Growth and Development of Dairy Industry in India

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Abstract: ***Milk provides nutritious food and supplements the income of rural people of the country. The study investigates the growth and development of the dairy industry in India. It studies the status of milk production and consumption of the country. The study attempts to forecast the production of milk in the country at the current trend of production. It tries to find the relationship between milk production of the country with its global export and imports. The findings will be helpful for both the policymakers and the dairy farm industry in making a production decision. Descriptive statistics, forecasting, and correlation analysis were used during the study to bring out the relationship between production, consumption, and distribution of milk products. It was found that with the current production trend in the country, India will be able to produce about 217 million tonnes of milk by 2025. The per capita milk availability of the country stands at 351 gms in 2016-17, which exceeds the global milk per capita availability of 229 gms per day. Correlation analyses were used to determine if there is a relationship between import and export of milk products with that of the amount of milk produced. The findings indicated that the production of milk has a positive impact on the export of milk products (r = 0.220, p = 0.601), whereas it has a negative effect on the imports (r = 0.228, p = 0.588). The study found that there is ample room for promotion, production, and distribution of liquid milk and its products, which policymakers and dairy industry can use it in their favour.***

Keywords: Dairy Industry, Production, Consumption, Development, per capita milk availability and correlation analysis.

I. INTRODUCTION

Milk production and dairy farming as a subsidiary occupation to agriculture have been given immense importance as dairy farming not only gives employment opportunities but also act as a catalyst to improves the dietary supplement of the family and provides a steady income to a large number of people to both the rural and urban poor of the country. With the introduction of 'Operation Flood' in the country, the importance of dairy units as the potential source of income and employment has gain momentum in the rural areas. Hence, the dairy industry plays a vital role in the production of milk products and helps in making milk production as one of the most profitable sectors in the economy.

Avhad, Kadian, Verma, and Kale (2015) have acclaimed that entrepreneurs play a pivotal role in promoting economic and technological growth. They opine that developing entrepreneurs through entrepreneurship development is directly related to the socio-economic development of the country.

They cited that entrepreneurship has a massive contribution to the development of a country in numerous ways. Entrepreneurial activities of developing one's country include; assembling, harnessing, bearing risks, innovating, imitative learning of tools and techniques, market expansion, coordinating and managing the manufacturing units at various levels, develop ways and means to reduce production cost and enhance its quality and quantity. They recognised the central role played by the dairy producers in the socio-economic development of the country and also making our country on the global map as the largest milk producer of the world.

In 1970 India was a milk deficient country with a mere production of 20 million tonnes has now developed as the world's largest milk producers with more than 160 million tonnes which accounts for 18.5 % of the global milk production. Milk production was enhanced extensively from 137.7 million tonnes in 2013-2014 to 164 million tonnes in 2016-2017. During 2011 – 2014, the annual growth rate of milk production was 4%, which was improved to 6% during 2014-2017 whereas the improvement of global milk production was only 2% during the same period. Further, it was estimated that India's milk production would outperform the global milk production at 4.2% compounded annual growth rate producing around 185 million tonnes annually and is expected to surpass European Union and emerge as the largest producer by 2020 **(The Economic Times, 2017).**

India, Inspite of its massive production milk and its products, the consumption of milk is increasing at a very fast pace. This massive consumption of milk is due to the increase in the purchasing power of people, growing urbanisation, changing food practice, lifestyles, and demographic growth. The per capita availability of milk is 351 grams in 2016-2017, which was enhanced from 307 grams in 2013-2014. Milk with its wide range of benefits is the only source of animal protein and the needed nutrients for the largest vegetarian population in the world. The driving force of demand for milk products is the increased consumer interest in high protein diets and increasing awareness and accessibility of value-added dairy products through structured retail chains. Thus, due to its tremendous and rapidly growing domestic demand and increased population with increasing purchasing power, most of the production is domestically consumed with no surplus for the export market. India's ranked 52 in the world global milk export market with a mere 0.01% of the total global milk exports in 2017.

Khamkar (2014) had highlighted that household producing milk had consumed almost 55% of the milk they produced.

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Out of the total milk produced in the country, 2/3 of the products are sold in the informal markets, and only 15-16 % enters the regulated market which is operated by the cooperatives and the private sector.

The massive production ability, consumption capacity, the global export opportunity of milk, and also government policy of doubling the farmers' income in the country, there is a need to promote entrepreneurship in milk production through dairy farming. The study attempts to carry out an analysis of the Indian dairy industry through the production of milk and also crucially examines the significant challenges and strategies for promoting milk production through the dairy industry. Against this background, the purpose of this paper is to answer the research question: "How can production of milk be augmented in the dairy farm through entrepreneurship development"?

II. LITERATURE REVIEW

Kumar and Parappurathu (2014), analyzed the data collected from National Sample Survey Organization (NSSO) of the 38th, 50th, 61st, and 66th rounds covering the years 1983, 1993–94, 2004–05 and 2009–10 including both the rural and urban households. The average per capita consumption of over 30 days of all foods and non-foods commodities in a household are included in their analysis. The rising significance of dairy products in the food basket of the people of India are revealed in their study. The increasing demand for dairy products is found to be due to the higher income elasticity of demand, which is more significant in rural than urban areas. They found that the demand for value-added milk products like ice cream is increasing rapidly, whereas the demand for traditional milk products like butter and ghee is found to be in a negative trend. They commented that the rising demands for milk and milk products would put India under pressure to maintain at least the existing growth trend in milk production in the country. A slight deceleration in the growth of milk production would risk India's ability to maintain self-sufficiency and also have implications for the evolving international milk market. If India falls short of meeting its domestic need, it will have a substantial impact on the prices of dairy products in domestic as well as global markets. They suggested that the government of India, as well as the international community, arrange alternative supply sources to avoid milk deficiency in the future.

Birthal and Negi (2012) have opined that the demand for animal products is projected to rise rapidly, offering significant opportunities for enhancing agricultural growth and reducing rural poverty through the livestock route. The productivity of Indian livestock, however, is low and constrained by a low level of adoption of technologies, scarcity of feed and fodder, and poor animal health. Institutional and policy support to the livestock in terms of investment, credit, insurance, extension, and the market is not commensurate with its economic contribution. On the note of the financial contribution of livestock and dairy farming share in agricultural Gross Domestic Product (GDP) and employment generation **(Patel, 2017)** gave his opinion to recognise dairy farming as an important sector like agriculture rather than its subsidiary status.

Sethumadhavan (2017) concluded that the productivity of Indian cows and buffaloes are very low. The average milk yield from local cows, buffaloes and crossbreed cow 3 to 3.5 liters, 3.96 to 5.39 liters 5.82 to 7.80 liters per day, respectively. The milch yield is found to be significantly lower than cattle in the developed countries. The feed conversion efficiency is high in developed countries. The best-run farms in the world produce 1.6 kilograms of milk for every kilogram feeds, which is less than a kilogram in India. Scientific dairy practices like proper breeding, feedings, and hygienic management, along with quality inputs and extension support services, is required to achieve better productivity. However, **Chakravarty (2017)** has preferred indigenous dairy cattle despite their low productivity because indigenous cattle are more sustainable in comparison to crossbreed cattle. He further said that indigenous cattle are more tolerant of heat, comparatively resistant to many diseases, low maintenance costs, and higher feed conversion efficiency. He also added that indigenous cattle milk contains a substance called A2 allele, which is good for human health. He also claims that an intense selection of dairy animals for higher milk production and milk quality has shown the decline in reproductive performance, including the fertility of dairy animals.

Khamkar (2014) opines that the method of operation of the current dairy industry has developed into more consumers oriented. The producers have employed various innovative practices of organised retailing, supply chain management, balanced product portfolio, and product development. He also supplements how to milk producers have used mass media and advertisement for their competitive advantage. Consumers' awareness of product quality and variants coupled with consciousness have led the producer for new product development. He also adds that western culture also influences eating habits related to dairy products. Lastly, he concluded by stating that the immense growth of milk production was due to demand-side development and supply-side promotions. It is known from his observation that with extensive dairy development programs and promoting entrepreneurs by increasing the value of milk products can go a long way in the milk market of the country.

Nargunde (2013), in his study on the role of the dairy industry in rural development, concludes that milk production has supplemented as a year-round source of income for small seasonal crops farmers and occasional labour. He estimated that up to 60-65 per cent of the marginal and small scale farmers' incomes derive from dairying. He found that dairying is more profitable in rural areas which surpassed crop production for marginal, small, and medium-sized holdings. Whereas for irrigated small scale farmers, Mixed farming that includes dairying and crop production to be more profitable than crop farming alone.

He pointed out that the dairy industry had acquired the status of a fully-fledged industry in the country for improving the lives of those engaged in this business, directly or indirectly, which bring significant socio-economic changes in the country. He concluded that dairy sector still is characterized by small–scale scattered and unorganized farmers and hence face various constraints like low productivity, lack of scientific feeding practices, animal health care, lack of assured year-round remunerative prices of milk, inadequate infrastructure for provision of production inputs and services, procurement, transportation, processing and marketing of milk and lack of professional management. He viewed that liberalisation of world trade in dairy products under the new trade regime of the World Trade Organisation (WTO) has posed new challenges and has opened up new export opportunities for dairy products in terms of quality, cost, and credibility in international markets. He highlighted the importance of increasing milk yield of cattle to decrease the per litre cost of production. He believes that enhancing the export of dairy products can be achieved with the adoption of the latest processing and packaging technology.

Jha (2005) concluded that the efficient yet cost-effective procurement network, hygienic and economical processing facilities and innovativeness in the market place are the key to the success of dairy-enterprise. He emphasised the need for training to be imparted to the entrepreneurs to achieve this. He also highlighted the importance of commercial facilities, micro-level planning, and intervention by central and state governments on unexplored areas and, lastly, promoting awareness among educated and uneducated unemployed youth are important for the development of dairy industry in India.

III. OBJECTIVES

The current quest has the following objectives:

1. To study the production and consumption pattern of milk in the country.
2. To study the imports and export trends of milk in the country.
3. Attempt to forecast the future production of milk in the country.
4. To suggest ways and means promote milk production through entrepreneurship development.

IV. HYPOTHESIS

Ho1: The production of milk does not have any significant impact on the export and import of dairy products.

V. MATERIALS AND METHODS

Secondary data were used for the study. They were collected from various publications, journals, magazines, articles from the newspaper, publications from state and central government departments, research articles available on various websites and other internet sources.

VI. ANALYSES

The data gathered were codified and then administered using MS excel 2000 and SPSS English version 21.0 for analyses. Statistical tools like descriptive statistics, forecasting analysis, and correlation analysis were used for the analyses of research data.

VII. PRODUCTION AND CONSUMPTION PATTERN OF MILK

Dhawan (**2016**) has commented that the production of milk in India exceeds 258 million liters per day, accounting to around 94 million tonnes per annum. He pointed out that about 70 million farmers maintain a milch cattle of about 105 million, of which 58 million is cows and 47 million buffaloes which account for 98 % of all milk produced in India. These large numbers of farmers feed their cattle on crop residues. He observed that the dairy sector in India is vital for its subsequent relationship with agriculture and for its potential to provide a protein-rich diet to the large vegetarian population. He further said that the milk economy had been transformed from a subsistence activity to business activity the reason being receiving of remunerative price by the farmers. He concluded that the consumer has also benefited because of the fact that the increase in milk prices has generally been lower than the rate of inflation comparing to other food products

Business Standard (2017) reported that the production of milk in India has increased from 22 million tonnes in 1970 to 156 million tonnes in 2015-2016. This report shows a growth of 700 per cent during last the 46 years resulting in the per capita availability of milk in India enhanced to 337 grams per day in 2015-2016 as compared to the average global milk per capita availability of 229 grams per day during the same period.

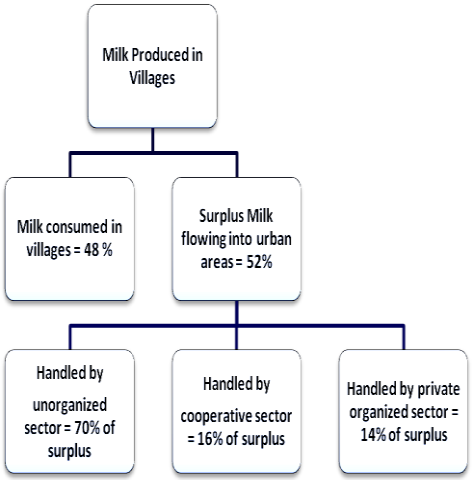

Figure.1: Production, Distribution and Consumption Pattern of Milk Produced In India

Source: *National Dairy Plan 2007-08 to 2011-12, Department of Animal Husbandry, Government of India.(adopted from Chawla & Chawla, 2009)*

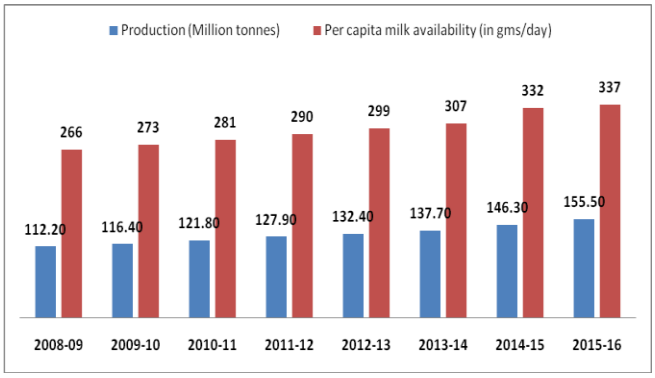

Figure 2: Year-wise Production of milk and per capita availability in India

Source: *Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture, GoI.*

Figure 2 shows the average milk production for the last eight years at the national level. From the table, it is understood that the average production of milk at the national level is 131.28 million tonnes (min=112.20 and max=155.50). The average per capita availability of milk for the last eight years was 298.13 gms/day (min=266 and max=337).

VIII. EXPORTS AND IMPORTS OF MILK

Despite being the largest milk producer in the world in terms of absolute quantity, India's average milk yield per cattle remains comparatively very low compared with the developed nations and other developing countries. The small size milk production of rural India finds it difficult to adopt a modern dairy technology due to its economic inviability, which hampers quality management of milk at the farm levels. Milk consumption in India is substantial due to its largest vegetarian population in the world whose only source of an animal-based protein and essential nutrient is milk. Unlike other major dairy exporting countries, only a few surpluses remain for exports.

Table 1: Year-wise dairy India's export and imports in quantity and value

Year	Export		Import	
	Quantity (in Metric tonnes)	Value (in lakhs)	Quantity (in Metric tonnes)	Value (in lakhs)
2008- 2009	48045.75	66107.09	1516.9	2435.48
2009-2010	26135.26	29817.14	31374.76	32224.6
2010- 2011	27475.35	39646.7	54334.61	82240.52
2011- 2012	23194.13	24726.47	70699.92	120393.14
2012- 2013	69366.42	110351.04	7417.44	16653.65
2013- 2014	113972.5	240545.2	9916.42	21283.6
2014-2015	55909.55	93722.18	11901.61	28278.12
2015-2016	28967.43	63333.54	16986.74	32230.14
Total	**393066.99**	**668249.36**	**204148.48**	**335739.25**

Source: *Authors' calculation based on Agricultural and Processed Food Products Export Development Authority (APEDA) latest Report.*

Table 1 shows India's dairy export and import for the last eight years. From the table it is understood that the average export of dairy products was 49,133.30 metric tonnes (min=23,194.13 and max=1,13,972.50) with an average value of Rs 83,531.17 lakhs (min=24,726.47 and max=240545.20). During the year under study and the average import was 25,518.55 metric tonnes (min=1516.90 and max=70,699.92). Quantifying the value of imports in Rupees for the last eight years, we had Rs 33,5739.25 lakhs with an average of Rs 41967.41 lakhs, of which the minimum was 2435.48 lakhs and the maximum of Rs 1,20,393.14 Lakhs.

Table 2: Correlation analysis of Export and Import of the country with production

Variables	Export	Import
Pearson correlation Milk Production sig. (2-tailed)	**0.220 0.601**	**-0.228 0.588**

Source: *Computed from Table 1 and Figure 2*

Correlation analyses were used to examine the relationship between import and export of milk products with that of the amount of milk produced. The result indicated that the production of milk has a positive impact on the export of milk products ($r = 0.220$, $p = 0.601$), whereas it has a negative impact on the imports ($r = 0.228$, $p = 0.588$).

IX. FORECASTING FUTURE TREND OF MILK PRODUCTION

Table 3: Milk output forecasting based on the last eight years of production

Year	Milk production in (million tonnes)	Projected Year	Projected milk output
2008	112.20	2017	165.03
2009	116.40	2018	171.65
2010	121.80	2019	178.30
2011	127.90	2020	185.12
2012	132.40	2021	191.55
2013	137.70	2022	197.44
2014	146.30	2023	203.57
2015	155.50	2024	210.59
2016	158.32	2025	216.96

Source: Calculated from Fig.2

Table 3 showed the year wise estimated milk output until 2025 based on the production trend for the last eight years using forecasting analysis in MS Excel. As per the estimated data, it was found that the total output forecasted for the year 2025 is 216.96 million tonnes, which is not incongruent with the projection for the demand of milk made by the National Dairy Development Board by

2021-2022 which stands at 200 million tonnes.

To meet the domestic consumption needs, livelihood to more than 90 million farm families and also generate revenue through export to the milk deficient countries, and we have a long way to go in producing milk through innovative farming models by promoting and motivating large numbers of small milk entrepreneurs in the country.

X. POTENTIAL FOR FUTURE GROWTH

Patel (2017) has cited that milk production grows annually only at 4% against consumption which grows at around 6% annually. The increase in per capita availability of milk is substantial with an increased from 120 gm per day per person in 1960 to 307 grams per day per person in 2013 – 2014 and further increase to 359 grams per day per person in 2014 – 2015. He highlighted that the National Dairy Development Board projected that India's demand for milk might be increased to 200 million tonnes by 2021-2022. He also expressed his concerned that though India is the largest producer of milk in the world had an insignificant share in the global export market. The large quantity of milk stills remains unprocessed (or is handled by the unorganised sector as given in Fig.1).

India is surrounded by milk deficient countries like China, Japan, Bangladesh, Singapore, Thailand, Malaysia, Philipines, UAE, and other gulf countries. India can explore this market through a systematic approach, research, and feasibility studies on sustainable production. Government intervention on entrepreneurship development is the need of the hour.

XI. DISCUSSION AND CONCLUSION

This study investigated the entrepreneurship development through milk production. India's position in the global market as the supplier is shallow despite its massive production. It was also found that the productivity of cattle is comparatively very low with that of developed and also developing countries in the world. Maximum of the milk products are consumed domestically, which are also handled by the unorganised sector. The present study is incongruent with the study by **(Imam, Zadeh, & Dubey, 2011),** where they pointed out that India consumed 100% of its production.

Analyzing the current economic conditions, the technical knowledge that our farmers posses, the climatic condition, and the lifestyle of rural India, it is observed that promoting indigenous cattle with the available resources and inputs from the government can boost production of milk in the country.

After extensive research on the study area, few suggestions can be made on entrepreneurship development on milk production of the country. Firstly, Electricity charges should be given at a subsidized rate to the small farmer. Secondly, credit facilities at a concessional rate with a more extended moratorium period and the longer repayment schedule should be arranged for the rural entrepreneur. Thirdly high-quality local breed cattle with high lactation yield must be made available to the farmers by the government, which will also include insurance cover to their cattle. Fourthly, a Milking machine should be provided to the small entrepreneur at an affordable price. Lastly, training on feed management, value addition on milk products, marketing, and also providing suitable marketing for their processed items will be a boon for the small producer, which will, in turn, help us in realizing our dreams of not only milk sufficient countries but also milk surplus country.

Some limitations were found in the collection and interpretation of the data. Although the period and amount of data were deemed acceptable, a more extended period and more extensive data would have allowed us to run more analyses. The current study was limited to the overall milk production and consumption scenario of the country. An in-depth study can be undertaken on a specific area like management of feeds, breeds, marketing by the future researcher.

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