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## 2020 Vision for Indian Poultry Industry

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**Abstract:** A study was conducted to estimate the demand for egg and poultry meat for India in 2020. Income elasticities were calculated separately for urban and rural areas using National Sample Survey (NSS) data and were used to project demand for each of the five income groups within urban and rural areas. The results revealed a relatively strong growth for egg and poultry meat both in the urban and rural areas in the next two decades. Egg consumption was found to grow at a much faster pace than poultry meat with the rise in income and nearly triples by 2020. Similarly, average per capita poultry meat consumption was found to increase from 0.69 to 1.28 kilograms during the same period. Overall, the study reports the total egg consumption to increase from 34 billion in 2000 to 106 billion in 2020 and total poultry meat consumption to increase from 687 million kilograms to 1,674 million kilograms during the same time period.

**Key words:** Indian poultry, meat consumption, egg consumption

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### Introduction

India is the fifth largest producer of eggs and ninth largest producer of poultry meat in the world, producing 34 billion eggs and about 600,000 tons of poultry meat in 1999 (Mehta, 2002). Poultry sector in India has been growing at a much faster rate than other sectors of the Indian economy and accounts for 100 billion rupees to the Gross National Product (GNP). Despite such amazing growth in last two decades, annual per capita consumption of egg and poultry meat in India is disappointingly low with approximately 36 eggs and 0.7 kilograms of poultry meat in 2001 (Mehta, 2002). These levels are too low as compared to the world average of 147 eggs and 10.9 kilograms of poultry meat on a per capita basis (FAOSTAT). These low levels of per capita consumption of eggs and poultry meat have been mostly attributed to lower purchasing power (Gandhi and Mani, 1995). However, purchasing power of Indians is likely to grow at a much higher rate in the future due to strong economic growth, as a result of continued economic liberalization initiated in early 1990s. Macroeconomic forecasters such as World Bank, and Standard and Poor's DRI are now projecting average annual growth of 6 to 8 percent in India's real GDP in the next decade. In addition to strong income growth, consumption pattern is also likely to be influenced by population growth, urban-rural population composition and other demographic variables.

Although it is extremely important to understand the future consumption growth in poultry meat and eggs both from policy and industry perspective, it has received little attention from the researchers (Sharma and Yeung, 1985; Sinha and Giri, 1989; Gandhi and Mani, 1995) both in India and abroad. However, most of these studies except Gandhi and Mani (1995) have ignored how difference in the consumption behavior across

income groups is likely to evolve in the future with the rise in income. Even Gandhi and Mani (1995) estimated separate income elasticities for different income groups both in the urban and rural area; they didn't extend their analysis in projecting future demand for livestock and its products. Hence an attempt has been made to measure future growth in poultry meat and egg demand by taking into account urbanization and varying consumption behavior across different income groups.

### Materials and Methods

**Modeling Framework:** There are two primary ways to determine the projected demand for food grains and other consumption necessities (Brahmananda, 1997). The first approach is to postulate a different value of the growth rate of real national income and then calculate the growth rate of demand for food commodities on the basis of estimates of income elasticity of demand for agricultural commodities. The second approach is to project alternative values for the growth rate of employment and then derive the growth rate of agricultural commodities on the basis of employment elasticity of demand for agricultural commodities.

In this study, income elasticity approach is used to estimate urban and rural demand projections. Separate demand projections are justified because of significant variations in food consumption between rural and urban areas and the rapid growth in urban population in the next few decades. In addition, consumption level also varies significantly across different income classes within each category. In order to capture the varying income responses on consumption, demand projections are made separately for five income groups within each category.

A large number of alternative functional forms are possible for modeling the Engle curve, which is the

relationship between food demand and income levels. Double-log specification has been used widely because of its simplicity and readily interpretable properties.

$$\text{Double Log: } \ln(Y) = a + b \cdot \ln(X), \quad (1)$$

Where, Y is the quantity consumed, X is the income level and b is income elasticity.

But this functional form is not theoretically desirable because of its limitation that all food consumption is expected to increase with rising income levels. Other functional forms include semi-log, log-log inverse, and log-quadratic.

$$\text{Semi-Log: } Y = a + b \cdot \ln(X) \quad (2)$$

$$\text{Income Elasticity} = b/Y$$

$$\text{Log-Log inverse: } \ln(Y) = a + b/X + c \cdot \ln(X) \quad (3)$$

$$\text{Income Elasticity} = b/X - c$$

$$\text{Log Quadratic: } \ln(Y) = a + b \cdot \ln(X) + c \cdot \ln(X)^2 \quad (4)$$

$$\text{Income Elasticity} = b + 2 \cdot c \cdot \ln(X)$$

**Data and Estimation:** Data for estimating demand equations for urban and rural categories are collected from 1996/97 consumer expenditure data from the National Sample Survey Organization of India. In this study, three alternative functional forms (equation 2 to 4) of the Engle curve are estimated. All three provide good fit. But the log-quadratic functional form appears to be better for most commodities. The income elasticities for five different income groups (quintiles one to five)<sup>1</sup> in urban and rural areas are reported in Table 1.

It could be seen from Table 1 that the income elasticities for eggs are found to be much higher than those for poultry meat both in urban and rural locations. For example, the income elasticity for eggs is 1.724 compared with 0.477 for poultry meat for quintile one in urban areas. As income rises, the income elasticity for eggs decreases but still remains high even for higher income groups. This is similar to the findings of Gandhi and Mani (1995) who found high-income elasticities for milk both in the rural and urban areas. Unlike many others developing nations, the income elasticities for poultry meat is found to be really low, particularly in the rural areas. This is consistent with the findings of many past studies such as Gandhi and Mani (1995) and Sarma and Yeung (1985) who found low-income elasticity for meat in India.

## Results and Discussion

### Macroeconomic Assumptions:

- Population growth is projected to decline from 1.53 percent in 2001 to 1.29 percent in 2010 and declines further to 1.06 percent by 2020.
- Real GDP is projected to grow at an average annual rate of 5.8 percent between 2002 and 2010, and 5.6 percent for 2011 to 2029. With declining population growth, this GDP growth is translated into a per

capita real GDP growth rate of 4.4 percent for 2001 to 2010 and increasing to 4.56 for the next ten years.

Generally, expenditure growth is assumed to be the same as GDP growth. However, GDP includes more than just private consumption, i.e., private investments, imports, exports, and government spending. Thus, it is likely that food expenditures will follow private consumption more closely than general economic indicators such as GDP. A recent study by Lutz and Smallwood (1997) supports this by finding that in the United States food spending tends to more closely follow private consumption than GDP. Keeping this in mind, in this study, consumption expenditure growth is calculated from private consumption rather than GDP. Urban and rural per capita expenditure is calculated using national average per capita expenditure based on their population share and ratio of expenditures using:

$$E_r = E_a \cdot (1 - S_u) / PS_r,$$

where  $E_r$  = average per capita rural expenditure,  $E_a$  = average per capita expenditure,  $S_u$  = share of urban in total expenditure and  $PS_r$  = population share of rural. Further inequality in income distribution is introduced in five income groups (quintile 1 to 5) for the rural and urban populations. It is assumed that upper income groups will have a greater share of income growth. Each quintile accounts for 20 percent of the population and increases with income, i.e., quintile one is the poor and quintile five is the rich.

- Private consumption is projected to decline from 55 percent in 2001 to 52 percent of GDP by 2010 and further declines to 49 percent by 2020, which translates into decreasing growth rate per capita real expenditure from 4 percent in 2001 to 3.8 percent by 2020.
- Urban population is projected to grow from 35 percent in 2001 to 42 percent by 2020.
- The ratio of rural to urban expenditure is projected to decline from 59 percent in 2001 to 51.5 percent by 2020. With these assumptions, urban per capita expenditures are projected to grow almost one percent higher than rural per capita expenditures.

Strong income growth and urbanization are expected to significantly change the composition of the food basket. A shift in diet from carbohydrate to protein is likely to drive up the per capita egg and poultry meat consumption throughout the projection period. An in depth examination of egg consumption among different income classes both in urban and rural areas, is projected to grow at different rate in the future. On an average, per capita egg consumption in rural area is projected to increase from 30.4 in 2000 to 69 in 2020 whereas the consumption growth for the urban is projected to rise from 48 to 106 during the same time

<sup>1</sup>Each quintile accounts for 20 percent of the population. Quintile 1 and 5 represent 20 percent population with lowest and highest income.

Table 1, Income Elasticities for Different Income Groups in Rural and Urban Areas at the Mean Expenditure Level

Location	Commodity	Quintile One	Quintile Two	Quintile Three	Quintile four	Quintile five
Rural	Eggs	2.443	2.165	1.979	1.767	1.393
	Chicken	1.346	1.320	1.303	1.283	1.248
Urban	Eggs	1.724	1.562	1.437	1.293	1.062
	Chicken	0.477	0.452	0.432	0.409	0.373

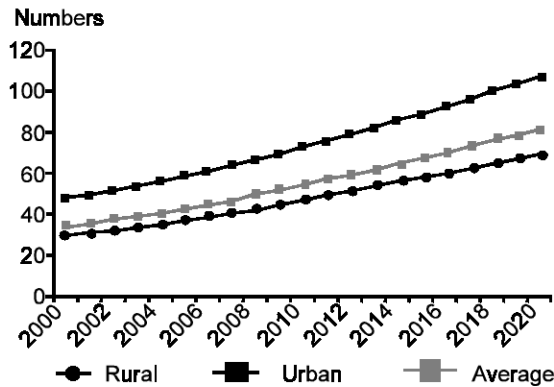


Fig. 1: Average per capita egg consumption: Rural vs Urban

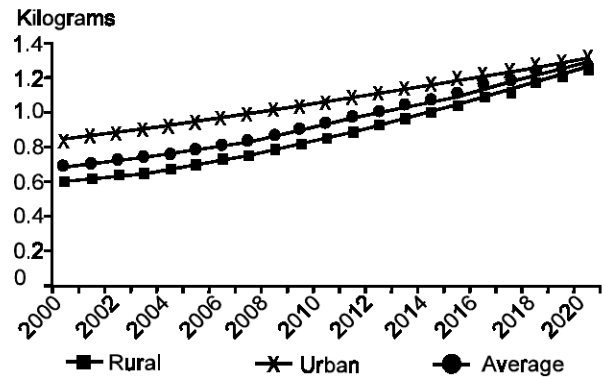


Fig. 3: Average per capita poultry meat consumption: Rural vs Urban

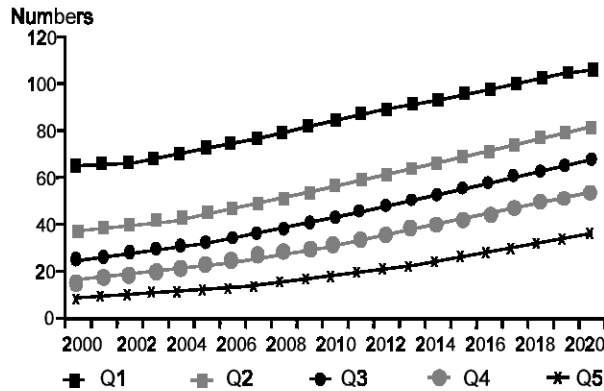


Fig. 2: Per capita rural egg consumption by income groups

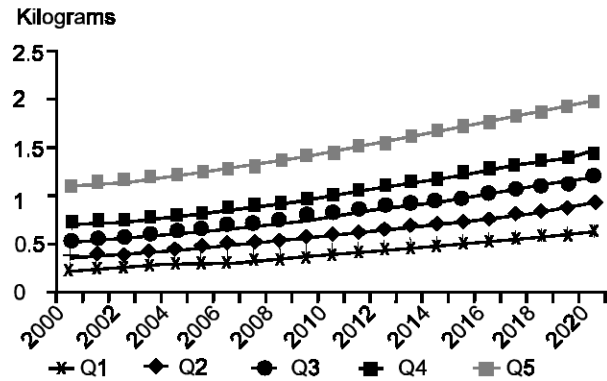


Fig. 4: Per capita rural poultry meat consumption by income groups

period (Fig. 1). Within rural, per capita egg consumption of lower income groups are projected to increase at a much higher rate than the upper income groups. For example, per capita egg consumption of quintile one in rural area is projected to increase by more than 700 percent in the next two decades as compared to less than 200 percent for the quintile five (Fig. 2). Similar disparities in consumption growth are also found among different income classes in urban areas. Strong growth in egg consumption can be expected in a country like India with vast vegetarian population, who consider egg as vegetarian.

Unlike egg, modest growth in poultry meat consumption is projected both for urban and rural areas. Interestingly,

average rural per capita poultry meat consumption, which is more approximately 40 percent lower than the average urban per capita chicken consumption in 2002, is projected to catch up with urban per capita consumption by the end of the projection period (Fig. 3). Within urban locations, per capita poultry meat consumption of the lowest income group is projected to rise from 0.47 kilogram in 2000 to 0.8 kilogram in 2020 where as for the highest income group it increases from 1.18 kilogram to 2.08 kilogram. However, the rural per capita poultry meat consumption, particularly for low-income groups, is projected to grow at a much faster rate than urban consumption growth. For example, rural per capita poultry meat consumption for the quintile one

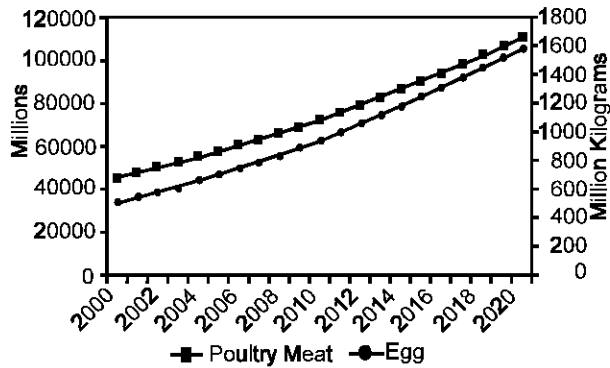


Fig. 5: Projected poultry meat and egg consumption

is projected to expand by more than 165 percent from 0.24 kilogram in 2002 to 0.64 kilogram in 2020 (Fig. 4). By the end of the projection period, rural per capita poultry meat consumption for most income groups is projected to exceed their urban counterparts. Average rural per capita poultry meat consumption, which is more than 35 percent lower than the average urban per capita chicken consumption, is projected to exceed its urban counterparts by more than 70 percent (Fig. 4). Recently, Churchill *et al.* (2003) projected per capita availability of both egg and poultry meat by simply extending historical growth rate for the future. Their results indicate per capita availability of 90 eggs in 2020. However, their poultry meat availability of more than 3 kilograms in 2020 is much higher than our projected per capita consumption of 1.68 kilograms.

As shown in Fig. 5, total domestic utilization of egg, which is around 34 billion in 2000, is projected to increase more than 200 percent reaching 106 billion by 2020. Unlike egg consumption, total domestic poultry meat consumption is projected to increase at a slower pace than egg from 0.7 million ton in 2000 to around 1.67 million tons in 2020. However, the projected average per capita consumption of 81 eggs and 1.28 kilograms of poultry meat level remains significantly lower than the 2000 world average per capita consumption of 147 and 10.9 kilograms, respectively. The projected per capita consumption for eggs and poultry meat also remains far below the recommended level of 180 eggs and 11 kilograms of poultry meat by Indian Council of Medical Research (Churchill *et al.*, 2003). From the policy planning point of view, the knowledge of growth in future consumption of eggs and poultry meat is extremely important in the face of receding per capita pulse availability which is a major source of protein for average Indian. The gap in requirement of protein can be bridged with the increased supply of protein from animal sources, where poultry industry can play an important role.

**Is Poultry Industry Up for the Challenge?:** From a

backyard venture, Indian poultry industry has come a long way in the last three decades to become one of the dynamic and fastest growing sectors. The last three decades showed significant development in poultry industry with each decade focusing the developments in three different areas. The seventies saw a spurt in egg production, the eighties in broiler production and the nineties in poultry integration, automation and feed production (Balakrishnan, 2002). This amazing growth has been possible due to several breakthroughs in poultry science and technology which has led to development of genetically superior birds capable of high production, even under adverse hot climate. Manufacture of high-tech poultry equipment's, quality poultry feed, pharmaceuticals and health care products including vaccines are some of the important factors contributing to higher productivity.

Currently, more than 85 percent of total egg production and 60 percent of broiler production are from improved poultry birds in the organized sector. The million-dollar question is whether Indian poultry sector can expand its production as rapidly as projected demand growth. The answer partly lies with the development of the backyard poultry sector, which consists of indigenous birds and thrives only on scavenging. The efforts should be directed in replacing these indigenous birds with high-yielding birds.

Another important factor that hampers production growth is the lack of efficient marketing system such as collection, storage, processing and marketing of eggs and poultry meat, particularly in the rural areas. Presently, the poultry traders and commission agents operating in various metropolitan cities, fix wholesale prices of eggs and table birds on day-to-day basis, taking into account the supply and demand. The rural producers find it extremely difficult to get reasonable returns from the small poultry units because prices offered to them are not remunerative. The state poultry corporation/federation have been playing a major role in providing marketing support, but their impact has been very limited due to financial constraint. The government of India has entrusted the responsibility for marketing of eggs and poultry meat at regional and national level to National Agricultural Co-operative Marketing Federation of India Ltd. (NAFED) by providing financial support. However, efforts of NAFED have not had the desired impact of improving overall eggs and poultry meat-marketing situation in the country. One possible solution for this problem is to organize poultry farmers' co-operative societies, in the line of dairy co-operatives, which will not only offer a remunerative price to their producer-members, but will also, safeguard the consumer's interest.

**Conclusion:** The study examines consumption behavior of egg and poultry meat for 2020 by taking into account

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urbanization and differences in consumption behavior across income groups both in urban and rural areas. The findings reveal a relatively strong growth for egg and poultry meat both in the urban and rural areas in the next two decades. As expected, egg consumption is found to grow at a much faster rate than poultry meat with per capita consumption rising from 30.4 in 2000 to 69 in 2020. It is also found that per capita egg consumption of lower income groups both in the rural and urban areas are likely to grow at a much faster pace than the upper income groups. Similarly, average per capita poultry meat consumption is found to increase from 0.69 to 1.28 kilograms during the same period. Interestingly, rural per capita poultry meat consumption for all income groups, which are substantially lower than their urban counterparts, is likely to grow at a higher rate and reach very close to urban per capita consumption by 2020.

Overall, the study reports that total egg consumption is projected to increase by 200 percent from 34 billion in 2000 to 106 billion in 2020. During the same time period, total poultry meat consumption is likely to expand from 687 million kilograms to 1,674 million kilograms. The study also identifies few important factors such as improvements in the marketing infrastructure and transformation from indigenous to high-yielding birds that may accelerate the production growth to keep pace with the projected demand expansion.

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