

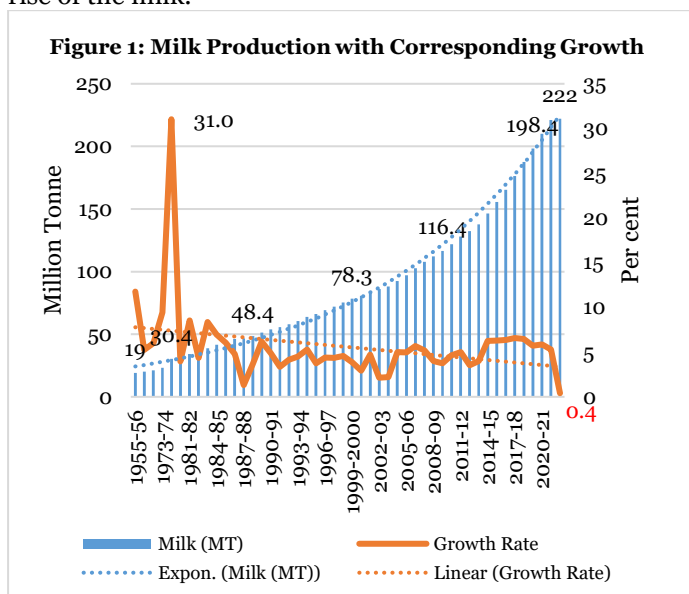
1. Introduction:

Milk market in India is mainly a demand-driven due to increasing population, income levels, rising urbanisation and lifting of ban on export of skim milk powder. However, recent price rise of milk is largely driven by the supply side. In 2023, a surge in milk prices has been witnessed, which is causing concern among consumers as well as policy makers. The average retail price of milk in India has increased by 12% from a year ago to ₹57.15 per litre. As per the latest inflation data (CPI-combined), milk and products inflation rate were 9.3% in March 2023, which is also pulling retail inflation upward.

The major reason for price rise in milk and products are stagnation in production and increase in the cost of production. Rise in feed cost, cereals price, wage rate, and death of cattle due to lumpy skin disease have influenced the milk production significantly. The present situation has forced government to go for the import of milk products such as skim milk powder (SMP) and butter. Milk is an integral part of India's dietary system, which makes it important to analyse the factors affecting production, consumption, price and trade of milk and milk products in India.

2. Production of Milk:

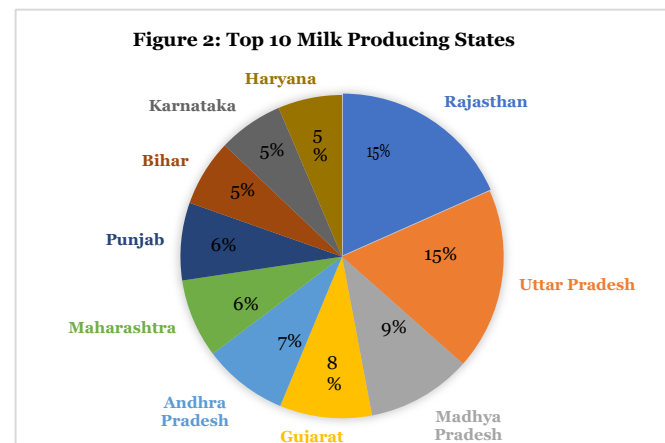
India's milk production has grown significantly since independence. India has become self-reliant in milk production and consumption through many years of strenuous nation-wide efforts, led by Operation Flood programme in the 1970s. This programme has insured market accessibility for any quantity of milk supplied through cooperative movement, which connected the consumption centres in urban areas to the villages (production centres). At the time of independence, milk production was just 17 MT, which has now increased to 222 MT (provisional data) with compound annual growth rate of 4.9%. Figure 1 shows that milk production has increased exponentially. However, the growth in milk production has declined sharply from 5.3% in 2021-22 to just 0.4% in 2022-23. Stagnation in milk production has caused price rise of the milk.



Source: Department of Animal Husbandry and Dairying, GOI

State-wise per Capita Milk Production and Availability

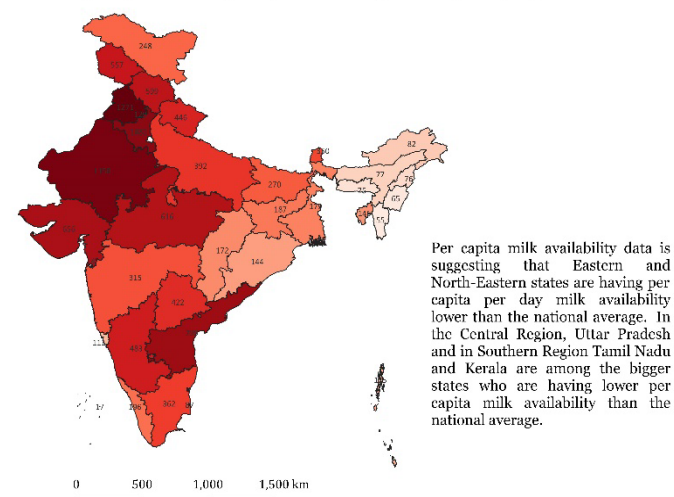
Figure 2 highlights the contributions of states in total milk production. Uttar Pradesh (15%) and Bihar (5%) are among the top 10 milk producers in absolute terms but in terms of per capita, these states are below national average due to high population.



Source: Department of Animal Husbandry and Dairying, GOI

Top 10 states contributes 82% of total milk production, among which top 5 states namely Rajasthan, Uttar Pradesh, Madhya Pradesh, Gujarat and Andhra Pradesh alone contributes 54% of total milk production.

Figure 3: State-wise per capita availability of milk (grams/day)



Source: Prepared by NABARD using data from Basic Animal Husbandry Statistics, MoFAHD, DAHD, GOI.

Another way to study milk production in the country in terms of self-sufficiency or food security is to analyse the per capita availability and its growth trend. The per capita availability of milk has reached a level of 444 grams per day during the year 2021-22 which is more than the world average of around 320 grams per day in 2021 (estimates) (Food Outlook November 2022). State-wise analysis suggests that 6-7 states dominated the milk production while others are having lower per capita per day availability than the national average (figure 3).

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Adult Dairy Animal Population

Since the source of milk is the female dairy animal, it is crucial to understand the factors that influence their population. The profitability is moderated by productivity in terms of breed, feed and management. The number of female animals is also adversely affected by high beef price as it results in increased attrition. Feeding and labour are the major costs of rearing dairy

animal, apart from cost of ownership and availability of labour is affected by social factors such as stigma associated with farming and preference for employment in urban areas.

Compound annual growth rate in female bovine is 3.4%, in which adult female buffalo population has grown more than the adult female cattle population (Table 1).

Table 1: Bovine Population in India by Species (Million numbers)

Species/ Year	1951	1956	1961	1966	1972	1977	1982	1987	1992	1997	2003	2007	2012	2019	CAGR
Cattle	155.3	158.7	175.6	176.2	178.3	180	192.5	199.7	204.6	198.9	185.2	199.1	190.9	192.5	1.6
Adult Female Cattle	54.4	47.3	51	51.8	53.4	54.6	59.2	62.1	64.4	64.4	64.5	73	76.7	81.4	3.8
Buffalo	43.4	44.9	51.2	53	57.4	62	69.8	76	84.2	89.9	97.9	105.3	108.7	109.9	8.2
Adult Female Buffalo	21	21.7	24.3	25.4	28.6	31.3	32.5	39.1	43.8	46.8	51	54.5	56.6	55	8.9
Total Female Bovine	75.4	69	75.3	77.2	82	85.9	91.7	101.2	108.2	111.2	115.5	127.5	133.3	136.4	5.6
Total Bovines	198.7	203.6	226.8	229.2	235.7	242	262.2	275.7	288.8	288.8	283.1	304.4	299.6	302.3	3.4

Source: Livestock Census, MoFAHD, DAHD, GOI

Dairying has become an important secondary source of income for millions of rural families and has assumed the most important role in providing employment and income generating opportunities particularly for women and marginal farmers.

Percentage Share of Milk Production and Average Yield Rate

The analysis of the contribution of milk production by Cow, Buffalo and Goat show that indigenous/non-descript buffaloes contribute 45% of the milk production followed by crossbred cows (30%) during 2021-22. The Indigenous/Non-descript cows contribute 20% of the total milk production in the country. Goat milk shares a contribution of 3% in the total milk production across the country. The contribution of exotic cows to total milk production is 2%.

The average yield of milk per day per animal in milk at National level from different species during 2021-22 suggests that exotic cows (11.36 kg/day) and crossbred cows (8.32 kg/day) are having significantly high yield in comparison to indigenous (4.07 kg/day) and non-descriptive cows (2.83 kg/day). Similarly, average productivity of indigenous buffalo is 6.62 kg/day.

3. Milk Consumption

Total milk consumption is factor of per capita consumption and number of persons or households

consuming milk. If any one or both grow over time, an increased demand for milk is expected. Table 2 indicates the growth in monthly consumption expenditure on the milk and milk products. Expenditure on milk consumption since 1987-88 grew at CAGR of 50% in rural areas and 48.4% in urban areas.

Table 2: Per capita monthly consumption expenditure on milk and milk products (₹)

NSS Round	Rural/ Urban	Milk and Milk Products
43rd (1987 - 1988)	Rural	13.63
	Urban	23.83
50th (July 1993 - June 1994)	Rural	27.00
	Urban	45.00
55th (July 1999 - June 2000)	Rural	42.56
	Urban	74.18
61st (July 2004- June 2005)	Rural	47.31
	Urban	83.30
66th (July 2009- June 2010)	Rural	79.78
	Urban	139.29
68th (July 2011- June 2012)	Rural	116.38
	Urban	187.14

Source: Level & Pattern of consumer expenditure, various issues, National Sample Survey Organisation, Ministry of Statistics & Programme Implementation, GoI

Growth in expenditure in milk and milk products consumption have increased more after 2004-05. Since 2004-05, expenditure on milk and milk products in rural areas have increased at CAGR of 56.8%, while in urban area, it has increase at CAGR of 50%. In addition to higher per capita consumption, a greater number of households have also started to consume milk. In 1993-94, one-third of rural households and one-fifth of urban households are reported to have not consumed milk. By 2011-12, their number decreased to 12 % and 15%, respectively (Table 3). The increase in consumption expenditure indicates that increase in per capita income has causal relation with the demand for milk consumption.

Year	Rural	Urban
1993-94	67	79
2004-05	71	85
2009-10	76	85
2011-12	78	85

Source: 50th, 61st, 66th & 68th Rounds of NSS

4. Milk and Milk Products Price:

Price rise of milk is due to short-term and long-term factors. In the short term, supply side becomes major reason for the price rise. Even the domestic stock of SMP and butter also play role in determining the price of milk as the stock of SMP and butter can easily be affected by exports or imports. On the other hand, long-term factors are mainly demand side factors such as growing population, increase in per capita income, urbanisation, growth in demand of milk-based products, high-income elasticity for the demand of milk, etc. Further, income elasticity for milk is generally more than 1 and higher in rural areas and as high as 2.3 for lower income class indicating that with the rise in consumer income, the share of expenditure on milk would go up. Researchers have also estimated that the uncompensated own price elasticity of milk is -0.8 for the very poor. Relation of milk inflation with overall food inflation and factors determining the price rise in milk is analysed in the subsequent sections.

Milk and Milk Product Inflation vis-à-vis Food Inflation

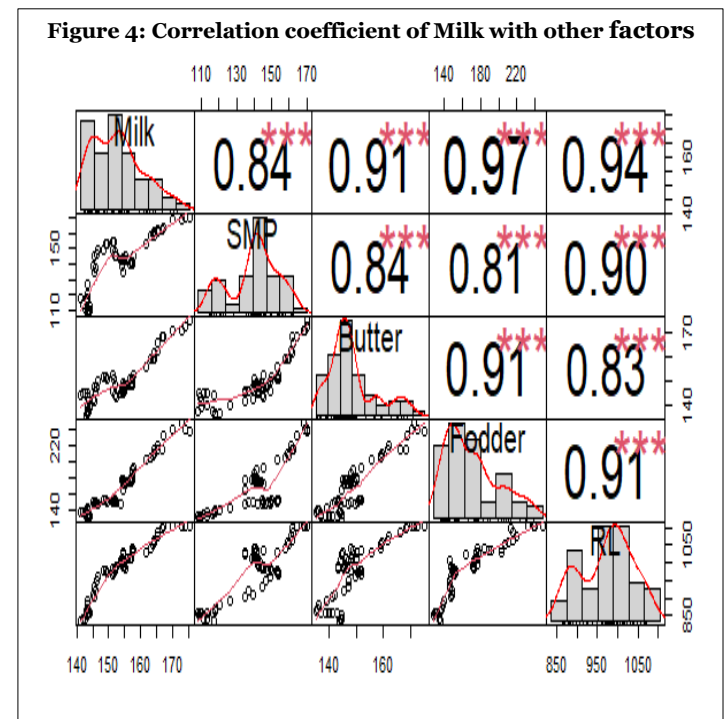
Milk and milk products price have second highest weightage is the food inflation at 6.61% after cereals and products at 9.67%. In rural areas weightage of milk and milk products are 7.72%, while in urban areas it is 5.33%. In the recent few months, milk and milk product is dragging the food inflation upward. During the year 2022-23, food inflation was 6.61% (CPI combined) and milk and milk products inflation was 7.41% (Table 4).

Trends of monthly food inflation vis-à-vis milk and milk products inflation for last 5 years display the positive relations with high correlation of 66%.

Year	Food Inflation	Milk Inflation
2018-19	0.14	1.83
2019-20	6.71	2.9
2020-21	7.69	5.39
2021-22	3.76	2.84
2022-23	6.61	7.41

Source: Consumer Price Index, Government of India Ministry of Statistics and Programme Implementation National Statistical Office

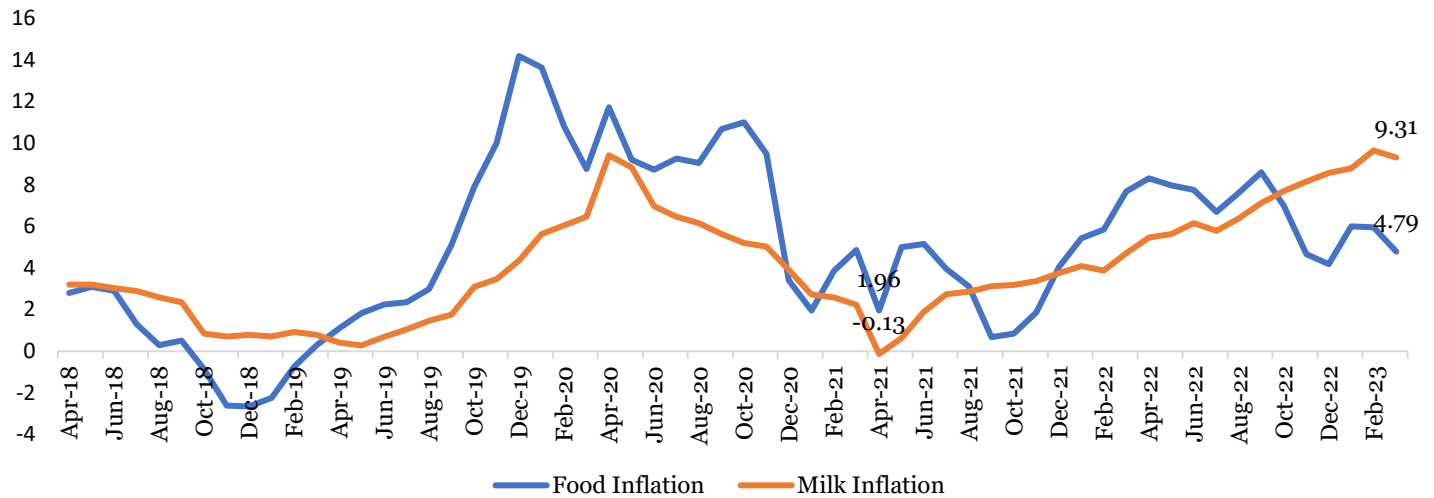
Correlation analysis also suggest that monthly WPI of milk and products have high positive correlation with WPI of Skim Milk Powder (SMP), fodder, butter and rural labour (Figure 4).



Source: WPI data for SMP, milk, butter and fodder, Office of Economic Advisor, GOI and CPI for the rural labourers, MOSPI, GOI. Chart has been created by author using R.

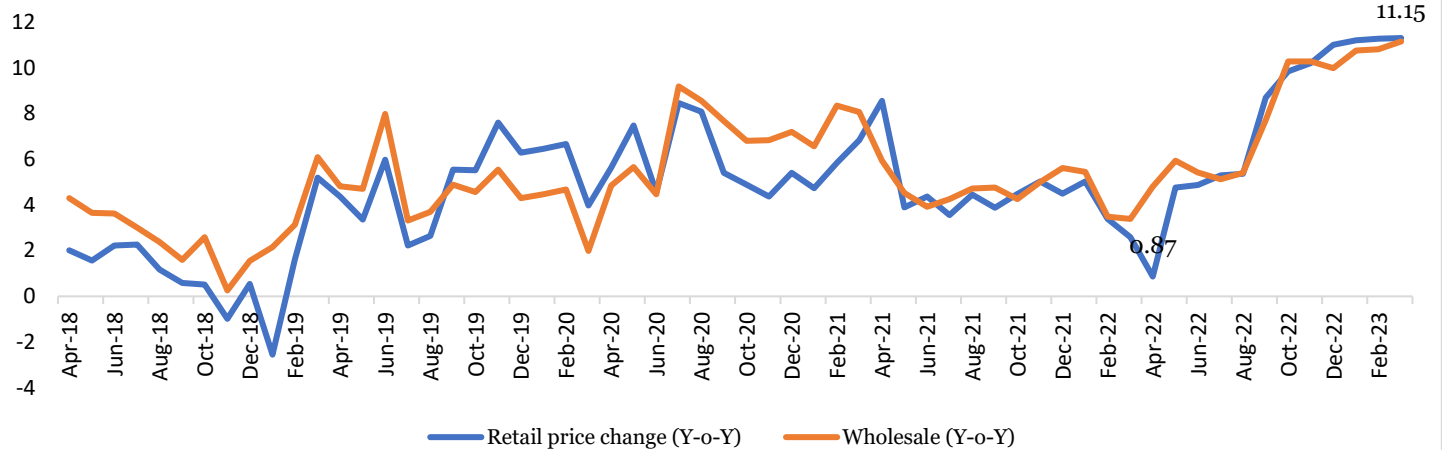
Figure 5 indicates that in recent months' milk and milk products inflation has surpassed the food inflation. Since April 2022, both retail and wholesale price of milk has upwards trends in Y-o-Y growth (Figure 6). It is also witnessed that difference between retail and wholesale price of milk is not high mainly due to successful cooperatives.

Figure 5: Food Inflation vis - a - vis Milk and Products Inflation



Source: Consumer Price Index, MOSPI, GOI.

Figure 6: Price movement of milk



Source: Office of Economic Advisor, GOI for WPI and MOSPI, GOI for CPI.

Factors Affected Recent Price Rise of Milk

Milk prices can vary significantly across different regions and periods, depending on local factors such as weather conditions, seasonal fluctuations, and regional as well as global demand and supply dynamics. The rise in milk prices is a complex issue influenced by multiple factors, including production costs, government policies, and global market conditions. Recent jump in the increase in milk prices are short-term phenomena led by supply constraints. As compared to last year, milk production has just grown by 0.4% this year. Some of the major reason in reduction in the growth of milk production are explained below:

Rise in production cost

The cost of producing milk has increased due to rising costs of feed, fuel, and labor. Additionally, farmers have faced higher costs for animal healthcare, which has further increased the cost of production.

Table 5: WPI of Fodder, Fodder Inflation and CPI-RL During FY 2022

Months	WPI	Inflation (%)	CPI-RL (%)
April	203.4	17.44	6.67
May	206.8	20.02	7
Jun	210.5	21.82	6.76
July	215.7	24.11	6.82
August	219.2	25.54	7.26
September	215.6	22.22	7.9
October	213.6	19.80	7.34
November	231.5	30.94	6.99
December	240.1	30.56	6.6
January	248	31.15	6.88
February	238.8	24.31	6.87
March	237.9	17.13	6.94

Source: Office of Economic Advisor, GOI for WPI and MOSPI, GOI for CPI.

In last one-year, production cost of milk has increased significantly due to increase in feed and labour cost. In the month of December 2022, January and February

2023, fodder inflation has gone as high as to 31%. Increase in fodder cost is mainly due to price rise of cereals and rice bran, which is used, in animal feed. Apart from the fodder cost, transportation costs contribute significantly to the final price of milk. The cost of fuel and maintenance of vehicles has increased in recent times, which has led to an increase in transportation costs.

Lumpy Skin Disease in Cattle

Lumpy skin disease, a viral disease has infected more than 30 lakh cattle in which 1.69 lakh cows and buffaloes died due to LSD (Table 6). Apart from the death, productivity of the infected animal were reduced and affected the milk production. Vaccination drive of GOI and good recovery rate are expected to increase the productivity and production in the upcoming years.

Table 6: State wise Detail of Lumpy Skin disease (LSD) in the country during 2022 (as on 20-12-2022)

S.No	State/UT	Number of cattle affected	Number of cattle died	Number of cattle vaccinated	Number of cattle recovered
1	Gujarat	176094	6193	6319005	169901
2	Himachal Pradesh	137346	10872	387264	113206
3	Punjab	174927	17932	921615	156995
4	Rajasthan	1572460	75820	10581925	1440073
5	Uttarakhand	36323	920	675838	35395
6	Madhya Pradesh	32257	694	3361279	31144
7	Jammu & Kashmir	71377	2698	1964241	61653
8	Uttar Pradesh	110249	647	15764900	104801
9	Haryana	114838	2937	1736348	102921
10	Maharashtra	397249	28227	14187109	320679
11	Goa	27	1	21895	26
12	West Bengal	304	0	3670	304
13	Andhra Pradesh	767	58	117300	709
14	Delhi	827	0	25067	774
15	Bihar	803	0	0	633
16	Tamil Nadu	204	1	99350	195
17	Jharkhand	169	0	163647	169
18	Karnataka	237194	21305	6937440	164254
19	Telangana	9030	70	3206369	8852
20	Kerala	7141	130	25654	1433
21	Chhattisgarh	10	0	2474	10
22	Odisha	6258	21	390900	3864
23	Total	3085854	168526	66893290	2717991

Source: Data has been taken from the reply of Minister of Animal Husbandry and Dairying in the Parliament on 23rd Dec 2022.

Impact of COVID

The COVID-19 pandemic has disrupted the global supply chain and caused logistical challenges, which have affected the availability and cost of milk and dairy products. During pandemic induced lockdown, the demand for milk and milk products decreased sharply due to close of restaurant and restrictions on public functions. This drop of demand affected price and profitability of dairy farmers. As most the farmers in dairy are small and marginal, they were affected badly and started selling their cattle. This has also affected the milk production and supply of milk post pandemic.

5. Conclusion and Recommendations

Current inflation rate in milk and milk product is temporary phenomena. It is expected that in future, inflate rate will be moderate. Government is also planning to import milk products to normalise the price rise. However, for the long-term price stabilisation, following policy measures are recommended:

1. Price control of feed prices: Feed price plays significant role in the cost of milk production. Government has recently announced setting up 100 fodder plus Farmer Producers Organisations (FPOs) during 2023-24. Of these, a maximum 16 are planned in Gujarat, followed by Karnataka (11 FPOs), Bihar (9), Kerala (9), and Rajasthan (8). NABARD may also support such FPOs.
2. Strengthening the initiatives to improve the breed of cattle, enhance measures to enhance the productivity.
3. The specific areas that need to be addressed afresh with renewed vigour are credit, insurance and market for livestock along with preventive health cover and targeting the small holder.
4. Faster vaccination drive to overcome situation like LSD death.
5. Robust and effective value chain to overcome the supply chain disruption to maintain the demand for milk and milk products.