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Production and consumption behaviour of poultry-meat and egg in rural and urban areas of Bangladesh

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Abstract

This study was undertaken with a view to determining the poultry and egg production and their consumption behaviour with variation in income in rural and urban areas of Bangladesh. For this purpose, 800 households from 4 regions were interviewed. Results showed that the number of local poultry per urban and rural households were 0.56 and 16.26 respectively. The numbers of commercial layer per urban and rural households were 0.38 and 3.31 respectively. Annual egg production per layer were 48.16, 280.40 and 57.64 for local, commercial layer and duck respectively. It is revealed that per capita daily consumption of poultry meat and egg were respectively increased to 7.64g and 6.31g in 2002 compared to 6.04g and 4.82g in 1995. The calculated value of coefficient of income elasticity of demand for poultry meat and egg were +1.20 and +1.28, respectively. The most responsible factors that affected the demand for and supply of poultry meat and egg were identified. Some suggestions were made to improve the production and consumption of poultry and egg in the country.

Key words: Poultry, Egg, Production, Consumption, Income elasticity of demand

Introduction

Poultry production emerged as an integral part of farming system in Bangladesh. The farmer who cannot afford to rear cattle or goats can easily raise poultry. About 75 per cent of rural households and 89 per cent of the rural livestock households rear poultry under scavenging condition (Alam, 1998). It is an important source of cash income for the rural people. The scavenging poultry are dual-purpose birds providing both meat and eggs to the farmers. They are raised with little or no inputs and their productivity is very low and irregular (Huque, 1993).

Bangladesh has undergone a tremendous demographic, economic and social changes during the last two decades. Levels of national output have gone up along with improvements in infra-structural facilities, technological changes in the productive system, rapid urbanization, social polarization, change in the agrarian systems and in the pattern of employment in various fields. With these changes, people's food habit and preference in taste is also changing from carbohydrate to animal protein. The available information indicated that cereals accounted for the largest share of food consumption (79.7% in rural and 69.2% in urban areas, BBS, 1995-96). Cereals, non-leafy vegetables and roots and timbers contribute more than four-fifth of the total quantity consumed by rural people, and a little more than three-fifth of that consumed by urban people. Protein and other micro-nutrient rich food like fish, meat, eggs, milk and milk products, fats, oils and pulses, accounted less than 10 percent of the food consumed by rural people and about 16 percent by urban people (Jahan, 1995-96).

Now-a-days, commercial poultry is playing a vital role in meeting the protein gap in the country. They are mostly operated under intensive management. These birds are of high yielding strains and raised exclusively on commercial diets.

The growth rate of poultry population was 2.81 per cent in 1995-96 compared to 1983-84 and it was 3.4 per cent in 2001-02 compared to 1995-96. In terms of number, the poultry population during 1983-84, 1995-96 and 2001-02 were 7.64, 12.67 (BBS, 1983-84 & 1995-96) and 18.88 (DLS, 2001-02) millions, respectively. It is observed that in compared to 1983-84, the number of poultry population has been increased to 16.58% in 1995-96 and 247.11% in 2001-02.

However, the influence of increased production over the consumption was not known. Therefore, in this study an attempt was made to determine the production of poultry and eggs and their consumption behaviour with variation in income in rural and urban areas of Bangladesh. In addition to that, respective value of coefficient of income elasticity of demand for poultry meat and eggs were calculated. Moreover, factors affecting the demand for and supply of poultry meat and eggs were also analysed.

Materials and Methods

A pre-designed and pre-tested survey schedule was used to collect data from the field. The schedule was single but useable for data collection from each category of producers or traders alternately. The survey works were started from January and ended in June/2002.The necessary data were collected by quarterly visits to the respondents' houses.

From 4 geographical regions, 4 divisional districts, namely Rajshahi of Northern region, Sylhet and Chittagong of South-eastern region, Khulna of Western region and Old Dhaka of Central region was selected for the study. From each of 4 regions one urban area and one rural area was selected. One hundred households were selected randomly from each of Mahallas and Villages. Thus, there were, in all, 800 households for final investigations. Of those 100 households, there were 20 city dwellers/villagers, 20 assembly traders, 20 inter-district traders, 20 aratdars/wholesalers and 20 retailers. From each of these selected households, data on types of poultry reared, production of eggs, consumption of poultry meat and eggs, factors affecting demand for and supply of poultry meat and egg and household income were collected.

Based on consumption and income distribution behaviour, the elasticity of demand for poultry meat and egg was calculated. The formula for calculating the coefficient of income elasticity of demand by using arithmetic method is as follows:

$$e_{D/I} = \frac{\dfrac{Q_2 - Q_1}{Q_2 + Q_1}}{\dfrac{I_2 - I_1}{I_2 + I_1}} = \frac{\%\,\Delta Q}{\%\,\Delta I}$$

Where:
$e_{D/I}$ = coefficient of income elasticity of demand
Q_1 = Quantity before change
Q_2 = Quantity after change
I_1 = Income before change
I_2 = Income after change
Δ = change

The magnitude of the coefficient can range from zero to infinity. The sign of the elasticity of coefficient is universally understood to be negative for all goods except Giffen's goods (subject to exceptional circumstances in which a rise in price may lead to an increase in the quantity purchased; such cases are rare), because there exist inverse relationship between price and quantity. Any coefficient within the range from '0' to –1.0 is classified as relatively inelastic. Any coefficient greater than –1.0 is classified as relatively elastic. Any coefficient equal to zero is classified as perfectly inelastic. The sign of income elasticity of demand may be positive or negative depending on the nature of products. When the sign of the coefficient of income elasticity of demand is **positive**, it indicates **'superior products'** and **negative** indicates **'inferior products'** (McCoy, 1998).

The tabular technique using descriptive statistics such as mean, percentage and ratio were used to analyse the data. Semi-logarithmic Growth Model was used to determine the growth rate of poultry and egg production and projection was made on the basis of growth rate for the stipulated period. Poultry population and egg production were estimated considering 75% of agricultural households to total number of household (15062612) in Bangladesh (DAE, 2000-01).

Results and Discussion

Poultry population/household

Poultry population/household is presented in Table 1. In rural households, the number of broiler was higher (40.72) followed by local chicken (16.26), ducks (5.58) and commercial layer (3.31) and in urban households, the number of local chicken and commercial layer were 0.56 and 0.38, respectively. The number of local chicken is more or less similar to the study conducted by Rahman (2002). In duck grazing areas, the numbers of duck however, were much (206) higher (Huque and sultana, 2003) .The table further showed that cock: hen ratio for chicken and duck were 1:3.64 and 1:1.37, respectively. Rearing higher ratios of layer for chicken and duck indicated that farmers using them as regular source of their household incomes. No broilers and ducks were observed rearing in urban households in the study areas.

Table 1. Poultry population per household in the selected study areas

Divisions	Area	Local chicken					Broiler	Commercial layer	Duck				
		Cock	Hen	Growers	Chicks	Total			Male	Female	Growers	Chicks	Total
Dhaka	Urban	-	-	-	-	-	-	-	-	-	-	-	-
	Rural	1.50	6.50	3.98	7.00	18.98	58.49	4.44	0.62	1.45	0.68	1.50	4.25
Rajshahi	Urban	-	-	0.91	-	0.91	-	0.61	-	-	-	-	-
	Rural	1.20	5.69	2.55	5.90	15.34	36.32	3.35	2.09	1.73	0.92	1.52	6.26
Khulna	Urban	-	-	0.65	-	0.65	-	0.43	-	-	-	-	-
	Rural	1.70	5.43	4.84	3.78	15.75	28.83	2.32	1.32	2.00	1.15	1.16	5.63
Chittagong	Urban	-	-	0.69	-	0.69	-	0.46	-	-	-	-	-
	Rural	1.80	4.95	5.55	2.65	14.95	39.23	3.14	1.37	2.21	1.25	1.36	6.19
Average of all divisions	Urban	-	-	0.56	-	0.56	-	0.38	-	-	-	-	-
	Rural	1.55	5.64	4.23	4.83	16.26	40.72	3.31	1.35	1.85	1.00	1.38	5.58

Source: Field survey, 2002.

Comparison of poultry population among different sources

Local poultry population

Local poultry population of various sources and their projection for the year 2010 is presented in Table 2. The local poultry population for the year 1983-84 according to DLS and Huque & Huque were 76.41, 73.70 million numbers, respectively. According to BBS, DLS and Huque & Huque for the year 1994-95, local poultry population were 126.67, 140.15, 147.80 million numbers. According to BBS, DLS, Huque & Huque, Khan and our survey for the year 2001-02, local poultry population were 174.46, 188.83, 200.30, 170.10 and 183.67 million numbers, respectively. The local poultry population projection for the year 2010 would be stand at 242, 276, 396, 248 and 294 million numbers according to BBS, DLS, Huque & Huque, Khan, and our survey, respectively.

Commercial poultry population

Commercial poultry population is presented in Table 2. The commercial poultry population for the year 1983-84, 1995-96 and 2001-02 were 20.74, 124.12, 470.43 million numbers (Khan, 2001), and according to our estimate it was 497.41 million numbers for 2001-02. The projection for 2010 showed that the number of commercial poultry would stand for 2221 and 2492 million according to the sources of Khan, 2001 and our survey, respectively.

Table 2. Comparison of Poultry population among different sources

Local poultry:

Million number

Year/ Source	1983-84	1995-96	2001-2002	Growth Rate	Projection for 2010
BBS (1995-96)	76.41	126.67	168.33 (projected)	1.70	242
DLS (2001-2002)	-	140.15	188.83	1.76	276
Huque & Huque (2001-2002)	73.70 (1984)	147.80 (1995)	246.87 (projected)	2.21	396
Khan, M.M. (2001-2002)	-	-	170.10	1.74	248
Present Survey (2001-02)	-	-	183.69	2.02	294

Commercial Poultry:

Million number

Year	Sources	Layer	Broiler	Cockerel	Total	Growth rate	Projected for 2010
1983-84	BBS	1.76	1.61	17.37	20.74	-	-
1995-96	DLS	103.30	20.92	102.17	124.12	3.73	-
2001-02	Khan, M.M.	25.05	197.63	247.76	470.43	3.84	2221
			445.38				
2001-02	Present Survey	37.39	460.01		497.41	3.91	2492

Source: BBS (1995-96), DLS (1995-96), Huque & Huque (1997), Khan, M.M. (1995-96) and Author's calculations.

Annual egg production per layer

Annual egg production per layer is shown in Table 3. Annual egg production/layer for local, commercial layers and ducks were 48.16, 280.04 and 57.64, respectively.

Table 3. Annual egg production in the selected study areas

Divisions	Area	Local layers			Commercial layers			Duck		
		No. of layers	Egg production	Egg Production/layer	No. of layers	Total egg production	Egg Production/layer	No. of layers	Egg production	Egg Production/ layer
Dhaka	Urban	-	-	-	-	-	-	-	-	-
	Rural	6.50	337.22	51.88	4.44	1202.62	270.86	1.45	76.85	53.00
Rajshahi	Urban	-	-	-	0.61	171.11	280.50	-	-	-
	Rural	5.69	284.50	50.00	3.35	940.55	280.76	1.73	99.72	57.64
Khulna	Urban	-	-	-	0.43	120.74	280.80	-	-	-
	Rural	5.43	259.99	47.88	2.32	626.40	270.00	2.00	120.00	60.00
Ctg.	Urban	-	-	-	0.46	124.61	270.90	-	-	-
	Rural	4.95	205.13	41.44	3.14	817.97	260.50	2.21	128.18	58.00
All	Urban	-	-	-	0.38	102.89	270.75	-	-	-
	Rural	5.64	270.95	48.16	3.31	926.93	280.04	1.85	106.63	57.64

Source: Field survey, 2002

Comparison of egg production of different sources

Comparison of egg among different sources and projection for 2010 are presented in Table 4. Total egg production according to BBS for the year 1983-84, 1995-96 and 2001-02, were 1356, 2314 and 3080 million numbers. According to our survey for the year 2001-02, the egg production was 4266 million numbers. The projection of egg production according to BBS and our survey for the year 2010 would stand at 4439 and 6149 million numbers, respectively.

Table 4. Comparison of egg production among different sources and projection for 2010

Poultry egg (Local): **Million number**

Source	1983-84	1995-96	2001-2002	2010
BBS	1356	2314	3080	4439
Survey (2002)	-	-	4266	6149

Source: Field survey, 2002

Comparison of per capita daily consumption of poultry meat and egg in 1995

In 1995, per capita daily consumption of poultry meat and egg in rural and urban areas according to our survey and HES is presented in Table 5. Per capita daily consumption of poultry meat according to Household Expenditure Survey (HES) during 1995-96 was 7.50g in urban and 3.40g in rural areas while, according to our survey, the per capita daily consumption of poultry meat for the year 1995 were 7.85g in urban and 4.22g in rural areas, respectively. Similarly, per capita daily consumption of egg according to HES during 1995-96 was 5.90g in urban and 2.60g in rural areas, whereas, according to our survey, the per capita daily consumption of egg for the year 1995 was 6.53g in urban and 3.11g in rural areas. In 1995, both HES and our survey showed that average per capita daily consumption of poultry meat and egg was higher in urban areas than rural areas. It is due to the fact that people residing in the metropolitan areas are able to consume more protein-rich food (such as pulses, fish, meat, oil, sugar, eggs, fruits, etc.) because their per capita income is higher than the rural area.

Table 5. Per capita daily consumption (g) of poultry meat and egg during surveyed year 1995

Divisions	Areas	Per capita daily consumption (g) of poultry meat during our survey of 1995			Per capita daily consumption (g) of eggs during our survey of 1995		
		Own source	Purchase source	Total	Own source	Purchase source	Total
Dhaka	Urban		7.85	7.85	-	6.30	6.30
	Rural	2.23	1.77	4.00	1.75	1.55	3.30
Rajshahi	Urban	1.47	6.42	7.89	1.53	4.85	6.38
	Rural	2.02	2.02	4.04	1.49	1.09	2.58
Khulna	Urban	0.65	7.11	7.76	0.75	5.90	6.65
	Rural	2.04	1.80	3.84	1.53	1.35	2.88
Chittagong	Urban	1.01	6.90	7.91	1.15	5.60	6.75
	Rural	2.09	2.90	4.99	1.65	2.01	3.66
Average of all divisions	Urban	0.78	7.07	7.85	0.87	5.66	6.53
	Rural	2.10	2.12	4.22	1.61	1.50	3.11
Average of All		**1.44**	**4.60**	**6.04**	**1.24**	**3.58**	**4.82**

Source: Field survey, 2002.

Comparison of per capita daily consumption of poultry meat and egg in 2002

Comparison of per capita daily consumption of poultry meat and egg according to our survey of 2002 with that of HES 1991-92 and 1995-96 is shown in Table 6. It is observed from the table that per capita daily consumption of poultry meat according to our survey in 2002 was 9.33 grams in urban and 5.94 grams in rural areas with an average of 7.64 grams. According to HES, they were 4.00 grams and 2.00 grams in 1995-96 and 1991-92, respectively. The percentage of increase in consumption of poultry meat in HES during 1995-96 compared to HES 1991-92 was 100%. But it increased to 91% as per our survey in 2002, compared to HES 1995-96. This implied that increased production of poultry in one hand and increased income (Table 7) on the other might lead to higher consumption of it.

Table 6. Per capita daily consumption (g) of poultry meat and eggs during 2002

Divisions	Areas	Per capita daily consumption (g) of poultry meat during our survey of 2002			Per capita daily consumption (g) of eggs during our survey of 2002		
		Own source	Purchase source	Total	Own source	Purchase source	Total
Dhaka	Urban	-	8.98	8.98	-	7.29	7.29
	Rural	2.90	2.54	5.48	2.59	1.87	4.46
Rajshahi	Urban	0.81	9.53	10.34	-	9.26	9.26
	Rural	3.11	3.22	6.33	2.10	2.15	4.25
Khulna	Urban	0.55	7.53	8.08	-	7.05	7.05
	Rural	3.20	2.75	5.95	1.16	3.20	4.36
Chittagong	Urban	0.65	9.30	9.95	-	8.87	8.87
	Rural	3.50	2.48	5.98	1.18	3.70	4.88
All Div. Average	Urban	0.94	8.40	9.33	-	8.12	8.12
	Rural	3.18	2.78	5.94	1.76	2.83	4.49
All average		**2.06**	**5.58**	**7.64**	**1.29**	**5.02**	**6.31**

Source: Field survey, 2002.

Table 7. Per capita monthly income during the surveyed year 1995 & 2002

Monthly income in Taka

Divisions	Urban		Rural	
	2002	1995	2002	1995
Dhaka	10000.31	8927.39	5425.19	4139.25
Rajshahi	9514.15	7780.25	4547.23	3182.53
Khulna	9025.31	8745.56	4048.35	2995.42
Chittagong	9845.27	7558.45	4788.42	3795.23
All	**9596.26**	**8252.99**	**4714.80**	**3528.40**

Source: Field survey, 2002.

It is observed from the table that per capita daily consumption of egg according our survey in 2002 was 8.12 grams in urban and 4.49 grams in rural areas with an average of 6.31 grams. According to HES, they were 3.20 grams and 4.70 grams in 1995-96 and 1991-92, respectively. It can be seen from the table that according to HES, there was a decrease in consumption of egg in the year 1995-96 compared to 1991-92 by 31.91%. But according to our survey in 2002, compared to HES 1995-96, there was an increase in consumption of egg by 34.26%. This is true to the fact that the egg production was undoubtedly increased in the 2002 compared to both HES 1991-92 and 1995-96. This implied that increased production of egg in one hand and increased income (Table 7) on the other might lead to higher consumption of it.

Comparison of per capita monthly income

The comparison of per capita monthly income during the surveyed year 1995 and 2002 with that of HES 1995-96 is shown in Table 7. The table revealed that in urban areas per capita monthly income were Tk. 8252.99 and Tk. 9596.26, for the surveyed year of 1995 and 2002, respectively, while according to HES, per capita monthly income were Tk. 4832.00 and Tk. 7973.00 for the year 1991-92 and 1995-96, respectively. In rural areas, per capita monthly income were Tk. 3528.40 and Tk. 4714.80, according to our survey for the year 1995 and 2002 whereas, according to HES per capita monthly income were Tk. 3109.00 and Tk. 3658.00 for the year 1991-92 and 1995-96, respectively.

The proportion of increase in per capita monthly income for HES during the year 1995 compared to 1991 was 65%, whereas, the proportion of increase in per capita monthly income according to our survey for the year 1995 & 2002 were 3.51% and 20.36%, respectively, compared to HES 1995-96. This increased proportion of per capita monthly income was due to increase in per capita monthly income over the years.

Coefficient of income elasticity of demand

Coefficients of income elasticity of demand for poultry meat and eggs are shown in Table 8. The coefficient of income elasticity of demand for poultry meat in rural areas was found higher (+1.22) than urban areas (+1.18). This higher coefficient of income elasticity of demand for poultry meat indicates that with the increase in income, rural people spent more money on purchasing poultry meat compared to egg. On the other hand, the coefficient of income elasticity of demand for egg was found higher (+1.29) in urban areas than rural areas (+1.26). This implies that when income increased in urban areas, people spent more money

on purchasing eggs compared to poultry meat. This may be due to the fact that urban people have time constraints and they prefer egg rather than poultry meat which can be quickly tabled on. It is also seen from the table that the coefficient of income elasticity of demand as a whole was observed marginally higher for egg (+1.28) than poultry meat (+1.20), indicating that consumption of egg is more responsive to consumption of poultry meat with the change in income.

Table 8. Coefficient of income elasticity of demand for poultry meat and egg in the study areas

Divisions	Coefficient of income elasticity of demand for poultry meat		Coefficient of income elasticity of demand for egg	
	Urban	Rural	Urban	Rural
Dhaka	+1.18	+1.16	+1.22	+1.11
Rajshahi	+1.11	+1.25	+1.52	+1.38
Khulna	+1.11	+1.38	+1.38	+1.31
Chittagong	+1.06	+1.36	+1.03	+1.23
All divisions	+1.18	+1.22	+1.29	+1.26
Average	+1.20		+1.28	

Source: Field survey, 2002.

It is further noticed that both the coefficients of poultry meat and eggs were positive indicating that they are "superior product" and greater than unity means they are elastic in demand.

Factors affecting demand for & supply of poultry meat and egg

Factors affecting demand for and supply of poultry meat and egg are presented in Table 9. According to the opinions of the respondents, the most responsible factors affecting demand for poultry meat and eggs on average followed the same trend, such as: change in income (93%), change in savings (93%), change in population (88%), change in climate (84%), change in price (78%), change in capital/assets (73%), change in price of substitute goods (65%), and change in taste, habits and life style (28%).

Table 9. Factors affecting demand for and supply of poultry meat and egg in the study areas

Values in (%)

Factors affecting demand for poultry meat and egg	Poultry meat	Egg	Average	Factors affecting supply of poultry meat and egg	Poultry meat	Egg	Average
Change in taste, habits and life style	25.74	30.58	28.16 (VIII)	Change in demand of producer's own produce	40.33	45.11	42.72 (VIII)
Change in climate	80.15	88.24	84.37 (III)	Change in the cost of production	60.47	65.23	62.85 (V)
Change in population	85.50	90.46	87.98 (II)	Change in the production technology itself	75.58	85.39	80.49 (III)
Change in price of substitute goods	60.37	70.56	65.47 (VII)	Change in price of substitute goods	65.69	75.66	70.68 (IV)
Change in income	90.79	95.29	93.04 (I)	Change in the supply of complementary goods	50.26	58.55	54.41 (VI)
Change in savings	90.79	95.29	93.04 (I)	Change in prices	80.24	88.25	84.25 (II)
Change in capital / assets	70.25	75.32	72.79 (V)	Change in marketing functions/facilities	85.13	90.75	87.94 (I)
Change in prices	75.12	80.14	77.63 (IV)	Lack of transportation system	30.75	44.78	37.77 (VII)

Figures in parentheses indicate ranking

It can be further seen from the table that the most responsible factors affecting the supply of poultry meat and eggs on average followed the same trend, such as: change in marketing facilities (88%), change in price (84%), change in production technology (81%), change in supply of complementary goods (71%), change in cost of production (63%), change in demand of producer's own produce (43%) and lack of transportation system (38%).

Suggestions for improvement in production and consumption of poultry meat and egg

Suggestions for improvement in production and consumption of poultry meat and egg are shown in Table 10. The higher respondents (75%) suggested for the availability of hybrid chicks locally and marketing facilities (65%) for Dhaka district, impart training to the farmer on modern poultry management techniques (57%) and veterinary and medicare facilities to control local chicks mortality (63%) for Rajshahi district, and a provision of supervised credit (65%), introduction of poultry insurance policy for averting risk (57%) for Chittagong district. On average, the availability of hybrid chicks locally should be ensured (70%), following a provision of supervised credit (65%), marketing facilities (65%), veterinary and medicare facilities to control local chicks mortality (63%), introduction of poultry insurance policy for averting risk (57%) and lastly, impart training to the farmer on modern poultry management techniques (57%).

Table 10. Suggestions for improvement in production and consumption of poultry meat and egg

Divisions	Suggestion for future improvement in production and consumption of meat and egg					
	Impart training on modern poultry management techniques	Ensure provision of supervised credit facilities	Make sure of availability of hybrid chicks locally	Increase government veterinary & medicare facilities	Introduce poultry insurance policy for covering risk	Facilitate marketing facilities
Dhaka	59.71	65.51	75.25	60.65	55.49	69.22
Rajshahi	60.75	66.67	72.62	65.29	57.51	66.33
Khulna	55.02	60.76	65.39	62.31	56.78	62.69
Chittagong	50.75	68.24	67.03	63.83	58.87	60.85
All division	56.56 (VI)	65.30 (II)	70.05 (I)	63.02 (IV)	57.16 (V)	64.77 (III)

Figures in parentheses indicate ranking.

Conclusion

The poultry population and production of egg has increased from 76.41 and 1356 million numbers in 1983-84 to 174.46 and 3080 million numbers. in 2001-02, respectively. On the contrary, monthly income per household also increased in urban areas from Tk.7973.00 to Tk 9596.00 and in rural areas from Tk.3658.00 to Tk.4715.00 for the year 1995-96 and 2002, respectively. This implied that an increase in poultry population, production of egg, in one hand and an increase in monthly income per household, on the other, led to higher consumption of both poultry meat and egg in the country. This statement is supported by the positive sign and greater than 1 value of coefficient of income elasticity of demand for poultry meat and egg. The positive sign and greater than 1 value of coefficient of income elasticity of demand for poultry meat and egg indicated that they are **'superior products'** and are **'elastic'** in demand.

Therefore, it is suggested to establish large numbers of small-scale commercial poultry farms under easy term of loan for generating income and employment, which in turn, will increase demand and consumption of poultry meat and egg in the country.

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