

PERFORMANCE PROSPECTS OF DAIRY FARMING IN INDIA: A REVIEW

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ABSTRACT

India is predominantly an agrarian society where animal husbandry forms the backbone of national economy. Dairy enterprise, next to agriculture, not only provides continuous income and improves the dietary standards of family, but also reduces unemployment to an extent. Various studies suggest that dairying has enormous potential to improve the socio-economic status of the large percentage of rural population. Dairying is an integral part of the Indian economy, more so, the rural economy. The contribution of this sector to the national income is invaluable, estimated to be about 4.11 per cent of the gross domestic product (GDP) and about 25 per cent to agricultural economy. At the household level, dairying plays an important role in improving the economic condition of 70 million farm families.

INTRODUCTION

Dairy holds an important role in various facets of Indian society, encompassing food, religion, culture, and the economy. India possesses the largest dairy herd globally, consisting of more than 300 million bovines that generate over 187 million tonnes of milk. India leads all nations in both milk production and consumption. The majority of the milk is consumed locally, although a small percentage is exported. Indian cuisine, especially North Indian cuisine, includes various dairy items such as paneer, whereas South Indian cuisine relies more on yogurts and milk. Milk and dairy items are significant in Hindu ritual and mythology.

Dairy farming in the Indian subcontinent has historical origins that trace back 8,000 years to the domestication of zebu cattle. Dairy products, particularly milk, have been consumed on the subcontinent since at least the Vedic era. During the mid- to late 20th century, Operation Flood revolutionized the Indian dairy sector, making it the largest globally. Previously, milk was primarily produced on family-run farms in India.

The financial influence of the dairy sector in India is significant. The majority of the milk produced is from buffalo, with cow milk following closely, while goat milk ranks much lower. India produces a wide range of dairy products. India's dairy imports are minimal and subject to tariffs. The domestic industry is overseen by government bodies like the Ministry of Animal Husbandry, Dairying and Fisheries; National Dairy Development Board; and Food Safety and Standards Authority of India.

STATUS OF DAIRY SECTOR IN THE WORLD

India has now emerged as world's largest producer of milk, currently it contributes more than 16 percent of the world's total milk production followed by USA (12.1 %), China (5.71%) and Pakistan (4.92%). The details of top milk producing countries in the World are presented in table –1.

Table- 1

Top milk Producing Countries in the World

Countries/ years	Production (million tonnes)				Share in Percentage				Rank in
	1970	1990	2000	2023	1970	1990	2000	2023	2023
India	20.8	53.68	79.66	117	5.31	9.9	13.8	16.2	1
USA	53.07	67.01	76.02	87.46	13.5	12.4	13.1	12.1	2
China	1.96	7.04	12.37	41.14	0.5	1.3	2.14	5.71	3
Pakistan	7.45	14.72	25.57	35.49	1.9	2.71	4.42	4.92	4
Russia	0	0	32.28	32.14	0	0	5.58	4.46	5
Brazil	7.42	15.08	20.53	31.82	1.89	2.78	3.55	4.41	6
Germany	28.18	31.34	28.35	29.67	7.19	5.78	4.9	4.12	7
France	22.85	26.81	25.74	24.21	5.83	4.94	4.45	3.36	8
New Zealand	5.99	7.51	12.24	17.01	1.53	1.38	2.11	2.36	9
UK	12.97	15.25	14.49	13.19	3.31	2.81	2.5	1.83	10
World	391.87	542.47	578.88	720.98	100	100	100	100	-

Source: NDDB, Government of India.

Table – 1 reveals that the top ten countries of the world are contributing around 60 % of the world milk output in 2023. The investment, innovation, energy and application of scientific production techniques by our small, medium and large farmers have made India becoming a major player in the world dairy sector.

SHARE OF AGRICULTURE AND LIVESTOCK SECTOR IN GDP

Table - 2 reveals that the share of agriculture sector and livestock sector in total GDP of India has declined from 34.72% and 4.82% in 2009-10 to 15.18% and 3.92% in 2022-23 respectively. However, the livestock sector has shown a rising trend in terms of share in agricultural GDP, which increased from 13.88% in 2009-10 to 25.85% in 2022-23.

Table- 2

Share of Agriculture and Livestock sector in GDP at current prices

Year	GDP	GDP Agriculture		GDP Livestock		% share of Agricultural GDP
		Rs Crores	%	Rs Crores	% share of Total GDP	
2009-10	1224	425	34.72	59	4.82	13.88
2010-11	4778	1352	28.30	308	6.45	22.78
2011-12	19250	4089	21.24	1047	5.44	25.61
2012-13	20977	4425	21.09	1093	5.21	24.70
2013-14	22614	4255	18.82	1149	5.08	27.00
2014-15	25382	4830	19.03	1183	4.66	24.49
2015-16	29714	4766	16.04	1193	4.01	25.03
2016-17	33905	5368	15.83	1275	3.76	23.75
2017-18	39532	6046	15.29	1426	3.61	23.59
2018-19	45820	7162	15.63	1692	3.69	23.62
2019-20	53035	8066	15.21	2004	3.78	24.85
2020-21	61089	9286	15.20	2371	3.88	25.53
2021-22	72670	11320	15.58	2761	3.80	24.39
2022-23	83535	12681	15.18	3278	3.92	25.85

Source: Basic Animal Husbandry Statistics (BAHS-2023 Ministry of Agriculture, Government of India.

NUMBER OF MILK COWS IN THE WORLD

The number of dairy cows worldwide, which was around 136 million heads in 2019, reached 137 million heads in 2020 according to the data of the **US Department of Agriculture Foreign Agriculture Service (USDA FAS)**. The number of animals in question is estimated to exceed 138 million heads in 2021.

India is the country with the highest number of dairy cows. It is estimated that there are approximately 56 million dairy cows in the country in 2020, and that this will rise to 58 million in 2021. The European Union follows India with about 22 million heads. It is estimated that the number of dairy cows in the European Union will decrease slightly in 2021. For dairy cows, India and the European Union are followed by Brazil with 16 million heads, the US with approximately 9 million heads, Russia, Mexico, and China with approximately 6 million heads each. Table - 3 gives the details of fluid milk cow numbers, summary for selected countries.

Table - 3

Fluid Milk – Cow Numbers, Summary for Selected Countries

Sl.No	Cows in Milk	2018	2019	2020	2021
01	India	52482	54600	56450	58000
02	EU	23311	22908	22627	22550
03	Brazil	16300	16500	16200	16400
04	USA	9398	9336	9375	9395
05	Russia	6815	6711	6580	6500
06	Mexico	6550	6500	6550	6600
07	China	6200	6100	6150	6200
08	New Zealand	4993	4946	4815	4800
09	Ukraine	2078	1970	1840	1750
10	Argentina	1640	1598	1610	1615
	World Total	134771	136082	137088	138721

Source: Source: USDA.

GLOBAL MILK PRODUCTION AND CURRENT STATUS OF THE MARKET

According to the OECD-FAO Agricultural Outlook 2020-2029 report, 81% of world milk production is cow milk, 15% buffalo milk, and 4% goat, sheep, and camel milk. Total milk production from all types increased by 1.3 percent in 2020, reaching approximately 852 million tons. According to FAO data, this production amount was 843 million tons in 2019.

India is the world's largest milk producer, making up 22 percent of global production in milk of all types. The US, China, Pakistan and Brazil follow India in global milk production. India, the world's largest milk producer, increased its production by 4.2 percent in 2019 to 192 million tons according to the OECD-FAO report.

The total milk production of the EU (157 million tons), the US (101 million tons), New Zealand (22 million tons), Argentina (11 million tons), and Australia (9 million tons) was estimated to be 301 million tons in 2022, according to same report. This amount is expected to reach 304 million tons in 2023.

The production amount of cow's milk alone in the world in 2022 is approximately 532 million tons as per USDA figures. This amount is expected to approach 540 million tons in 2023. In 2022, the largest share in world cow milk production belongs to EU countries with 157 million tons; but on a country basis, the largest producer is the US with 101 million tons. The USA is followed by India with 93 million tons, China with 33 million tons, Russia with

31 million tons, Brazil with 23 million tons, and New Zealand with 22 million tons. The details of cows milk production: Summary for selected countries are presented in table – 4.

Table – 4

Cows Milk Production: Summary for Selected Countries 1000 Metric Tones

Sl.No	Countries	2020	2021	2022	2023
01	EU	154575	155200	157500	158100
02	USA	98688	99055	101015	102648
03	India	89800	92000	93800	96000
04	China	30750	32000	33000	34500
05	Russia	30398	31154	31650	31800
06	Brazil	23745	24262	23505	24000
07	New Zealand	22017	21896	22000	22200
08	Mexico	12368	12650	12750	12900
09	Argentina	10837	10640	11350	11575
10	Canada	9944	9903	9950	9980
11	World Total	519719	524409	532245	539533

Source: USDA.

PROJECTIONS IN MILK PRODUCTION (2020-2029)

World milk production is expected to increase by 1.6 percent annually between 2020 and 2029 and reach 997 million tons in 2029, according to OECD-FAO report. It is thought that the growth in herds and especially the increase in yield will be effective in the increase in milk production. Factors such as optimization of milk production systems, improved animal health, improved feeding efficiency, and better genetics are among the factors of productivity growth.

Again, it is stated by the OECD-FAO report that between 2020 and 2029, India and Pakistan are expected to contribute more than half of the growth in world milk production and provide more than 30 percent of world production by 2029.

Production in the European Union, which is the second-largest milk producer, is expected to grow slower than the world average due to environmental constraints and limited domestic demand. An annual decrease of 0.6 percent is expected in dairy herds in the region between 2020 and 2029, while an annual increase of 1 percent is expected in yield.

There are also expectations for an increase in North America, where the average yield per cow is highest. The number of dairy cattle in the US and Canada is expected to remain largely unchanged and the increase in production is mainly due to increased yields. As an important milk producer, New Zealand ranks among the top exporting countries of dairy products. However, milk production in the country shows a very modest growth.

In Africa, a strong production increase is expected from larger herds. It is thought that especially goat's and sheep's milk will contribute to the production in the region. During the period of 2020-2029, it is estimated that about a third of the worldwide herd population will be located in Africa, where production will account for about 5 percent of world milk production. The details of cows milk fluid consumption: summary for selected countries are presented in table – 5.

Table - 5

Cows Milk Fluid Consumption: Summary for Selected Countries 1000 Metric Tons

Sl.No	Countries	2020	2021	2022	2023
01	India	77000	79000	81000	83000
02	EU	33500	33300	33400	33350
03	USA	21623	21250	21200	21000
04	China	12700	13200	12000	13000
05	Brazil	10762	10900	11010	11100
06	Russia	7318	7270	7200	7115
07	Ukraine	4862	4967	4550	4409
08	Mexico	4183	4190	4200	4175
09	Japan	3995	4000	4000	4005
10	Canada	2832	2816	2875	2910
	World Total	1,86,813	1,88,787	1,89,494	1,92,220

Source: USDA.

MARKET STATUS FOR DAIRY ANIMAL FEEDS

According to the 2021 Global Feed Survey prepared by Alltech, the production amount in world dairy animal feed is around 128 million tons. The biggest share in dairy animal feed production, where there was no increase between 2022-23, belongs to European countries with approximately 42 million tons. Dairy feed production of European countries decreased by approximately 1.6 million tons (4%) in 2020 compared to the previous year. The details of global dairy feed production are presented in table – 6.

Table – 6

Global Dairy Feed Production

Sl.No	Country	2022	2023	Growth
01	Africa	5.97	5.8	-3%
02	Asia-Pacific	22.85	23.56	3%
03	Europe	43.36	41.82	-4%
04	Latin America	19.97	21.45	7%
05	Middle East	6.59	6.26	-5%
06	North America	28.30	28.30	0%
07	Oceania	1.74	1.62	-7%
	Total	128.77	128.81	0%

Source: Global Food Survey.

European countries are followed by North American countries with approximately 28 million tons in 2020 and Asia Pacific countries with approximately 23 million tons. While production in North America remained at the same level as the previous year, production in the Asia Pacific region increased by 3 percent compared to the previous year.

Latin America, which ranks third in world dairy animal feed production with approximately 22 million tons, was the region that achieved the largest growth (7%) in production in 2020 compared to the previous year.

CHALLENGES & UNCERTAINTY IN MILK INDUSTRY

Covid-19 Effect: Although the food sector is less affected in general by the Covid-19 pandemic compared to other sectors, problems in supply chains of perishable foods such as milk and dairy products have become an important point of loss for the industry. Again, the fact that places that provide mass food services such as restaurants & cafes were affected

firstly by restrictions was reflected as a decrease in the consumption of dairy products (although it varies according to consumption habits).

Climatic changes: Especially grazing based production systems are significantly affected by climatic changes. According to the OECD-FAO report, world milk production may be restricted due to unforeseen weather events, especially due to grazing systems. Climate change also increases the likelihood of droughts, floods and disease threats, all of which can affect the dairy sector in various ways (e.g. price volatility, milk yield, cow inventory adjustments).

Environmental regulations: Environmental concerns and environmental legislation to be created as a result of these concerns have a strong impact on the future development of dairy production and can change all current forecasts. Greenhouse gas emissions resulting from dairy operations account for a high proportion of total emissions in some countries (e.g. New Zealand, Ireland), and any change in related policies could affect dairy production. The increasing trend towards sustainable practices such as water access and fertilizer management is additional areas where policy changes can be effective. However, stricter environmental legislation can also lead to innovative solutions that increase the long-term competitiveness of the industry.

Animal diseases: Animal diseases and their spread can affect milk production. Mastitis is the most common infectious disease in dairy cattle and all farm sizes worldwide. It is also the most economically damaging challenge that has a significant impact on milk yield and milk quality. Future advances in awareness, detection, and treatment of this disease may lead to significant increases in milk production through smaller losses.

Antimicrobial resistance: Treatments based on antimicrobials are widely used to control many diseases, including mastitis. The overuse of antimicrobials has raised concerns about the development of antimicrobial resistance that would reduce the effectiveness of existing treatments and require the development of new ones. The evolution of this process remains an uncertainty for the next decade.

Plant-based products: In recent years, the role of plant-based dairy substitutes (e.g. soy, almond, rice and oat drinks) in the liquid dairy sector has increased in many regions. The growth rates of plant-based milk substitutes are strong, albeit from a low base, but conflicting views exist regarding their environmental impact and relative health benefits. As a result, there is uncertainty about their long-term impact on dairy demand.

Domestic policies of countries – bilateral trade agreements, etc: The domestic policies determined by the countries and the special bilateral trade agreements they have with other countries will affect the demand for dairy products and trade flows.

Dairy farming has been an important part of the agricultural scenario for thousands of years. India being a predominantly agrarian economy has about 70 per cent of its population living in villages, where livestock play a crucial role in the socio-economic life. Livestock provide high-quality foods such as milk, cheese, butter, ghee, etc. India is not only one of the top producers of milk in the world, but also the largest consumer of milk and milk products in the world. Due to the shortfall in supply, we have to import significant amounts of milk products to meet internal demand.

Agriculture and animal husbandry have a symbiotic relationship, in which the agricultural sector provides feed and fodder for the livestock and animals provide milk, manure and draught power for various agricultural operations. Dairy sector is instrumental in bringing

socio-economic transformation in India. It has created a lot of employment opportunities and also provides improved nutritional benefits.

Animal husbandry is a major sub-sector of agriculture sector and contributes about 28.6 per cent to the agricultural value output (Annual Report 2017–18, Department of Animal Husbandry, Dairying and Fisheries, Government of India). The growth rate of 6.27 per cent and 6.37 per cent during 2015–16 and 2016–17, respectively in the livestock sub-sector is much faster than the overall 0.7 per cent and 4.9 per cent growth rate of agriculture and allied sector during the same period (Economic Survey, 2016–17). The statistics indicate that there is a lot of employment potential for entrepreneurial activities in the dairy sector. This Unit discusses the scope of dairy sector in the Indian context.

IMPORTANCE OF DAIRY FARMING

Milk is a wholesome food among all the animal products. It contains in proper proportions the various essential food ingredients required by human body in an easily digestible form. Inclusion of milk in the human diet increases the digestibility of other types of food as well.

The productivity of milk varies in different countries, as some countries are surplus in production, some are deficit in production and in some of the countries, and availability matches their requirement. The annual milk production in India in 2015–16 was 155.5 million tonnes and the per capita availability of milk was 337 grams per day.

In India, milk is produced by a vast number of small, medium and large-sized farms. There is exponential growth in the number of the commercial dairy farms in the urban and semi-urban areas of the metros and big cities.

It is clear that 49 per cent of milk production comes from buffaloes, followed by 27 per cent, 21 per cent and 3 per cent from crossbred and exotic cows, indigenous cows and goats, respectively. Small quantity of milk is also procured from camel, sheep and yak. Uttar Pradesh is the largest milk producer in India, followed by Rajasthan. The per capita availability of milk is highest in Punjab, followed by Haryana (Basic Animal Husbandry Statistics, Government of India, 2017). It is interesting to note that in 2016–17, the per capita availability of milk was highest in Punjab at 1075 grams, followed by Haryana at 930 grams, whereas Delhi recorded a dismal 35 grams.

The demand for milk is constantly increasing in cities as well as small towns and rural areas. The factors influencing this increased demand are — rapid increase in population, spread of education, growing nutritional awareness and improved purchasing power of consumers. Dairy farming in India has evolved from just an agrarian way of life to a professionally managed industry. A large number of rural families in India are engaged in dairy production, for which this is an important source of secondary income. In India, raw milk is perceived to be fresh by most consumers and has a large market. Conventional dietary habits in India account for about 60 per cent of milk consumption in liquid form, and the remaining in the form of ghee, cheese, curd, paneer, ice cream, dairy whiteners and traditional sweets.

Dairying provides a source of daily income with a relatively low level of risk. Most of the dairy farmers in India raise animals at a small scale in traditional ways. The productivity of these farmers can be enhanced if they run their business in a scientific manner. Most of such farmers are not aware of the modern methods of dairy farming. As a result, some farmers lose their investment instead of making profit. To ensure maximum production and profits from dairy farming, it is essential that these farmers adopt proper business plans and good dairy management practices. Nearly 43 per cent of Indian farmers are small cultivators, and about

26 per cent are agricultural labourers who have one or two milch animals (Planning Commission, GOI, 2009). This indicates that dairy sector provides basic sustenance for small farmers, landless people and agricultural labourers, especially for people in draught affected areas in Rajasthan and Gujarat.

CONTRIBUTION OF DAIRY SECTOR TO INDIA'S GDP

The dairy industry is one of the key rural economic sectors that improve the financial situation of India's 80 million landless, tiny, and marginal farm households. The sector also aids in assuring nourishment for low-income rural households and reducing rural poverty and inequality. It directly employs 80 million dairy farmers and has a 5% contribution to the national economy.

The dairy sector is expected to rise by 9–11% in 2021–2022 as a result of a recovery in economic activity, rising per capita consumption of milk and milk products, shifting dietary choices, and increasing urbanization in India. Over the previous five years ending in 2020, the cattle industry expanded at a Compound Annual Growth Rate (CAGR) of 8.15%. Over 50% of the dairy industry's revenue comes from the liquid milk segment, where growth is expected to be consistent (6-7%). Comparatively speaking, the organized dairy segment has grown more quickly than the unorganized component, which makes about 26–30% of the business (by value).

Additionally, this industry offers prospects for self-employment, notably to women and economically underprivileged populations. 8.4 million Small and marginal farmers depend on the dairy industry annually for both their direct and indirect means of subsistence; 71% of these farmers are women, illustrating the sector's critical role in the empowerment of women and inclusive growth. Greater expansion of the dairy industry in emerging nations can boost women's educational success and reduce gender disparities.

CONCLUSION

Dairy development in India has proven a low milk production of 17 million tonnes in 2001 to 165.4 million tonnes in 2023. Today Indian dairy industry contributes significantly to GDP and Agricultural GDP. The share of livestock in GVA of agriculture has been rising since 2011-12. With Gross Domestic Product (GDP) growth estimated to be 6.5 percent in 2022-23, as per estimates released by CSO. India can be rated as among the best performing economies in the world on this parameter. India has become the largest producer of milk in the world and is the largest consumer of milk. This huge success in dairy development through Operation Flood largest rural development programme in the world, Intensive cattle development programme, and key village scheme. In spite of that Indian dairy industry also evident by various challenges which are repeatedly hampering its additional development. The organized sector has limited coverage of dairy industry it needs to footstep up to increase its coverage and the benefits of dairy development should be reached to the village level milk producer farmer which are the main contributors to the dairy development of India. Although India is self-sufficient in dairy product but its dairy industry is facing challenges we have to overcome it through systematic approach and planning.

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