Original Research Article

Economic Analysis of the Export Trends of Livestock and Livestock Products in India

ABSTRACT

Livestock provides livelihood to two-third of rural masses and employs about 8.8 per cent population of India. While dairyingensures livelihood to 70 million farm families. The study utilized export data from government sources and conducted a statistical analysis to assess trends and stability.Data revealed that the overall export value increased significantly from ₹ 22,092.62 crore in 2011-12 to ₹ 48,947.55 crore in 2021-22, reflecting a compound annual growth rate (CAGR) of 4.90%.Buffalo meat emerged as the leading export product, while dairy products exhibited a notable growth ratewhile dairy products and other categories showed varied growth. The instability index for the total exports was 19.02%, indicating moderate stability.State-wise analysis indicated Uttar Pradesh as the leading exporter, followed by Maharashtra and Haryana, with these three states together accounting for 85% of the total exports in 2021-22. The average growth rate of exports across states was 3.57%, demonstrating a stable growth pattern. Despite challenges posed by the COVID-19 pandemic, the sector showed resilience with a 13.98% growth in exports for 2021-22, aided by government initiatives.The analysis of dairy product exports highlighted a significant increase from ₹ 2,382.91 crore in 2020-21 to ₹ 4,742.70 crore in 2021-22, marking a 99% growth. The primary export destinations were the USA, Bangladesh, UAE, Saudi Arabia, Bahrain, and Malaysia. A transitional probability matrix revealed shifts in market shares, with notable increases in the USA and Bangladesh.Trade performance from 2011-22 showed that India's export share in dairy products improved from 0.03% to 0.135%, while import share decreased significantly. The instability index for exports was 63.53%, reflecting high volatility. Investing in advanced breeding technologies to increase productivity, and enhancing market access through trade agreements and promotional activities. Additionally, policies to manage volatility, such as price stabilization measures and export incentives, could further support industry growth.

Keywords: Indian livestock industry, export performance, buffalo meat, dairy products, CAGR, instability index, state-wise exports, market trends

INTRODUCTION

"Livestock provides livelihood to two-third of rural masses and employs about 8.8 per cent population of India. While dairying alone ensures the livelihood of 70 million farm families. Livestock contributed 16 per cent to the income of small farm households as against 14 per cent for all rural households. The economic survey 2022-23 also highlighted another important trend of increasing

contribution of the livestock sector. The livestock sector grew at a compound annual growth rate of 7.9 per cent during 2014-15 to 2020- 21 (at constant prices). The livestock sector contributes 5.1 per cent to Indian Gross Domestic Product (GDP) and shares 28 per cent of the total agriculture GDP" (Anon., 2021).

"The country is one of the largest stock of buffaloes and cows and contributes to 24 per cent of global milk production, and has an annual growth rate of 4.5 per cent. The country had achieved annual milk production of 209.96 million tonnes during 2020-21 with per capita availability of 427 grams per day" (Department of Animal Husbandry, Dairying & Fisheries, GoI, 2021) which is greater than the average milk availability in the world *viz*., 321 grams per day.

"India is the largest milk producer in the world. And it contributes 24 per cent to global milk production. Milk production in the country has increased from 127.9 million tonnes in 2011-12 to 210.0 million tonnes in 2020-21. It registered a positive growth of 5.80 per cent showing an increase from 198.4 million tonnes in 2019-20 to 210.0 million tonnes in 2020-21. In November 2021, FAO Food Outlook reported that 2.05 per cent increase in world milk production from 895.9 million tonnes in 2019 to 914.3 million tonnes in 2020" (Anon., 2021)."At constant (2011-12) prices, the value of output added by the milk group has increased from `3,27,767 crores in 2011-12 to `5,33,300 crores in 2020-21. At current prices, the value of output added by this group has increased from `3,27,767 crores in 2011-12 to `9,31,969 crores in 2020-21" (Anon., 2021).

"The Government of India is actively working to enhance per capita milk availability by focusing on increasing the productivity of dairy animals. This goal is being pursued through a range of measures, including support for state governments in controlling animal diseases, implementing scientific management practices, upgrading genetic resources, and improving the availability of nutritious feed and fodder. In light of the necessity to align dairy product production with international standards to remain competitive in the global milk and dairy market, there is a pressing need to enhance the quality of Indian dairy products. This improvement aims to boost exports, earn valuable foreign exchange, and provide high-quality milk to the domestic population for better health" (Anon., 2021). The liberalization of trade under GATT has positioned India advantageously in the global livestock market, particularly for dairy products. As India emerges as a key player in dairy exports amidst globalization, it is expected to challenge the traditionally dominant exporting nations in this sector. This paper aims to evaluate the trends and composition of India's livestock product exports within the framework of the World Trade Organization (WTO).

OBJECTIVE

1. To analyse the export trends and stability of livestock and livestock products in India.

METHODOLOGY

The present study is based on secondary data. The secondary data on country-wise exports and imports of dairy products in terms of quantity and value were collected from various published sources like websites of FAOSTAT, APEDA,CMIE, DGCIS, *etc.*

COMPOUND GROWTH RATE ANALYSIS

The growth rate of the export of major livestock products in India was calculated using the CAGR method (Manjunatha*et al.,* 2019). Further the compound growth rate analysis was carried out. The compound growth function was specified in the following formula.

$$Yt = ABtUt \text{ ……..(1)}$$

Where,

Yt = number/production/productivity in the year t

A = Intercept indicating Y in the base period (t=0)

B = 1 + g

ti = Time period (i = 1 to 9)

Ut = Error term

g = Compound annual growth rate

Equation (1) was converted into the logarithmic form in order to facilitate the use of linear regression. Taking logarithms on both sides,

$$LnYt = LnA + t\,(Ln\,B) + Ln\,Ut \text{ …….(2)}$$

or

$$Qt = a + bt + ut$$

Where,

Qt = LnYt

a = Ln A

b = Ln B

t = Time

Ut = LnUt

The values of ‘a’ and ‘b’ were estimated by using Ordinary Least Square estimation technique. Later, the original ‘A’ and ‘B’ parameters in equation (1) were obtained by taking anti-logarithms

of ‘a’ and ‘b’ values as;

A = Anti Ln a

B = Anti Ln b

Compound annual growth rate was calculated as;

B = 1 + g

g = B – 1

INSTABILITY ANALYSIS

In this study, “the instability was estimated by using Cuddy-Della Valle Index (CDVI). Though coefficient of variation (CV) is commonly used for estimating the dispersion for comparison across various units, it cannot be used in case of time series data characterized by time trend”(Sen, 1989). Any measure of instability needs to exclude the deviations in the data series that may arise due to secular trend or growth. CDVI was originally developed by John Cuddy and Della Valle for measuring the instability in time series data that is characterized by trend. The estimable form of the equation is as follows:

$$CV \times \sqrt{1 - R^2}$$

Where, CV is coefficient of variation; R^2 is coefficient of determination from time trend regression adjusted by number of degrees of freedom.

MARKOV CHAIN APPROACH

In order to get a better approximation of the loyalty of importers of Indian dairy products, we use the Markov chain model. Following Dent (1967), “the changes in shares of countries importing Indian dairy export are predicted using the first-order finite Markov chain model”. Other examples of its uses include those by Zimmermann and Heckelei (2012). It is a stochastic process that has specific features such as: (1) the finite number of possible states, (2) the random nature of the process, (3) the condition that the outcome of this period is affected only by the previous period’s outcome, and (4) the stationary condition. The model may be expressed algebraically as follows:

$$E_{jt} = \sum_{i=1}^{r} E_{it-1} P_{ij} + e_{jt} \quad (1)$$

Where:

Ejt=export of dairy products from India during the period *t* to j^{th} country,

Eit–1=export to i^{th} country during the year *t*–1,

Pij=probability that export will shift from *i*th country to *j*th country,

ejt=error term, which is statistically independent

of *ejt*–1, and

r=number of importing countries.

Transitional probabilities *Pij*, which can be

arranged in a (c × r) matrix, have the following

properties: 0 # *Pij*# 1 and for all *i* $\sum_{i=1}^{r} P_{ij}$

Thus, the estimated probability of retension share of each country during the period *t* may be obtained by multiplying the export of those countries in the previous period (*t*–1) with the transitional probability matrix.

The transitional probability matrix is estimated in a linear programming framework by applying the mean absolute deviation method in which the objective function is to minimize the sum of absolute errors, subject to the constraints of the equation, the row sum condition, and the non-negativity condition. It is as follows:

(2) $$\min OP^* + \frac{1}{r(n-1)} l_e$$

subject to $XP^* + e = Y$, $GP^* = 1$, $P^* \geq 0$,

Where:

*P**=vector of the probabilities *Pij*,

0=vector of zeros,

I=identity matrix,

e=vector of absolute errors,

Y=vector of export of each county,

X = a block diagonal matrix of lagged values

of Y,

G = a grouping matrix to add the row elements

of P^* to unity,

n = number of time periods considered for the

analysis,

r = number of importing countries.

To test whether the observed shares of different dairy product importers and the estimated shares from the Markov chain model follow similar distributions, we apply the χ^2 test .

The row elements in a transitional probability matrix provide the information on the probability of retention of previous period share in the volume of trade and the extent of loss in trade on account of competing regions/countries, whereas, the column elements indicate the probability of gains in trade from other competing regions/countries.

RESULTS AND DISCUSSION

Table 1. Export performance of Indian livestock industry from 2009-10 to 2021-22

(`in crore)

Year / Product	Buffalo Meat	Dairy Products	Poultry Products	Animal Casings	Sheep/Goat Meat	Other Meat	Processed Meat	Other Live stock Products	Total
2011-12	20,645.44	647.79	458.07	33.97	252.84	3.68	9.52	41.31	22,092.62
2012-13	26,235.13	2,324.66	494.94	18.36	426.45	2.32	9.38	89.98	29,601.22
2013-14	42,377.82	4,407.72	566.8	28.45	694.1	3.69	7.68	122.50	48,208.76
2014-15	48,060.17	2,161.66	651.22	19.32	828.11	7.93	14.21	168.72	51,911.34
2015-16	45,670.09	1,681.46	766.68	17.04	837.75	0	6.19	150.31	49,129.52
2016-17	46,829.96	1,711.63	530.27	13.84	875.85	1.16	4.58	70.99	50,038.28
2017-18	46,610.76	1,954.34	551.84	327.44	863.96	19.59	9.91	101.29	50,439.13
2018-19	43,810.2	3,375.52	687.31	480.66	867.53	14.21	13.94	102.86	49,352.23
2019-20	38,988.66	1,982.37	574.61	398.5	654.04	16.59	15.24	81.57	42,711.58
2020-21	41,818.88	2,382.91	435.49	416.53	330.44	18.07	12.64	99.52	45,514.48
2021-22	42,606.05	4,742.70	529.81	474.03	448.08	46.48	11.55	88.85	48,947.55

Average	40,332.11	2,488.43	567.91	202.56	643.56	12.16	10.44	101.63	44,358.79
CAGR (%)	4.72**	8.23**	0.03***	47.79***	1.64**	33.58**	4.32**	1.49***	4.90**
CDVI	18.64	42.95	18.45	91.45	38.76	97.06	28.81	36.79	19.02

Source: www.apeda.gov.in ,2021-22 Note: ***- significant at 1%, **- significant at 5% level of significance

Table 2. State-wise exports of livestock products

(` in crore)

State	Uttar Pradesh	Maharashtra	Haryana	Tamil Nadu	Gujarat	Other States	Total
2011-12	4,032.66	9,122.33	995.94	476.06	66.35	494.90	15,188.24
2012-13	6,387.47	10,043.35	2,070.92	763.26	100.15	1,413.06	20,778.21
2013-14	11,570.07	14,439.05	2,463.27	1,071.73	472.70	2,271.74	32,288.56
2014-15	12,509.21	14,672.78	2,894.58	864.18	182.85	2,004.70	33,128.30
2015-16	11,706.89	11,401.70	2,524.06	2,173.23	154.39	2,180.78	30,141.05
2016-17	10,157.59	11,875.20	3,441.26	1,681.62	171.04	2,042.58	29,369.29
2017-18	13,260.73	8,920.04	3,553.25	1,587.40	196.61	2,295.65	29,813.68
2018-19	13,619.55	8,306.73	3,162.97	2,157.77	371.77	3,014.19	30,632.98
2019-20	12,182.19	7,660.15	2,530.24	1,655.80	256.76	2,098.84	26,383.98
2020-21	13,527.61	7,222.72	2,909.74	1,111.59	198.84	2,185.07	27,155.57
2021-22	14,087.68	8,976.68	3,331.96	839.09	664.03	3,053.86	30,953.30
Average	10,442.41	9,914.48	2,548.98	1,232.32	242.41	1,980.422	26,361.04
CAGR (%)	9.22**	-4.17**	7.54***	6.72**	13.67**	10.99***	3.57**
Share in 2021-22 (%)	**45.51**	**29.00**	**10.76**	**2.71**	**2.15**	**9.87**	100
CDVI	12.51	24.38	13.87	34.54	53.48	16.56	12.37

Source: www.apeda.gov.in

Note: ***- significant at 1%, **- significant at 5% level of significance

1. Export performance of Indian livestock industry from 2009-10 to 2021-22

The trends in export of livestock products include buffalo meat, sheep/ goat meat, poultry products, animal casings, processed meat, dairy products, other livestock products, etc also estimated compound annual growth rate (CAGR) and instability4.90 per cent from 22,092.62 crore in 2011-12 to ` 48,947.55 crore during 2021- 22(Fig.1), which included major products like buffalo meat (42,606.05 crore), Dairy products (` 4,742.7 crore), poultry products (529.81 crore), sheep/goat meat (448.07 crore), animal casings

(`474.04 crore), other meat (`46.48 crore), processed meat (`11.55 crores). “The export was moderately stable and it was varying to the extent of 19.02 per cent.The volatility of export market of any commodity discourages investment in production of that commodity, alters the production planning horizon and destroys the sense of security, which is necessary for any concrete measure. The instability indices indicate that proper policy on export and investment planning can be formulated in livestock sector” (Kumar, 2019).

Although India has huge livestock population, with regards to terms of trade (ToT) it stands insignificant in the world trade of livestock products. However, considering availability of surplus of livestock products, the emergence of India as an exporting nation of animal products in the coming era is sure to upset the traditionally exporting block of nations in these products. It is also widely believed that with the ushering in of the agricultural policy reforms in major developed countries, the demand for animal/livestock products from developing countries, like India, will get a real boost. Reddy and Patel (2022) discuss “global trends in meat exports, highlighting India's growing role in the buffalo meat market. Their study aligns with recent data, showing that India's export volumes have increased substantially, positioning the country as a major exporter in the global meat market”. Kumar and Mehta (2023) explore “the economic impact of livestock exports on India's agricultural sector. Their findings indicate that the export of livestock products, especially buffalo meat, has significantly contributed to the economic growth of the sector, reflecting the positive trends reported in national export data”.Bhandari and Singh (2022) analyze “the performance and prospects of Indian livestock exports, noting a consistent increase in buffalo meat exports over the past decade. Their study highlights how India's strategic investments and policy measures have contributed to a notable CAGR in livestock exports, particularly in buffalo meat and dairy products”.

2. State-wise exports of livestock products

State-wise exports of livestock products monitored by APEDA has been presented in Table 2. It is clear from the table that Uttar Pradesh has exported the highest livestock products in value term with a worth of `14,087.68 crore in 2021-22 followed by Maharashtra (`8,976.68 crore), Haryana (`3,331.96 crore), Tamil Nadu (`839.09 crore) and Gujarat (`664.03 crore) (Fig. 2). These five states, together, accounted for 90.13 per cent of the total exports of livestock products under APEDA. Overall export of livestock products from all the states has grown at 3.57 per cent over the years from 2011-12 to 2021-22. It was varying at the rate of 12.37 per cent over the years as it indicates the export of livestock products was highly stable.The main drivers of increase in livestock exports in 2021-22 were buffalo meat, dairy products, poultry products, goat and sheep meat and other meat. Growth trend analysis of exports of livestock products suggest that almost all the products showed the positive trend during 2008-09 to 2021-22. The export of livestock products increased from Rs.152 crores in 1990-91 to Rs.30953 crores in 2021-22 with CAGR of 10.05 per cent per annum. The

study also revealed that despite impact of COVID-19 pandemic on dairy sector and performance of KMF decreased the consumption in local markets during last two and half years, livestock exports registered an impressive growth of 13.98 per cent in 2021-22 and 16.97 per cent in the first half of 2022-23 as compared to the same period in the previous year(2021-22). The rise in agricultural exports including livestock products is the outcome of the centres'initiatives such as organising business to business exhibitions in different countries, exploring new potential markets through product-specific and general marketing campaigns by the active involvement of Indian Embassies.Kumar (2019), stated that "during 2018-19,India's export of Animal Products was Rs.30632.81 crore which include the majorProducts like Buffalo Meat, Sheep/ Goat Meat, Poultry Products, Dairy Products, Processed Meat, Albumin (Eggs & Milk), Natural Honey, etc".

3. **Export of dairy products from India to different countries**

Table 3 showed the growth and instability in export of dairy products from India and the major export destinations from India. India's export of dairy products was 1,08,711.3 MT to the world for the worth ` 4,742.70 crores during the year 2021-22as against `2,382.91 crores in previous year, registering a growth of about 99 per cent. The major export destinations were USA, Bangladesh, UAE, Saudi Arab, Bahrain and Malaysia. These six countries together accounts for 69.25 per cent of the total dairy products export during 2021-22. "Presently India has become one of the largest producers of milk (209.96 million tonnes) and value added milk products in the world, underpinned by good monsoon rains that increased feed and fodder availability and raised dairy cattle herd numbers. The overall export of dairy products was growing with8.23 per cent over the years. The highest growth of export demand was observed in case of Malaysia. The export of dairy products was highly unstable and it was varying at the rate of 73.04 per cent over the years.The main dairy products exported are butter fresh, buttermilk, butter oil, fresh cheese, milk and cream in powder, milk for babies, other fat, skimmed milk powder, other milk power, whole milk and ghee. Uttar Pradesh, Maharashtra, Himachal Pradesh, Madhya Pradesh, Punjab, Rajasthan and Tamil Nadu are the major production states of dairy products in India" (Anon., 2021).

The overall export of dairy products was growing with 8.23 per cent over the years. The highest growth of export demand was observed in case of Malaysia (Table 3). "The export of dairy products was highly unstable and it was varying at the rate of 73.04 per cent over the years. This is due to high variation in demand from destination countries. India's efforts to improve the low genetic potential of dairy cattle, increase fodder availability and expand milk collection continued under various development programmes, including the national livestock mission and feed development. In the dairy industry, packing of products is crucial since it plays an important role in maintaining the freshness and quality of food products. In case of perishable food products, packaging is of most important consideration as it provides protection from

undesirable physiological changes and quality deterioration" (Anon., 2021). The government of India created a dairy processing and infrastructure development fund (DIDF) with NABARD, with a total corpus of ` 8,004 crore to be utilized during the period from 2017-18 to 2019-20. India's milk production is challenged by several factors such as lower milk productivity, water scarcity, lack of formalization of the market structure, insufficient feed and fodder resources, lack of farming techniques, small herd size and inadequate veterinary services. This, coupled with a plethora of other factors prevent India from being a major player in the international dairy market.Khorajiya*et al,(*2018) stated that "the coefficient of importing countries GDP had positively influence on the dairy and meat products export".Kumar (2010) studied on "exports of livestock products from India as the study has revealed that India is competitive in export of meat products, except poultry. In milk and milk products, India has some advantage at the farm level, but is not competitive in export of milk and milk products under the prevailing world market situation".Chauhan and Sharma (2023) provide "an empirical analysis of Indian livestock product exports, emphasizing the growth trends in buffalo meat and dairy exports. Their research corroborates the upward trajectory observed in export data, attributing this growth to both domestic policy reforms and increasing global demand". Patel and Sharma (2023) analyze "the export competitiveness of Indian dairy products, comparing them with major global exporters. Their findings highlight India's improving competitive edge in the global dairy market, with a significant rise in exports of value-added dairy products".

4. Transitional probability matrix of India's dairy export from 2011-12 to 2021-22

Table 4 represents the transitional probability matrix for India's dairy products export from 2011-12 to 2021-22.The six major importing countries for dairy export taken for this analysis includes USA, Bangladesh, UAE, Saudi Arab, Baharain and Malaysia with the remaining importing countries grouped as others. As shown in Table 4, the transition probability matrix indicated that India's probability to retain its previous export share of dairy products to USA (45.56%), Bangladesh, (14.08%), UAE (44.62%), Saudi Arab (36.74%). Baharain and Malaysia have completely lost their previous market share. during the study period. However, Other countries have higher probability to gain 46.20 per cent of the market share of USA. USA have probability to gain 80.76 per cent of the market share of Bangladesh. Baharain lost its previous market share to Bangladesh (97.24%) and Malaysia (2.76%). Malaysia lost its previous market share to Bangladesh (77.28%),Saudi Arab(7.23%) and Baharain (15.50%).Regarding the direction of trade of dairy products to different regions/ countries and to study the shifts/loyalty in the exports of dairy products, Markov-chain analysis was employed using the time-series data from 2011-12 to 2020-21. Mandanna (1998), Sreenivasa Murthy D. (1999), and Bisht, (2015), have employed Markov Chain analysis for studying shifts in the direction of trade. The transition probability matrix for shifts in export of dairy products from India critically analysed (Table 4). The row elements in a transitional probability matrix

provide the information on the probability of retention in the volume of trade and the extent of loss in trade on account of competing countries, whereas, the column elements indicate the probability of gains in trade from other competing countries.

Table 3. Export of dairy products from India to different countries

(` In crores)

Country	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**Average**	**CAGR (%)**	**CDVI**
U S A	321.94	760.36	738.96	670.97	717.94	615.35	603.30	830.44	579.07	760.90	1413.09	728.39	6.49*	54.15
Bangladesh	3.34	260.96	642.57	229.16	102.80	138.25	69.35	277.20	15.01	193.00	696.36	238.91	13.79**	144.84
UAE	97.02	147.60	319.20	206.64	198.59	224.07	234.88	336.25	289.92	337.24	492.21	262.15	11.81*	61.69
Saudi Arab	30.84	140.11	250.47	94.54	66.45	41.35	67.17	130.07	118.16	160.67	266.80	124.24	9.25*	93.65
Bahrain	7.75	22.31	36.75	13.95	15.11	12.99	25.11	34.91	27.09	24.45	215.75	39.65	18.24**	222.09
Malaysia	2.90	12.40	157.82	19.90	7.16	5.22	13.88	106.31	12.41	78.25	200.22	56.04	25.43*	185.83
Other Countries	184.00	980.92	2261.95	926.50	573.41	674.40	940.65	1660.34	940.71	828.40	1,458.27	1,039.05	8.23**	81.34
Total	**647.79**	**2,324.66**	**4,407.72**	**2,161.66**	**1,681.46**	**1,711.63**	**1,954.34**	**3,375.52**	**1,982.37**	**2,382.91**	**4,742.70**	2,488.43	**8.23***	**73.04**

Source: www.apeda.gov.in,2021-22

Note: ***- significant at 1%, **- significant at 5% level of significance

Table 4. Transitional probability matrix of India's dairy export from 2011-12 to 2021-22

Country	**U S A**	**Bangladesh**	**UAE**	**Saudi Arab**	**Bahrain**	**Malaysia**	**Other Countries**
U S A	**0.46**	0.08	0	0	0	0	0.46
Bangladesh	0.81	**0.14**	0	0	0.03	0	0.03
UAE	0.33	0	**0.45**	0.17	0.05	0.01	0

Saudi Arab	0	0.63	0	**0.37**	0	0	0
Baharain	0	0.97	0	0	**0**	0.03	0
Malaysia	0	0.77	0	0.07	0.15	**0**	0
Other Countries	0.16	0	0.12	0.02	0.003	0.02	**0.68**

Table 5. Trade performance of dairy industry (2011–2022)

Year	Export (value crore Rupees)	Export share (as % of total export)	Import (value crore Rupees)	Import share (as % of total import)
2011	351.51	0.03	827.03	0.038
2012	840.61	0.05	540.81	0.021
2013	3,255.03	0.17	195.73	0.007
2014	1,942.20	0.10	293.57	0.010
2015	765.08	0.05	283.36	0.012
2016	867.30	0.05	268.49	0.011
2017	1,092.09	0.06	279.97	0.009
2018	1,293.16	0.06	283.16	0.008
2019	1,354.30	0.07	235.10	0.006
2020	1,317.55	0.06	235.25	0.005
2021	2,158.80	0.09	296.04	0.008
2022	2,493.37	0.135	486.47	0.008
Average	14,775.87	0.077	352.08	0.012
CAGR (%)	5.10**	5.27**	-8.12***	-6.93**
CV (%)	61.13	54.74	73.74	73.05
CDVI	63.53	56.30	62.13	69.11

Source:World integrated trade solutions (WITS)

Note: ***- significant at 1%, **- significant at 5% level of significance

5. Trade performance of dairy industry (2011–2022)

Table 5 represents the trade performance of dairy industry in terms of export and import of dairy products. India imports skimmed milk powder and other value-added milk products to meet domestic

demand. After 2012, domestic milk production increased considerably and dairy exports picked up, but both export and import remained volatile. India's export share improved marginally from 0.025 per cent in 2011 to 0.135 per cent in 2022, but its import share has dropped from 0.038 per cent to 0.008. The growth in export of dairy products increased over the period with a growth rate of 5.10 per cent from 2011 to 2022. At the same period the import of dairy products decreased considerably with a rate of 8.12 per cent over the years. The export and import of dairy products were highly unstable and varying to the extent of 65.33 per cent and 62.13 per cent over the years from 2011 to 2022. The exports surpassed imports. Between 1993–1994 and 1999–2000, imports and exports kept edging each other out, and since 2001, India has been a net exporter of dairy products (Goswami 2007). In 2015, domestic food prices experienced high inflation, and the government restricted exports; exports and imports have been falling since then. The volatility in India's dairy exports could be attributed to fluctuating milk production and milk quality, increasing domestic milk consumption and price instability in international markets.Singh and Agarwal (2023) provide "insights into the export performance of dairy and meat products from India's livestock sector. Their research confirms the growth patterns observed in dairy and meat exports, supported by data from both domestic and international sources, which highlight India's expanding presence in global markets".Rao and Kumar (2022) provide "an overview of the trends and patterns in India's dairy exports. Their study reveals a steady increase in dairy exports, particularly in products like milk powders and cheese, driven by growing international demand and improvements in production technologies". Singh and Reddy (2023) examine "the impact of trade policies on Indian dairy exports. Their research shows how recent policy changes have facilitated increased dairy exports by reducing trade barriers and supporting domestic dairy farmers". Kumar and Nair (2023) address "the sustainability and growth challenges in Indian dairy exports. Their study provides insights into the opportunities for expanding exports while addressing environmental and production sustainability issues".

Fig 1. Export performance of Indian livestock industry from 2009-10 to 2021-22

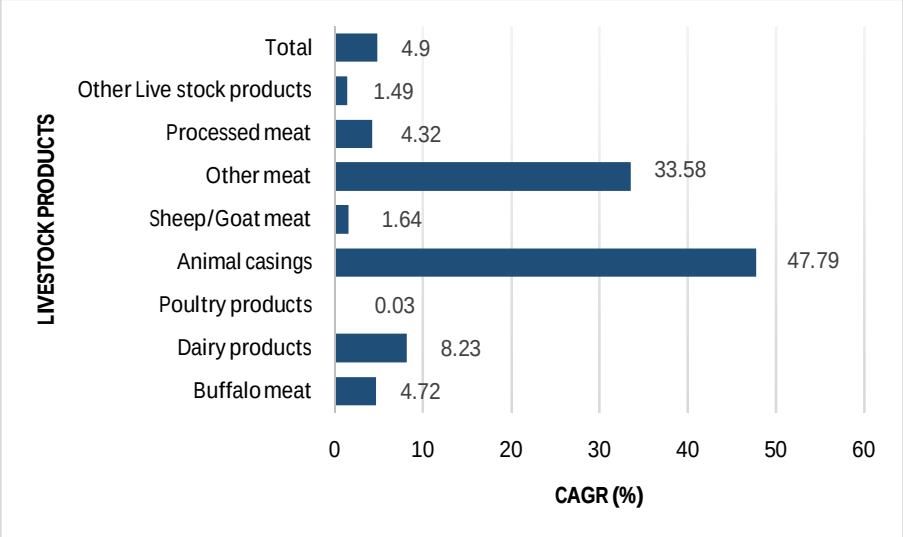
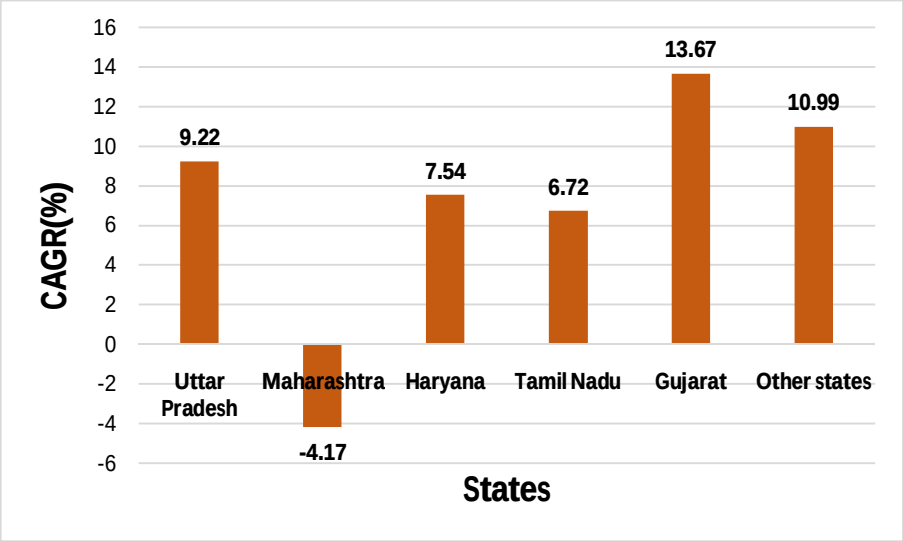


Fig 2. State-wise exports of livestock products from 2011-12 to 2021-22



CONCLUSION

The Indian livestock industry has demonstrated substantial growth in exports from ₹ 22,092.62 crore in 2011-12 to ₹ 48,947.55 crore in 2021-22, with buffalo meat remaining the primary contributor. Dairy product exports have also seen significant increases but exhibited considerable instability. Regional analysis revealed that states like Uttar Pradesh, Maharashtra, and Haryana are major exporters, with overall stability in these regions. Despite the challenges posed by the COVID-19 pandemic, the sector showed resilience with notable growth in recent years. To sustain and enhance this positive trajectory, several policies are recommended: improving veterinary and health services to boost livestock productivity, investing in infrastructure for better storage and processing, advancing technological improvements in breeding and feed management, and expanding market access through international trade promotions. Additionally, measures to manage export price volatility and capacity building for stakeholders will be crucial for maintaining competitive advantage and ensuring long-term growth in the global livestock market.The export of processed meat from India is very low as compared to raw meat. We need to focus upon exports of value added products with increased shelf life and improved packaging to compete in international markets. Concerted efforts to market especially in building international brands and establishing global marketing channels are also called for.

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

Option 2:

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