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Analysis of Milk Production Sector**

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# **Dairy Farmers under Neoliberal Trade Reforms in India: Analysis of Milk Production Sector**

**S. Mohanakumar**

India is one of the huge markets for milk and milk products in the world. As the demand for milk and milk products are income elastic, the demand for milk products have substantially increased in rural India with the increase in income over the years. Even though India is the leading producer of milk in the world, India's share in world trade of dairy products is not commensurate with her size of milk production. The low productivity of milch animals in India is a major stumbling block for the expansion of trade of dairy products in the international market and it has a bearing on international competitiveness. It is argued in the paper that the competitiveness of the dairy farmers in India would deteriorate further unless the domestic market is protected from external competition.

Key words: dairy products, international trade, animal husbandry, liberalisation, cow and buffalo

## **Introduction**

The farming system in India is known for its mixed crop-livestock production. The livestock economy of India houses 58% of buffalos and 15% of cows in the world and ranks top in cattle and buffalo population. India is the largest producer of milk in the world with a share of 18.5% in world production. However, the dairy farmers in India have been under severe stress for the last quarter of a century as the crisis of reproduction of small producers percolated into the milk production sector too since the introduction of economic liberalisation in 1991. Annual rate of growth in milk production in India was 6.8% for the last two years and grew at 4% during the last two decades (Govt. of India, 2017). It is more than double of the rate of growth of milk production in the world. The issue of reproduction of the small capital with the dairy farmers, to a great extent, is different from the crop production sector. On trade liberalisation, studies specific to dairy products present diverse views on trade liberalisation (Kumar, 2009; Joshi, 2012). As cattle rearing in India has long been characterised as an offshoot of the crop production sector, studies on trade related reforms for the agriculture and allied sectors, to a great extent, is valid for the dairy sector as well. The prominent pro-liberal views argued that domestic market would be liberalised further to make agriculture more competitive in the international market. It would eliminate supply side bottlenecks and liberalised exports of agricultural commodities would help farmers to access the wider international market and realise a better price (Gulati, 2019). On other hand, there exists plethora of literature on negative impact of trade reforms on agriculture

and allied sectors. It is argued that stringent protection from external competition in the domestic market coupled with active state's support is required for the sector and the current crisis in the crop production sector is attributed to policies of trade reforms (Mohanakumar 2008; Mohanakumar, 2018)

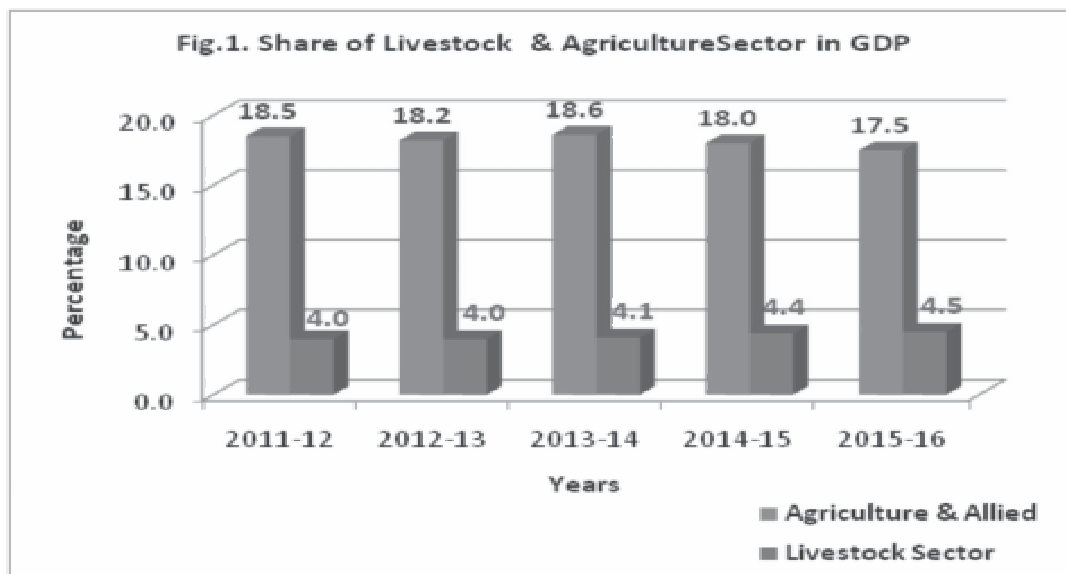
In the international trade scenario, productivity and scale of production matter more than the size of the bovine stock. The *numero uno* status in milk production is not a sufficient condition for trade in the global market. Productivity of animals (cow and buffalo) in India is much on a lower side as compared to that of the major milk producers in the world. The low productivity of cow and buffalo in India is attributed to both intrinsic (genetic potential) and extrinsic variables including management, poor veterinary and extension services and sub-standard breed improvement programme. Although the extrinsic variables can be improved with advanced management practices, intrinsic factors are difficult to be changed in the short run especially for small producers or subsistence farmers, who produce for the market in the neighbourhood. It has been estimated that informal sector handles more than 80% of the milk marketed in developing countries and India is not an exception to it (FAO, 2018). The Change in the breed of milch animals involves substantial investment and it is hard for the major chunk of milk producers in India to make substantial investment in the short run. However, a remunerative price supplemented with development of infrastructure for cattle rearing calls for active intervention of the state and it is difficult to come by under present economic dispensation. In the light of the above, the study examines the following: (i) What is the structure and composition of milk production and milch animals in India? Are milk producing farmers in India prepared to compete in the international market? (ii) What does the trend in the foreign trade of dairy products forecast for farmers in India? The discussion is organised in three sections. In section 1, production structure and trend in the dairy sector is analysed and the section 2 analyses the trend and structure in the foreign trade of dairy industry during the trade liberalisation phase. The findings are summarised in Section 3.

## Section I

### 1.1. Structure and Trend in Milch Animal Population and Milk Production

It has been sufficiently explored in the Indian context that there has been abnormal decline in the relative contribution of agriculture and allied sectors encompassing livestock too in the Gross Value Added (GVA) in India. While the share of agriculture and allied sectors decline in GVA, the relative contribution of the livestock sector has been increasing over the years and it is indicative of the importance of the sub-sector within agriculture (Fig.1). The structure, composition and changes in regional concentration of milch animal population assume special significance in the international trade in dairy products. As mentioned elsewhere, competitiveness of dairy products from India in the international market is influenced primarily by its quality and the competitiveness. In the international market, buffalo milk based products are preferred to cow milk. Further, Domestic Resource Cost (DRC) of exporting cow-milk based items from non-descript and indigenous cow is not

competitive as the productivity of animals are much below the exotic breed. In the cattle population, there exist mainly three varieties, viz., exotic breed, non-descript (Murrah) and indigenous. Similarly, two varieties are more common in buffalo population, viz., non-descript and indigenous. Productivity do vary significantly across different types of cattle as well as buffalo and, therefore, the change in the composition of population has a bearing on competitiveness of dairy products in the domestic and international markets.



During the cattle inter-census period (2007 and 2012), there was a marginal increase in the population of buffalo by 34000 while the cow population registered a fall by 82000. The cow population registered a negative growth rate to the tune of about -0.32% while the buffalo population registered an increase of 0.62% during the quinquennial period. Among 28 states considered for the analysis, 18 states experienced a negative rate of growth both in cow and buffalo population between 2007 and 2012 and those 18 states included, among others, major milk producing states, viz., Andhra Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Tamilnadu, Uttarakhand and West Bengal. The trend in milch animal population broadly provides a pointer to the current phase of the animal husbandry sector in India. Table 1 shows changes in the relative share of cow and buffalo by states (milch animal) in 2007 and 2012. Cow population accounted for 63% of the total milch animals in India and there has been a regional concentration and preference for milch animals in India. In the north east and south India, cow is the preferred milch animal as compared to buffalo. Five states, viz., Andhra Pradesh, Gujarat, Haryana, Punjab and Uttar Pradesh have a buffalo population above 50% of the total cow-buffalo population and in 12 states, relative share of cow population is more than 75% of the total milch population. It may be noted that animal preference is rooted into socio-cultural aspects and further warranted by a handful of other enabling factors as well. More than 25% of milch animal population is reared in two states, viz., Uttar Pradesh (16%) and Madhya Pradesh (10%) followed by Rajasthan (8%), Maharashtra (7%), Gujarat (7%), Andhra Pradesh (6.6%), Bihar (6.2%). West Bengal (6%), Karnataka (4%),

Odisha (4%) and Tamilnadu (3%). Those nine states in the second group accounted for more than 50% of the milch animal population in India. About 40% of the buffalo population in India are reared in two states, viz., Uttar Pradesh (28%) and Rajasthan (11%). At the national level, population of exotic breed cow registered a rate of growth of 5.39% between 2007 and 2012. Broadly, there has been a shift in the structure of milch animal population in India. Animal concentration and spatial distribution of milch animal have two aspects demanding special attention in the context of trade liberalisation. Liquid milk being a highly perishable commodity, and given the nature of consumption pattern in India, geographical concentration of liquid milk production and its trend assume special significance. Table 1 shows the regional concentration of milch animals in India.

Table 1: Distribution of Cattle and Buffalo Population by States in India 2007 & 2012 (percentage share)

State	2007		2012	
	Cow	Buffalo	Cow	Buffalo
Andhra Pradesh	45.82	54.18	47.46	52.54
Assam	95.26	4.74	95.95	4.05
Bihar	65.24	34.76	61.78	38.22
Chhattisgarh	85.54	14.46	87.59	12.41
Gujarat	47.62	52.38	49.01	50.99
Haryana	20.68	79.32	22.91	77.09
Himachal Pradesh	74.87	25.13	75.01	24.99
Jammu & Kashmir	76.63	23.37	79.11	20.89
Jharkhand	85.36	14.64	88.04	11.96
Karnataka	70.82	29.18	73.28	26.72
Kerala	96.77	3.23	92.85	7.15
Madhya Pradesh	70.59	29.41	70.54	29.46
Maharashtra	72.71	27.29	73.46	26.54
Manipur	84.62	15.38	79.90	20.10
Meghalaya	97.51	2.49	97.60	2.40
Nagaland	93.06	6.94	87.78	12.22
Odisha	91.19	8.81	94.12	5.88
Punjab	25.98	74.02	32.00	68.00
Rajasthan	52.21	47.79	50.66	49.34
Tamil Nadu	84.78	15.22	91.87	8.13
Tripura	98.53	1.47	98.87	1.13
Uttar Pradesh	44.23	55.77	38.97	61.03
Uttarakhand	64.70	35.30	67.01	32.99
West Bengal	96.17	3.83	96.51	3.49
Delhi	24.83	75.17	34.77	65.23
India	65.40	34.60	63.72	36.28

Source: Department of Animal Husbandry, Dairying & Fishing. Ministry of Agriculture and Farmers Welfare.

Out of 25 states considered for the analysis, relative share of buffalo population in the milch animal populations has registered a fall in 14 states (Table 1). However, a silver lining in the otherwise disparaging trend is that, major milk producing states like Rajasthan and Uttar Pradesh have recorded increase in buffalo population.

States can be classed under three categories based on the relative share of cross breed and indigenous cow (Table 2). Category 1: A relatively high share in indigenous cow population as compared to cross breed cow population; Category 2: A high share of cross breed cow population as compared to indigenous cow population; Category 3: More or less equal share in both types of cow population. Assam, Chhattisgarh, Jharkhand, MP, Odisha, UP and West Bengal fall under category 1 states. Bihar, Karnataka, Maharashtra, Tamilnadu, Haryana, Himach Pradesh, Jammu and Kashmir, Kerala and Punjab are in the advantageous group as the relative share of crossbreed is higher than indigenous as compared to category 1 states.

Table 2: Regional Distribution of Crossbred and Indigenous Cow Population by states in India- 2012 (Percentage share)

State	Crossbreed	Indigenous
Andhra Pradesh	5.90	4.05
Arunachal Pradesh	0.05	0.28
Assam	0.95	6.38
Bihar	8.87	6.84
Chhattisgarh	0.38	5.44
Goa	0.05	0.03
Gujarat	5.14	5.64
Haryana	2.48	0.56
Himachal Pradesh	2.44	0.67
Jammu & Kashmir	3.34	0.94
Jharkhand	0.61	4.47
Karnataka	8.02	4.29
Kerala	3.30	0.07
Madhya Pradesh	2.02	11.99
Maharashtra	9.50	5.66
Manipur	0.10	0.15
Meghalaya	0.08	0.58
Mizoram	0.03	0.02
Nagaland	0.25	0.07
Odisha	2.92	5.39
Punjab	5.40	0.19
Rajasthan	4.43	9.60
Sikkim	0.26	0.01
Tamil Nadu	16.20	1.93
Tripura	0.30	0.56
Uttar Pradesh	8.73	13.12
Uttarakhand	1.24	0.99
West Bengal	6.68	10.01
Delhi	0.15	0.03
India	100.00	100.00

Source: Same as Table 1.

Two broad trends emerging from the geographical concentration of milch animal population are: (i) there has been a concentration of milch animal population by type of animals; and (ii) buffalo population in relation to cow population has been on the decline for most of the states, notwithstanding the fact that the buffalo population has marginally increased. in India during the reference period.

Table 3. Per capita Milk Availability by States (per day/Gram)

State	2009-10	2016-17	Growth Rate
All India	273	355	3.34
Andhra Pradesh	342	522	5.43
Arunachal Pradesh	59	109	7.97
Assam	69	71	0.36
Bihar	175	228	3.36
Goa	96	68	-4.22
Gujarat	418	563	3.79
Haryana	662	930	4.34
Himachal Pradesh	397	521	3.46
Jammu & Kashmir	379	400	0.68
Karnataka	226	291	3.21
Kerala	201	189	-0.77
Madhya Pradesh	278	468	6.73
Maharashtra	190	243	3.12
Manipur	88	75	-1.98
Meghalaya	83	83	0.00
Mizoram	29	62	9.96
Nagaland	96	91	-0.67
Orissa	112	128	1.68
Punjab	944	1075	1.64
Rajasthan	509	785	5.56
Sikkim	200	228	1.65
Tamil Nadu	278	294	0.70
Tripura	77	114	5.03
Uttar Pradesh	283	348	2.62
West Bengal	133	148	1.34
A&N Islands	137	89	-5.25
Chandigarh	95	76	-2.75
Dadra & Nagar Haveli	86	62	-4.01
Daman & Diu	15	5	-12.83
Delhi	72	35	-8.62
Lakshadweep	84	110	3.43
Puducherry	96	107	1.37
Chhattisgarh	110	141	3.15
Uttarakhand	387	440	1.62
Jharkhand	130	157	2.39

Source: Source: Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture and Farmers Welfare, Government of India



Spearman Rank Correlation is estimated with a hypothesis that there is a positive correlation between the population density of cross breed cows and indigenous cows for the period 2007 and 2012 for important 25 states/ union territory in India. It implies that the shift from indigenous to crossbred animal is a gradual process and the transition involves different stages. Table 3 shows per capita availability of milk in India by states for the period 2009 to 2016. The Coefficient of Variation of Per Capita Availability of Milk remain more or less unchanged for the last 15 years and it implies that geographical distribution of production of milk remain unaltered. Important observations emerging from Table 3 are: (i) Per capita availability of milk showed significant differences across states in India. Out of 28 states and union territories considered in the analysis, only nine state recorded a higher per capita availability in milk production as compared to the national average. It is worth mentioning that the major milk producing states like Uttar Pradesh recorded a per capita availability less than the national average,; (ii) there are states with milk availability less than 100 grams per day and in those states, there is less possibility that the production can be increased in the short run. In such states, different forms of milk will meet the demand and the possibility looms large scale imports as cheap imports posing threat to the sustainability of dairy sector in India.

## **1.2. Trends in Milk Production**

For food item, it is the precondition for trade to take place that there should be sufficient production of marketable surplus, defined in terms of excess of production over own consumption. Milk production still continue to be an engagement of small capital owners, governed by the purpose of subsistence or livelihood rather than a commercial activity for profit. However, milk production in India has been growing faster in both absolute and relative terms. Per capita availability of milk has increased from 160 gram per day to 355 grams per day between 1985-86 to 2016-17. During this period, milk production in India has increased from 44 to 165.44 million tone and the annual rate of growth in milk production has surpassed the population growth and it drove the per capita availability up. Milk and milk products being income elastic, marketable surplus depend on the difference between income level and growth in milk production. The economic growth in India is one of the highest in the world with the second largest population and these two factors dampen the prospects of milk trade from marketable surplus in the domestic economy while the possibility of imports of dairy products loom large. Yet, per capita availability of milk in India is much on a lower side as compared to the same in major milk producers and exporters in the world. There are a couple of factors influencing per capita consumption of milk and milk products in a country like India where a substantial segment of the population is vegetarian and the required nutrients is derived from dairy products and milk.

Table 4. Percentage Share in Milk Production in States by Type of Animals-2016-17

States	Milk Production (Million Tonne)	Share of Buffalo milk	Share of cow milk	Buffalo milk production (States' Share)	Cow milk production (States' Share)	State's share in total milk production
Andhra Pradesh	12175	68.2	32	10.2	5.0	7.64
Assam	843	13.6	86	0.1	0.9	0.53
Bihar	8508	39.5	61	4.1	6.6	5.34
Chhattisgarh	1321	25.5	74	0.4	1.3	0.83
Goa	51	33.7	66	0.0	0.0	0.03
Gujarat	12478	53.6	46	8.2	7.4	7.83
Haryana	8926	81.4	19	8.9	2.1	5.60
Himachal Pradesh	1283	29.4	71	0.5	1.2	0.80
J & Kashmir	2300	20.2	80	0.6	2.3	1.44
Jharkhand	1764	19.6	80	0.4	1.8	1.11
Karnataka	6482	29.6	70	2.4	5.8	4.07
Kerala	2394	0.5	99	0.0	3.0	1.50
Madhya Pradesh	12753	48.6	51	7.6	8.4	8.00
Maharashtra	10182	39.4	61	4.9	7.9	6.39
Manipur	79	17.9	82	0.0	0.1	0.05
Meghalaya	84	1.6	98	0.0	0.1	0.05
Mizoram	24	0.0	100	0.0	0.0	0.02
Nagaland	78	8.0	92	0.0	0.1	0.05
Odisha	1999	13.0	87	0.3	2.2	1.25
Punjab	11222	71.9	28	9.9	4.0	7.04
Rajasthan	18801	59.1	41	13.7	9.8	11.80
Sikkim	54	0.0	100	0.0	0.1	0.03
Tamil Nadu	7442	4.9	95	0.4	9.1	4.67
Telangana	4675	70.5	30	4.1	1.8	2.93
Tripura	147	1.2	99	0.0	0.2	0.09
Uttar Pradesh	26455	66.9	33	21.8	11.2	16.60
Uttarakhand	1641	46.2	54	0.9	1.1	1.03
West Bengal	5051	4.9	95	0.3	6.2	3.17
A&N Islands	15	10.2	90	0.0	0.0	0.01
Chandigarh	36	53.3	47	0.0	0.0	0.02
Lakshadweep	1	0.0	100	0.0	0.0	0.00
Puducherry	48	4.6	95	0.0	0.1	0.03
India	159365	51.09	49	100.0	100.0	100.00

Note: Total milk production does not include goats milk, which account for 3% of the total milk production in India

Source: Derived from Basic Statistics of Animal Husbandry and Fisheries, Government of India, 2017.

Table 4 gives the geographical spread of milk production and its composition in 2016-17. The relative share of buffalo and cow milk is almost the same in India, albeit there exist significant differences across states. It may also be noted that more than 50% of buffalo milk production is concentrated in five major states while cow milk production is more evenly distributed. Another important observation emerging from Table 4 is that buffalo milk producing states are those with surplus milk production in terms of per capita availability. Table 5 shows the per capita monthly expenditure on milk and milk products in India. In 1970-1, relative share of milk and milk products in total food expenditure in rural India was 11.67%. It has increased to 18.72% in 2012-13. In the case of urban India, per capita monthly expenditure on milk and milk products in total food expenditure has increased from 14.71% to 20.25% during the reference period. The observed increase in expenditure on dairy products pulls down the available marketable surplus for export while it widens the scope for large scale imports to India.

The per capita consumption of different types of milk and milk products in India is much on a lower side as compared to other developed countries in the world. Over the years, as income increases, the per capita consumption will catch up with other countries as evidenced from Table 6. An important observation emerging from table 6 is that the per capita consumption of milk and milk products is 53 kg per annum in India and it is less than 1/4th of the per capita consumption of milk equivalent of developed countries like USA, Australia and Canada. It in turn implies that the quantity of milk and milk products would substantially increase as income increases in India. Increasing demand for dairy products would be met through imports if the dairy products are made available through competitive price in the international market. It would mark a death bell for the waning livestock sector in the country. Uttar Pradesh, Rajasthan, Gujarat, Karnataka, Maharashtra, Punjab and Kerala, accounted for 52% of total milk production in India. Among these states, except Punjab, compound growth rate of milk production during the last five years is less than the rate of growth in national average. Moreover, Punjab recorded the lowest growth rate followed by Kerala. The major milk producing states can be grouped into three, viz., (i) Best performing states; (ii) moderate performing growth; (iii) poor performers in milk production. The classification is based on last five years compound growth rate in milk production. The best performers include Madhya Pradesh, Andhra Pradesh, Chattisgarh, Karnataka, Tripura, Haryana and Himachal Pradesh. All these states have a compound growth rate ranging between 4% and 6%. Poor performers included Punjab, Odisha, Assam, Uttarkhand, Kerala, Bihar and West Bengal. These states have registered a growth rate less than the national average. It is worth noting that most of the milk producing states have a growth rate between 1 % and 4%.

Table 5. Per capita Monthly Consumer Expenditure on Milk and Milk Products in India

NSS Round/Year	% Share of Milk and Milk Products in Total Food Exp.		% Share of Milk and Milk Products in Total Expenditure	
	Rural	Urban	Rural	Urban
25th (1970 - 1971)	11.66	14.72	8.58	9.48
38th (1982)	11.46	15.62	7.51	9.24
46th (1990 - 1991)	14.28	17.42	9.42	9.91
56th (July 2000- June2001)	15.43	18.95	8.68	8.30
66th (July 2009- June2010)	16.04	19.16	8.60	7.80
68th (July 2011- June2012)	18.72	20.26	9.10	7.80

Source: NSSO, Various Rounds

Table 5 shows the trend in the consumption of milk and milk products in relation to the total food items and total expenditure on all items as reported in the consumer expenditure survey. There has been a significant increase in the relative share of milk and milk products in total food expenditure in both urban and rural area. However, in total expenditure of households, there has only been a marginal increase in the share of milk and milk and milk products while the same has registered a decline in urban India over the years. Table 6 gives per capita consumption of different types of milk and milk products in major milk producing and export countries in the world. Per capita consumption of milk and milk products in India is significantly on a lower side as compared to major milk producers in the world. Its policy implication is that India provides a large market for dairy products for traders in the international market and in the context of trade liberalisation, there is a possibility that large scale imports of milk and milk products from major producers may destroy the fragile domestic producers in India.

Table 6. Per capita Consumption of Different Types of Milk and Milk Products (Milk Equivalent) in India and other Countries -2017

Country	Milk Equivalent (Kg)	Excess consumption of Milk in Kg Equivalent in Other countries compared to India (in KG)
New Zealand	238.72	185.44
Australia	251.20	197.92
USA	240.50	187.22
Canada	207.84	154.56
EU-28	246.21	192.93
Russia	146.87	93.59
India	53.28	0
China	23.22	(-)30.06

Source: CLAL Dairy Forum, October 5, 2018

It is important to know if there is any endogenous or exogenous break during the period of the movement in milk production in India. Econometric tool of structural break is employed to detect any break in the long run movement of the milk production in India. It was found that there was a break in the long run movement of milk production in India and the break was in 2001-02. Table 7 shows the rate of growth in milk production during the period between 1985-86 to 2015-16. During the period of analysis, milk production in India grew at the rate of 4.08% per annum and the period can be broadly divided into two phases: (i) 1985-86 to 2001-02 and (ii) 2001-02 to 2016-17. In the first phase, there was marginal decline in milk production. The phase wise growth rate was estimated using kinked exponential function. The observed break in the long run movement of the trend warrants close scrutiny. It has been documented in the literature that the farmers produces more milk for subsistence during the crisis period and the crop production sector in India underwent a deep crisis in the late 1990s and early 2000s.

Table 7: Rate of Growth in Milk Production by phases

Period	Coefficient	T-value
1985-86 to 2013-14	4.08	145.88
1985-86 to 2001-02	4.04	75.13
2001-02 – 2016-17	4.14	55.13

The trend growth rate was estimated using the semi-log or log-lin model of the following form (Gujarati and Sangeetha,2007)

$$Y_t = Y_0 (1+r)^t \text{ -- (1)}$$

Where 'r' is the rate of growth of milk production.

Taking natural logarithm of both sides in Eq.1, it takes the form as in Eq.2.

$$\ln Y_t = \ln Y_0 + t \ln (1+r) \text{ -- (2)}$$

Substituting  $\beta_1$  for  $\ln Y_0$  and  $\beta_2$  for  $\ln (1+r)$  the model (1) can be rewritten as

$$\ln Y_t = \beta_1 + \beta_2 t + u_t \text{ -- (3)}$$

Whereas:  $\ln Y_t$  stands for natural logarithm of milk produced and  $\beta_1$  is the initial production or constant,  $\beta_2$  is the rate of growth or slope coefficient, 't' is the time,  $u_t$  is the error term. In order to estimate the rate of growth in a series characterised with numerous unknown breaks (Balakrishnan and Parameswaran, 2007), kinked exponential growth model is used. (Boyce, 1986 ). The advantage of estimating log-lin growth model with a single equation is that it allows the estimation of growth rate for relatively smaller periods without losing the degrees of freedom. The kinked exponential growth rate with linear regression with a single break at point 'K' in time series data for milk production takes the following form:

$$\ln Y_t = \alpha_1 D_1 + \alpha_2 D_2 + (\beta_1 D_1 + \beta_2 D_2) t + u_t \text{ -- (4)}$$

where  $D_1$  is dummy and it takes the value '1' for the period 1985-86 to 2001-02 and '0' for the rest of the period. The discontinuity is eliminated with the linear restriction as given below;

$$\alpha_1 + \beta_1 K = \alpha_2 + \beta_2 K \text{ -- (5)}$$

$$\text{Whereas: } \alpha_1 D_1 + \alpha_2 D_2 = \alpha_1 \text{ -- (6)}$$

Substituting Eq.5 in Eq.4, the restricted form is transformed into a linear regression form as Eq.7. The Eq. 7 is applicable for a series with single break point at 'K'.

$$\ln Y_t = \alpha_1 + D_1 + \beta_1 (D_1 t + D_2 K) + \beta_2 (D_2 t - D_2 K) + u_t \text{ -- (7)}$$

## Section 2

### 2.1. Foreign Trade of Dairy Products

India has been growing as an important player in the international market for agricultural commodities with a relative share of 2.69% in total exports and 1.31% in imports in the world trade in 2016-17. During the period from 2008-09 to 2016-17, agricultural exports as percentage of Gross Domestic Product (GDP) from Agriculture has registered an increase from 9.10% to 15.75% (Govt. of India, 2017). Alongside, import of agricultural commodities as percentage of agricultural GDP increased from 3.94% to 6.5% during the reference period. The share of dairy products in agricultural imports has increased from 0.05% to 0.26% between 2002-03 and 2015-16 (Elumalai, 2007 and Elumalai and Sharma, 2008). In the case of export of dairy products, its relative share in the total value of exports of agricultural commodities is still below 1%. In 2003-04, dairy products accounted for 0.51% of the value of agricultural exports and it increased to 0.78% in 2015-16. In the value of national exports, share of dairy products increased from 0.06% to 0.09% during the reference period. The trend broadly indicates that dairy products have been mostly confined to domestic market and its extension to international market has limitations, and it calls for a detailed scrutiny.

The foreign trade of milk and milk products in India may be viewed against hard facts elaborated above. In the international market, global commodity prices of both spot and futures markets have been on the decline and the commodity prices are likely to remain weak on account of low demand in the international market coupled with excess supply (Govt. of India, 2017). During the last two years, there has been surplus production of milk in major milk producing countries and in the international market, it has led to fall in the price of dairy products. India has comparative advantage over other countries, particularly of Europe and North America, on milk production on account of her low cost of production. Moreover, India is the single largest producer of milk with a share of 18.5% of the world production. The annual average growth rate was 6.26% in 2014-15 over the previous year. Since the introduction of trade liberalisation in 1991, there has been a change in the structure and pattern of foreign trade of milk and milk products in India. The shift can be broadly described as from supply driven to demand driven (Joshi, 2012). Dairy sector is one of the sectors in agriculture with sustained price and market. Since the World Trade Organisation (WTO) came into operation in the agricultural trade in, domestic market access for dairy products has significantly widened for dairy products from major milk producers in the world with the reduction in import tariff. However, it has also been widely reported that relaxations in trade restrictions have been increasingly used by USA and European Union to prevent low cost producing countries like India from entering the world market. In the last decade, the volume of trade in dairy products grew at the rate of 3% per annum which was on a higher side as compared to the production of dairy products (2.4%). It has been estimated that the

observed increase in the demand for dairy products in developing countries would reduce the volume of trade by 6% in the next decade (Joshi, 2012). In the next decade, the world milk production is expected to increase by 164 MT, of which India's contribution is projected to be 29% (*ibid*). However, the projected milk production in developing countries is 2.5% per annum as against 1% growth of the same in developed countries. It is indicative of the widening market opportunities for developing countries while the structural limitations in developing countries including India to make use of the opportunity to expand its market poses challenges in the external market for dairy products. Another limitation in international trade of dairy production from India is the difference in milk yield as compared to major milk producers in the world. Table 8 compares the milk yield per animal in India and other countries. It can be seen from Table 8 that the average yield per animal in India is much lower than other countries in the world, particularly of developed countries. It is indicative of the fact that the productivity of animals in India, which is one of the major factors determining the competitiveness of the international trade, has been at a disadvantageous position.

Table 8. Average milk production per animal per day in India and Other Countries

Countries	2010-12(Kg)	2022 Projection	India's yield ratio in 2010-2012 with respect to other countries	India's yield ratio in 2012-2022 with respect to other countries
USA	9.7	11.6	0.11	0.12
European union	6.6	7.2	0.17	0.19
Australia	5.9	6.6	0.19	0.21
Mexico	4.7	5.0	0.23	0.28
Argentina	4.6	5.8	0.24	0.24
New Zealand	3.9	4.3	0.28	0.33
Russian Federation	3.5	4.9	0.31	0.29
China	3.3	3.6	0.33	0.39
Ukraine	2.9	3.8	0.38	0.37
Brazil	1.4	1.4	0.79	1.00
Pakistan	1.2	1.5	0.92	0.93
India	1.1	1.4	1.00	1.00

Source: Derived from Joshi, 2012

**2.2. Composition of World Trade of Dairy Products:** In the international trade, cheese, curd, milk and cream concentrates accounted for about 70% of the exports in 2017 (DGCIS, 2018). Other items of importance in terms of value of exports are non-concentrated and non-sweetened milk, butter, cheese and curd, whey and natural milk. It is important to note that India has not yet figured in as an important player in the international market for dairy products. Germany is the major exporter (13%) followed by New Zealand, Netherlands, France and USA (6%).

Although the price of dairy products in the international market does not fluctuate as in the case of agricultural commodities, there are fluctuations in the price of milk. The price of dairy products has declined since 2011 as in the case of agricultural commodities in the

international market. In real terms, price of milk and milk products have flattened over the years since 2011. Though India is the largest milk producer in the world with a share of more than 18% in world production, India still remains a importer of dairy products. It is contributed, in part, by her large population size and partly by rising income. Milk and milk products being white goods, income elasticity of demand for white goods are more than unity. India's share in world milk export was 0.68% in 2016 against a share of import of the same of 0.04% in the same year. As mentioned elsewhere, imports of dairy products continued till 1993 and India became a net exporter of dairy products by early 2000s. There is no significant difference between export structure of India and the world. In the total value of dairy products exported from India, 89% was accounted for by milk and cream concentrates in 2017. Further, relative share of the item in the export basket has been on the increase and it shows lack of diversification in the export basket of India. Moreover, structure of exports from India does follow the world pattern. Bangladesh, United Arab Emirates and Egypt are major destinations of India's export and it can be also stated that the destinations concentrated in Asia. It means, India has not yet succeeded in advancing its exports to developed markets of the world or where the large market for dairy products are concentrated. On the contrary, major countries from where India imports its dairy products are developed nations, viz., USA, Newzeland and the Netherlands.

### **2.3. Tariff Structure and Unit Price of Dairy Products in India**

Competitiveness of dairy products for external trade is crudely measured with the ratio of unit price of import to export. Import price can be considered as boarder price and the protection is measured in terms of its nominal import value as ratio of export value. In this case, import value represents international or boarder price and export price is representative of the domestic market price. Dairy products comprising mainly five commodity groups enjoyed domestic protection of more than 200% in the pre-WTO regime. The bound rate of import duty for dairy product under WTO varied between 100% and 150%. Similarly, basic customs duty ranged between 30% (fresh milk and cream) and 60% for cheese.

Figure 2 shows percentage share of dairy products in the value of agricultural imports and exports in India. It is clear that relative share of imports of dairy products have been negligible during 2000s while it has started rising by 2010-11. Similarly, relative share of export of dairy products, particularly milk and concentrated milk remained high till the end of 2010s and it has started declining thereafter.





Source: Agricultural Statistics at a Glance, 2017

There were intermittent jumps in quantity and value of imports of milk and milk cream or concentrated milk to India. Often, quantity of imports to India increases when unit price declines and in contrast to the observed trend, the unit price too has increased along with the rise in quantity of imports of milk and milk products during the last few years. The value of exports of dairy products and its share in total value of agricultural exports remain relatively high as compared to the share of value of imports of dairy products in agricultural imports. There are exceptional years such as 2008-09 and 2012-13 during which the value of exports have markedly increased. In the total value of the export of agricultural product, share of dairy product is still 0.77%. It may also be noted that there have been wild fluctuations in the unit value of exports of dairy products and the observed trend is indicative of the non-sustainability of the sector in India in the international market. Table 9 provides details on the relative share of dairy products in the exports for the year 2001-2017. In the value of exports, milk and milk cream concentrates (IFSC code 0402) accounted for 75% of the total value of exports in certain years, but the relative importance of the product group in the export basket is inconsistent and has been on the decline for the last few years. The decline in the total value of exports of dairy products from India consecutively since 2014 is partly attributable to the decline in the export quantity and value of the item. The content and value of import basket of dairy products are given in Table 10. Interestingly, major items of imports of dairy products to India are the same as the product that India exports and it poses a threat in the context of trade liberalisation. It has already been mentioned elsewhere that the commodity characteristics of exports of dairy products in India is more or less the same as the product composition of trade in the international market reveals. Moreover, dairy products have relatively less scope for diversity and the diversification are distinguished on the basis of quality of the product. The export from India faces the challenge in the light of the above. Although there has been a decline in the value of imports of dairy products into India during the last few years, the rate of decline in imports is much less than that of exports. Whey, cheese, curd, butter and ghee still remain the major, items of imports into India.

Table 9. Export Value & relative share by product of Milk and Milk Products from India- 2001 to 2017

Year	Total Exports In 000 US \$	Butter, incl. dehydrated butter and ghee, and other fats and oils derived milk; dairy(%)	Milk and cream, concentrated or containing added sugar or other sweetening from matter matter (%)	Milk and cream, not concentrated nor containing added sugar or other sweetening (%)	Cheese and curd (%)	Buttermilk, curdled milk and cream, yogurt, kephir and other fermented or acidified milk (%)	Whey, whether or not concentrated or containing added sugar or other sweetening matter; product(%)	Annual Change (%)
2001	39713	12.68	83.51	0.03	0.84	0.15	2.79	
2002	24889	19.23	76.30	0.35	1.84	0.26	2.02	-37.33
2003	25782	21.73	70.00	0.75	3.66	1.99	1.87	3.59
2004	50533	16.70	78.44	1.12	1.00	0.39	2.36	96.00
2005	147163	10.50	84.78	0.67	1.46	0.19	2.41	191.22
2006	109154	12.55	80.98	1.94	1.95	0.80	1.78	-25.83
2007	155877	14.00	65.84	2.46	3.08	6.71	7.91	42.80
2008	269994	22.74	67.58	1.91	4.65	1.06	2.06	73.21
2009	88950	29.49	56.99	4.22	8.00	0.20	1.11	-67.05
2010	115333	35.07	52.76	2.15	7.53	0.43	2.06	29.66
2011	75446	64.62	15.25	7.15	11.06	1.13	0.78	-34.58
2012	157320	22.20	64.25	4.00	8.52	0.32	0.71	108.52
2013	575360	7.45	88.65	0.77	2.49	0.54	0.10	265.73
2014	311558	14.89	75.40	3.30	6.22	0.15	0.04	-45.85
2015	121455	36.25	44.91	3.28	15.23	0.30	0.02	-61.02
2016	130531	34.34	43.53	2.55	18.69	0.79	0.11	7.47
2017	161406	50.49	25.59	4.36	18.38	0.91	0.27	23.65

Source: Trade Map

Table 10. Import Value & relative share by product of Milk and Milk Products from India- 2001 to 2017

Year	Total Imports In 000 US \$	Whey, whether or not concentrated or containing added sugar or other sweetening matter; products (%)	Cheese and curd (%)	Butter, incl. dehydrated butter and ghee, and other fats and oils derived from milk; dairy (%)	Milk and cream, concentrated or containing added sugar or other sweetening matter (%)	Buttermilk, curdled milk and cream, yogurt, kephir and other fermented or acidified milk (%)	Milk and cream, not concentrated nor containing added sugar or other sweetening matter (%)	Annual Change in (%)
2001	4861	19.61	19.95	41.56	18.21	0.49	0.19	
2002	13135	5.95	13.28	73.24	6.59	0.93	0.01	170.21
2003	27106	6.57	7.17	28.46	57.61	0.15	0.03	106.36
2004	13069	13.90	15.23	48.83	20.78	0.88	0.37	-51.79
2005	7648	23.43	30.30	26.54	18.28	1.45	0.00	-41.48
2006	21671	15.08	13.78	63.44	6.64	0.86	0.19	183.36
2007	13636	30.00	30.11	17.40	19.88	2.12	0.49	-37.08
2008	15177	28.25	32.87	12.70	20.75	3.20	2.23	11.30
2009	63398	7.97	7.00	69.31	14.07	1.32	0.34	317.72
2010	183777	6.17	3.71	40.21	49.52	0.30	0.09	189.88
2011	177392	11.15	4.18	1.34	82.99	0.19	0.15	-3.47
2012	101238	17.02	7.91	24.46	50.04	0.34	0.23	-42.93
2013	34609	57.78	23.33	6.46	11.26	0.67	0.50	-65.81
2014	47117	59.27	18.40	6.65	13.76	0.50	1.43	36.14
2015	45025	46.06	15.99	27.91	8.94	0.14	0.96	-4.44
2016	40437	46.76	18.69	29.85	3.28	0.28	1.14	-10.19
2017	41436	51.18	19.99	12.72	10.39	3.58	2.15	2.47

Source: Trade Map

### **Section 3**

#### **Conclusion**

Even though India is the largest producer and consumer of milk in the world, large chunk of the milk is consumed without value addition. A large part of the segment producing milk is comprised of small and marginal farmers rearing cattle either as supplementary/complementary to their crop production or source of livelihood for wage labours. As a result, the sector remains, by and large, non-commercial in character and further, there are evidences that the crisis in the crop production sector has percolated in to the milk production sector. Though India still remains a net exporter of dairy products, the price of liquid milk, the form in which major part of the production is sold by farmers, remain non-remunerative. The very nature of production and the characteristics of the ownership of capital of majority of cattle rearing farmers in India indicate that the sector has not yet prepared to withstand the onslaught of trade liberalisation as well as neo-liberal policies effected through the crop production sector. There has also been a significant fall in the number of milch animals reared in India across states during the period between the last two Cattle Census period and India's share in world trade of dairy products is not commensurate with its share in production. Further, productivity of animals in India is much on a lower side as compared to the same in major milk producing and consuming countries. It is one of the major limitations of expanding the market for dairy products from India in the world market. Moreover, India's export basket of dairy products is highly concentrated to milk and cheese while India's import is concentrated in yogurt and other dairy products with value addition. The commodity composition of world trade in dairy products are more or less the same as that of India and it is yet another constraint in the world market. In spite of the marginal increase in the export value of dairy products from India, import of the same has also increased particularly during the last few years. The content of import basket for dairy products underline that items of exports and imports converge to a great extent and it poses the threat to existence of milk production sector in India in future unless the domestic market is protected with quantitative and qualitative tariffs. Along side, state support to match the domestic price on par with the cost of production is inevitable to sustain the sector.

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