11.65	23.57	12.73	15.98
Milk	62.99	41.13	48.05	50.73
Meat (Duck, sheep and buffalo)	1.54	1.88	0.64	1.35

Source: Authors calculation based on field survey, 2012.

Livestock products consumption by level of income

Mean consumption of livestock products for different areas according to income classes are presented in Table 3. It is evident from the table 3 on an average, income increased consumption of livestock products have also increased. This trend also applies to Sirajgonj. Gazipur and Dhaka City Corporation did not show any pattern of consumption with income. Majority of people in city area were educated and very conscious to take animal protein for their family. For all areas, average monthly household livestock consumption was lowest i.e. 6.79 kg for the lowest income group while it was 49.96 kg for the highest income group. This establishes the fact that income was directly related to livestock consumption.

Table3 Monthly Household livestock consumption according to income groups (kg)

Income groups (Taka)	Areas			
	Sirajgonj	Gazipur	Dhaka City Corporation	All areas
Below 12000	7.14	-	-	6.79
12,001 to 25,000	19.23	17.07	12.86	16.39
25,001 to 50,000	29.71	27.83	33.71	30.52
50,001 to 100,000	42.61	36.12	42.89	41.24
100,001 to 150,000	41.02	39.76	44.19	40.98
150,001 to 200,000	48.64	42.89	51.49	48.68
200,001 to 300,000	55.74	48.17	62.11	55.71
300,001 to 500,000	-	49.61	56.24	53.92
Above 500,000	-	45.41	53.21	49.96

Source: Authors calculation based on field survey, 2012.

Livestock products consumption across consumer types

Table 4 displays information on the livestock consumption of the sample areas. The general picture is that urban-consumers has the highest consumption. Their monthly/household consumption was 17.80 kg. Since they were higher income groups, their consumption was supposed to be higher than any other types of consumers. Producer as consumer had the next highest per month livestock consumption (12.55 kg). The least consumers were the rural non-producer consumers whose per household monthly consumption was (9.00 kg). Taking all these three groups together, per household monthly consumption of an average consumer stood at 13.11 kg. Figure 3 displays this information for different categories of sample consumers.

Table 4 Livestock products consumption per household (kg) and consumer types in Bangladesh

Livestock Products :	Producer as consumer	Urban consumer	Rural consumer (Non producer)	All consumers
Beef	1.04	4.12	1.93	2.71
Mutton	0.29	2.18	0.57	1.96
Chicken	3.67	4.33	2.83	4.03
Egg	1.92	3.07	1.1	2.03
Milk	4.61	32.16	10.94	29.24
Meat (Duck, sheep and buffalo)	1.02	0.94	0.62	0.96
Total/Month	12.55	17.80	9.00	13.11

Source: Author's calculation based on field survey, 2012.

Note: 1 egg = 60 grams

Food consumption: results from econometric analysis

Using linear and logarithmic forms of the dependent variable (caloric intake), two different models are estimated with same set of explanatory variables and the results are presented in Table 5 for comparing the two models.

Both models produced similar results in terms of direction of influence and level of significance. According to both the models estimates dependency ratio had negative affects on household calorie intake significantly, whereas land holding, mothers education and location dummy positively influence on caloric intake. The estimated coefficient of the variable in the linear model (Mode l) shows that each additional hectare of land, a household's daily calorie consumption increases by 4.47 kcal/AE. On the other hand, according to estimates of Model 2, a 1-hectare increase in land ownership will result in around a 0.3 percent increase in household's calorie intake. A negative significant impact of the dependency ratio on calorie intake implies that with an increasing dependency ratio of households consume fewer calories. The education of mother has a positive significant impact on a household's calorie intake. The location dummy suggesting that in urban area (D=1) calorie intake was higher than that of rural area by about 5.69 kcal/AE. In contrast, the estimates of model 2, calorie intake was higher in urban area compared to rural area by about

4 percent. The exogenous variable income has a positive sign in both models, but the effect is insignificant. The overall fit the both models is satisfactory where F value is 107.78 and 102.25 which is significant at 1 percent level.

Table 5 Regression results on household -level determinants of calorie intake of major food items

	Model 1 Dependent variable: calorie intake (kcal/day/AE)	Model 2 Dependent variable: log of calorie intake (kcal/day/AE)
N	300	300
Regressors	Coefficient	Coefficient
Dependency ratio	-237.666**	-0.115**
	(102.977)	(0.049)
Income	0.0061	4.116
	(0.0204)	(9.854)
Education of the father	-10,787	-0.0048
	(6.271)	(0.0030)
Education of the mother	98.2264***	0.044***
	(4.599)	(0.0022)
Age of the household head	2.196	0.0007
	(1.618)	(0.0008)
Land holding	4.478*	0.0023*
	(24.016)	(0.0115)
Location (1=Urban)	5.691**	0.039**
	(62.231)	(0.0305)
Constant	1657.117***	7.406***
	(113,649)	(0.054)
R-squared	0.74	0.73
F	107.78	102.25

***, ** and * denote 1%, 5% and 10% level of significance, AE=Adult equivalent.

Figures in the parentheses indicate standard errors

Determinants of livestock products (meat, milk and egg) consumption

Both models produced similar results in terms of direction of influence and level of significance. blein Ta 6 . According to both the models estimates dependency ratio had negative affects on household calorie intake and it is insignificant, whereas income, land holding, mother's education and location dummy positively influence on caloric intake of livestock products (meat, milk and egg). The estimated coefficient of the variable in the linear model (Mode l) shows that for each additional hectare of land, a household's daily calorie consumption increases by 0.9 livestock products (meat, milk and egg 5 kcal/AE. On the other hand, according to estimates of model 2, a 1-hectare increase in land ownership will result in around 5.15 percent increase in household's calorie intake. The location dummy suggesting that in urban area (D=1) calorie intake was higher than that of rural area by about 41.51 kcal/AE. In contrast, the estimates of model 2, calorie intake was higher in urban area compared to rural area by about 58 percent. On the contrary, both the models income has a positive sign and significant. The overall fit the both models is satisfactory where F value is 50 and 54.64 which is significant at 1 percent level.

Table 6 Regression results on household -level determinants of calorie intake of livestock products

	Model 1 Dependent variable: calorie intake (kcal/day/AE)	Model 2 Dependent variable: log of calorie intake (kcal/day/AE)
N	300	300
Regressors	Coefficient	Coefficient
Dependency ratio	-7.1792	-0.1224
	(9.98147)	(0.1284)
Income	0.00995***	0.00009***
	(0.00198)	(0.000025)
Education of the father	1.50494	0.0275
	(0.6726)	(0.0087)
Education of the mother	0.6787**	0.0047**
	(0.5266)	(0.0068)
Age of the household head	0.15523	0.00065
	(0.1569)	(0.0021)
Land holding	0.94538*	0.0515**
	(2.3476)	(0.0304)
Location (1=Urban)	41.508***	0.582***
	(6.1235)	(0.0790)
Constant	35.993***	3.6233***
	(10.72)	(0.1373)
R-squared	0.58	0.60
F	50.00	54.64

***, ** and * denote 1%, 5% and 10% level of significance, AE=Adult equivalent.

Figures in the parentheses indicate standard errors

IV. Conclusions

As a single product, milk occupied the top position of the total livestock consumption. For all of the livestock products variation of consumption was high across income class. In contrast, higher income groups' consumption of meat (duck. sheep and buffalo) was very lower. The general picture is that urban-consumers had the highest consumption for livestock products. There is a strong positive relationship between the level of income and the consumption of animal protein, with the consumption of meat, milk and eggs. The least consuming consumers were the rural non-producer consumers. The education of mother has a positive significant impact on a household's calorie intake. On the other hand, urban area calorie intake was higher than that of rural area. Government should ensure adequate animal nutrition for all types of consumers, especially rural lower income group's children and women.

References

Babatunde, R. O. and Qaim, M. (2010). Impact of Off-farm Income on Food Security and Nutrition in Nigeria. Food Policy 35(4):303-311.

Bruinsma J, ed. (2003). World Agriculture: Towards 2015/2030. An FAO Perspective Rome, Food and Agriculture Organization of the United Nations/London, Earthscan.

Deb, Nibaran Chandra (1986). Consumption Pattern in Rural Bangladesh. *The Bangladesh Development Studies*, **XIV** (1), 1-28.

DLS (2006-2007). Directorate of Livestock Services, Farmgate, Khamarbari, Dhaka.

Diamond, Rick and Moezzi, Mithra (2010). Changing Trends: A Brief History of the USA Household Consumption of Energy, Water, Food, Beverages and Tobacco.[WWW document]. URL http://epb.lbl.gov/homepages/Rick_Diamond/LBNL55011-trends.pdf (accessed 15 May 2010).

Ghosh, B.K. (2010). Rural-Urban Consumption Patterns In Bangladesh. International Review of Business Research Papers Volume 6. Number 4. Pp. 30 – 47.

Newbold, P. (1994). Statistics for Business and Economics, Prentice-Hall, Inc. Pp- 860.

Putnam, Judith Jones and Allshouse, Jane E. (1999). Food Consumption, Prices and Expenditures, 1970-1997. US Department of Agriculture, Statistical Bulletin No. 965. [WWW document]. URL http://www.ers.usda.gov/Publications/SB965/ (accessed 21

August 2009).

Subramanian, S and Deaton, A. (1996). The Demand for Food and Calories. The Journal of Political Economy 104(1):133-162.

Tschirley, D.L. and Weber, M.T. (1994). Food Security Strategies under Extremely Adverse Conditions: The Determinants of Household Income and Consumption in Rural Mozambique. World Development 22(2):159-173.

United Nations Development Program (1998). Overview: Changing Today's Consumption Patterns for Tomorrow's Human Development. Human Development Report1998.URLhttp://hdr.undp.org/en/media/hdr_1998_en_overview.pdf (accessed 8 April 2009).

World Bank (2007). Bangladesh: Strategy for Sustained Growth. Bangladesh Development Series Paper No. 18. Dhaka: World Bank.