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Exports of Livestock Products from India: Performance, Competitiveness and Determinants[§]

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Abstract

The paper has examined temporal changes in the composition of livestock exports, assessed the export competitiveness of different livestock products and analysed the factors affecting the growth of livestock export. The performance of livestock export has been found noteworthy. The liberalization policy initiated in 1991 seems to have improved the performance of livestock exports. The study has revealed that India is competitive in export of meat products, except poultry. The export of buffalo meat has been increasing consistently and the poor domestic demand has further fuelled its export. But, the export of mutton does not seem to have much prospects in the short-run, as even the domestic demand is not being met by domestic production. 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. The domestic policy initiatives and increased production and productivity have been identified as the important factors in increasing the export of livestock products. The study has suggested that strengthening of export supply capacity domestically holds the key for enhancing export of livestock products rather than expanding world market.

Introduction

Currently, the livestock sector in India contributes about 27 per cent to the agricultural gross domestic product (AgGDP) and provides employment to 20 million people, particularly women, in principal or subsidiary status. It possesses the largest livestock population in the world (520.6 million head) and accounts for the largest number of cattle (16.1% of the world population) and buffaloes (57.9%), the second largest number of goats (16.7%) and the third highest number of sheep (5.7%) in the world. The major thrust of livestock development strategy in India has been on achieving self-sufficiency in livestock products through import substitution. Several initiatives were taken to develop the Indian livestock sector in the past and India emerged as the largest milk producer in the world and it is also one of the largest producers of other livestock commodities. However, the economic policy reforms and economic liberalization triggered in 1991 have widened market opportunities for the livestock sector also. The global demand for livestock products is also on rise. Such developments offer an opportunity to India to increase its livestock exports, especially for products like bovine meat, whose domestic demand is low. With improved domestic production and marketing efficiency, better access to expanding world market, India has the potential to become more competitive and may augment export of livestock products. Nonetheless, there is still much to gain from further improvements in market conditions.

Apprehensions are being expressed about the ability of livestock farmers, a majority of whom are small and marginal, in taking advantage of the emerging opportunities, particularly under the liberalized trade scenario. Non-tariff barriers like stringent sanitary and phyto-sanitary (SPS) standards, technical barriers to trade (TBT), anti-dumping duties, countervailing duties,

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etc. are emerging as major constraints in tapping the benefits of export potential of the livestock sector (Kumar *et al*., 2007), though there has been a consistent decline in the import tariff rates on livestock products. Besides, concerns have also been raised about the necessity to improve and expand supply capacity to augment livestock exports from India. Supply conditions are fundamental in defining the export potential of a sector or an economy (Fugazza, 2004). Thus, a deeper knowledge about the determinants of export performance of the livestock sector in India would contribute towards the future livestock development strategy. In this backdrop, this study has examined the changes in the composition of livestock exports, assessed the export competitiveness of different livestock products and has analysed the factors affecting the growth of livestock export.

Materials and Method

Data

The study is based on the data pertaining to the period 1979-80 to 2007-08, compiled from various sources. The data on exports and imports of livestock products, agricultural exports & imports and total merchandize exports and imports were compiled from *Monthly Statistics of Foreign Trade*, published by DGCIS, Ministry of Commerce, and Government of India. The data on GDP, AgGDP and livestock GDP were taken from the *National Accounts Statistics*, published by Central Statistics Organization (CSO), Government of India. Data on the world trade for different livestock products, producer prices of different countries, consumption of livestock products, etc. were collated from Food and Agricultural Organization (FAO) database. The domestic wholesale prices of livestock products were compiled from *Agricultural Prices in India*, published by the Directorate of Economics and Statistics, Ministry of Agriculture, Government of India and the data on international prices of livestock products prior to 1991 were taken from *International Financial Statistics* of the IMF. The data on international prices since 1991 were downloaded from the FAO website. The data on geographical distances were set by the Distance Calculator accessible via http://www.indo.com/distance/.

Data on domestic transports were compiled from different sources, namely the *Economic Times*, Container Corporation of India, Truckers Association, etc. Personal discussions with the exporters and freight agents also supplemented the information regarding internal transportation of various products. The international freight rates were compiled from the freight agents. Port charges included cost of loading, unloading, custom clearing, transportation within international container depo, etc. The port charges were compiled from different port authorities.

Methodology

All the values of export and imports were converted into US dollars to net out the effect of fluctuations in exchange rates. To analyze the performance of export and imports of various livestock products, the triennium averages (TE) were computed to minimize wide fluctuations.

Export Competitiveness of Livestock Products

Among several methods applied to measure competitiveness, Nominal Protection Coefficient (NPC) is the most widely used measure (Corden, 1971; Balassa and Achydlowsky, 1972; Gulati *et al*., 1990; Taylor and Philips, 1991; Chand 1999; Kumar *et al*., 2001; Rakotoarisa and Gulati, 2006). NPC is defined as the ratio of a commodity's domestic price to its international reference price and is computed as per Equation (1):

$$NPC_i = \frac{P_i^d}{P_i^b} * ER \qquad \ldots(1)$$

where, NPC_i is the nominal protection coefficient of the *i-th* commodity; P_i^d is the domestic price of the *i-th* commodity in domestic currency; P_i^b is the border price in international currency adjusted for transport, marketing and other costs, and ER is the exchange rate.

The NPC basically helps in measuring the divergence of domestic price from international price and thus determines the degree of export competitiveness of a commodity. A ratio less than unity implies a competitive advantage and greater than unity shows lack of competitive advantage.

The NPC under an importable hypothesis assumes that an imported commodity competes with the domestic commodity in Indian port or city. Under importable hypothesis, the reference price is the CIF

price, which is the sum of the FOB price of the exporting country, freight and insurance and the port handling charges. The transportation cost from the producing zone (e.g. in case of Punjab, transportation from Chandigarh to Mumbai Port) to the port would be added to the domestic price.

Under exportable hypothesis, the exported commodity competes with the domestic commodity at the foreign port or city. Therefore, in this case the reference price is CIF price (which is FOB price of a major exporter plus freight and insurance) at the importing country's port minus the freight and insurance from Indian port to the importing country's port.

Determinants of Export Performance of Livestock Products

There is a diverse and growing empirical literature on the determinants of export performance. This literature includes cost or price competitiveness analyses through the use of real effective exchange rates, comparative advantage studies, shift share analysis of composition of exports, and econometric estimates of export supply and demand functions. The export of a commodity is influenced by a number of demand and supply side factors. The gravity model has been widely used to assess the influence of these demand and supply side factors in exports. The gravity model was first applied to the international trade by Tinbergen (1962) and Poyhonen (1963), but it has a long history in social science. Since the latter half of the nineteenth century, it is being used to explain social flows, primarily migration, in terms of the gravitational forces of human interaction. The simplest form of the gravity model for international trade conjectures that the volume of exports between any two trading partners is an increasing function of their national incomes, and a decreasing function of the distance between them (Wall, 1999). Specifically, the model can be expressed as Equation (2):

$$\ln X_{ij} = \alpha + \beta \ln Y_i + \gamma \ln Y_j - \delta \ln D_{ij} \qquad \ldots(2)$$

where, Y_i and Y_j denote national incomes of the trading countries and D_{ij} is the distance between the two countries. This baseline model, when estimated, gives relatively good results. However, there are several other factors which influence trade levels. It is common to use dummy variables to capture contiguity effects, cultural and historical similarities, and regional integration and trade preference agreements, trade policies and so on.

Assuming that we wish to test p distinct effects, the model then becomes:

$$\ln X_{ij} = \alpha + \beta \ln Y_i + \gamma \ln Y_j - \delta \ln D_{ij} + \sum_{s=1}^{p} \lambda_s Gs \qquad \ldots. (3)$$

With regard to the gravity model of India's export of livestock products, the following model was used:

$$\ln X_i = \alpha + \beta \ln Y_i + \beta_2 \ln Y_{ipc} + \beta_3 \ln Y_{in} + \beta_4 \ln Y_{inpc} + \beta_5 \ln Y_{pp} + \beta_6 \ln TP_i - \beta_7 \ln D_{ij} + \mu_i \qquad \ldots(4)$$

where, X is the export, i denotes livestock sector, dairy products, meat and eggs; Y_i is the GDP of the importing country; Y_{ipc} is the GDP per capita of the importing country; Y_{in} is the livestockGDP or production of the respective livestock commodities; Y_{inpc} is the per capita GDP of India; Y_{pp} is the ratio of the producer price of livestock commodities; TP_i is the trade policy rank of the importing country; D_{ij} is the distance between India and importing country; β_is are the coefficients of the explanatory variables; and μ_is are the error-terms.

Results and Discussion

Trade Performance of Livestock Sector

The data on export and import of livestock products along with different indicators of livestock trade performance presented in Table 1, reveal that India was a net importer of livestock products in TE 1981. This scenario changed sharply thereafter and the trade surplus for the livestock sector has been continuously increasing. The share of livestock export in the agricultural exports increased from 3.2 per cent in TE 1981 to 4.0 per cent in TE 1991. It reached 7.4 per cent in TE 2007, which is more than double its share in TE 1981. The share of livestock exports in total merchandise export hovered around 0.7 to 1.0 per cent during this period. The share of livestock exports in livestock GDP had slightly declined from 0.9 per cent in TE 1981 to 0.8 per cent in TE 1991. There has been

Table 1. Performance of livestock exports and imports in India: 1980-2007

TE	Livestock export (million US$)	Livestock import (million US$)	Trade balance	Share of livestock exports (%)			Share of livestock imports (%)		
				Total exports	Agricultural export	Livestock GDP	Total imports	Agricultural imports	Livestock GDP
1981	81	140	-59	1.0	3.2	0.9	1.0	13.5	2.7
1991	122	40	81	0.8	4.0	0.8	0.2	4.7	0.3
2001	255	28	227	0.7	4.1	1.2	0.1	1.2	0.1
2007	828	22	806	0.9	7.4	2.4	0.0	0.7	0.1

Source: Directorate General of Commercial Intelligence and Statistics, *Monthly Statistics of the Foreign Trade of India* (various issues), Ministry of Commerce and Industry, Government of India; *National Accounts Statistics*, Central Statistical Organization, Government of India.

a healthy rise since then and it reached 2.4 per cent in TE 2007: it is about three-times more than its share in TE 1991. This reveals the extent of internationalization of livestock sector, which could be partly attributed to trade policy reforms. The share of livestock imports has consistently declined over time, from 13.5 per cent in TE 1981 to 0.7 per cent in TE 2007; it is negligible in total imports and livestock GDP.

It is evident from the trends in trade indicators that the performance of livestock exports has been noteworthy, while the reverse has been observed in imports of livestock products. There has been a consistent improvement in the exports of livestock products during the post-reform period, as indicated by the trends in the trade indicators. The liberalization policy initiated in 1991 seems to have improved the performance of livestock exports.

India's Share in Global Export of Livestock Products

India's position in global livestock trade is presented in Table 2. India is still a small player in global market of livestock trade, though India ranks in the top tier of producers of different livestock commodities. India does not even contribute 1 per cent to the world export of the livestock products, except for bovine meat and eggs. The shares of bovine meat and eggs in the global export market have, by and large, increased consistently and have reached 2.1 per cent and 3.3 per cent, respectively in TE 2007 from the negligible share in TE 1981. In fact, India is now the fifth largest exporter of bovine meat in the world, and its present share in world bovine exports is noteworthy as the bovine meat is the heavily traded commodity in the world market. Though its share in global trade of eggs is 3.3 per cent, in absolute terms, its significance is still very little as compared to bovine meat.

The share of India in global imports of bovine meat, goat meat, sheep meat and swine meat has been negligible. India was a major importer of dairy products till TE 1981, when it accounted for more than 11.3 per cent of global import of dairy products, but has depicted a sharp decline thereafter, reaching to a negligible share of 0.4 per cent in TE 2007. However, the higher percentage of dairy imports during 1980s was mainly attributed to the large donations of dairy products by the EU as a contribution to 'Operation Flood' and thus was reflective of the policies than that of the market demand.

It is evident that in world trade of livestock products, India's contribution is insignificant, and therefore, it cannot influence the world market either in prices or supplies. But, having the leverage of being one of the largest producers of most of the livestock products, coupled with adoption of trade liberalization policies, India has the potential to enhance its share in the global markets of livestock products in the future.

Composition of Export of Livestock Products

Livestock exports have registered a commendable rise during the entire study span of twenty-eight years. The average annual livestock exports have increased remarkably from US $ 81 million in TE 1981 to US $ 828 million in TE 2007 (Table 1). Bovine meat, dairy products, eggs, other animal products and to some extent, hides and skins have shown promising signs during this period. Bovine meat has been the most dominant component of the livestock products exported from India (Table 3). The current (2007) contribution

Table 2. India's share in world trade of livestock products

(in per cent)

TE	Live animals	Bovine meat	Dairy products	Goat meat	Sheep meat	Eggs	Hides and skins
			Exports				
1981	0.1	0.0	0.0	0.0	0.6	0.3	0.0
1991	0.0	0.5	0.0	0.2	1.0	0.1	0.1
2001	0.0	1.2	0.0	0.8	0.9	1.3	0.1
2007	0.1	2.1	0.2	0.2	0.6	3.3	0.2
			Imports				
1981	0.1	0.0	11.3	0.0	0.0	0.0	0.0
1991	0.1	0.0	1.7	0.0	0.0	0.0	0.1
2001	0.1	0.0	0.8	0.0	0.0	0.0	0.1
2007	0.1	0.0	0.4	0.0	0.0	0.4	0.1

Source: FAO Database

Table 3. Average annual value and composition of exports of livestock products

Livestock products	Annual value and composition of exports (in million US $)			
	1981	1991	2001	2007
Live animals	6.6	0.5	0.8	7.5
	(8.1)	(0.4)	(0.3)	(0.9)
Bovine meat	60.4	73.2	178.1	595.6
	(74.2)	(60.4)	(69.8)	(70.5)
Sheep meat	9.5	16.0	18.5	17.1
	(11.7)	(13.1)	(7.3)	(2.0)
Other meats	0.0	0.1	0.7	2.5
	(0.0)	(0.0)	(0.3)	(0.3)
Eggs	3.4	0.7	18.8	69.5
	(4.1)	(0.6)	(7.4)	(8.2)
Dairy products	1.5	1.5	6.	115.7
	(1.8)	(1.2)	(2.5)	(13.7)
Hides & skins	0.0	29.3	31.8	36.3
	(0.0)	(24.1)	(12.5)	(4.3)

Source: Directorate General of Commercial Intelligence and Statistics, *Monthly Statistics of the Foreign Trade of India*, Ministry of Commerce and Industry, Government of India; Data refer to triennium ending average.

Note: Figures within the parentheses are percentages to the total.

of bovine meat in the total foreign exchange earnings from the livestock sector are of about US $ 596 million, that is nearly ten-times of the exports in the TE 1981. It is followed by dairy products, eggs and other edible animal products (swine meat, sheep meat and poultry meat), which have contributed about 13.7 per cent, 8.2 per cent and 2.3 per cent to the total earnings from the livestock exports, respectively in TE 2007. Bovine meat in India is largely a by-product of the main livestock production system. Cattle and buffalo that constitute about 60 per cent of the total meat production in the country are reared primarily for milk production.

The export of beef (cattle meat) was not explored due to socio-cultural and religious factors. All the states of India (except two) have imposed a ban on cattle slaughtering. On the other side, the export of buffalo meat has increased tremendously, as several initiatives have been taken to boost its export in recent years. However, the placement of location of meat processing plants is still a big issue even in this liberal economic regime in India.

Dairy products include whole milk powder, skimmed milk powder, butter, cheese, curd and whey along with some other milk products. India was a net importer of dairy products till 2000 and turned out to be a net exporter in the subsequent period. The export of dairy products gained momentum after 1991 due to a series of short-term and long-term strategies aimed at liberalizing the sector. These strategies resulted in a significant rise in milk processing and thus facilitated higher export of these products. In fact, the export of dairy products in TE 2007 was almost five-times higher than in TE 2001. Earlier, among the dairy products, butter & other fats and baby food constituted the major export items of dairy products. However, in recent years, skimmed milk powder has emerged as the largest constituent of dairy products exports. Further, processed cheese products are slowly finding their way into the

Table 4. Nominal protection coefficients of livestock products

Year	Butter	WMP	SMP	Bovine meat	Mutton	Poultry meat	Pig meat
			Exportable Hypothesis				
TE 1993	2.0	1.1	0.9	0.3	0.6	1.5	0.3
TE 1996	1.9	1.2	1.1	0.5	0.8	2.0	0.4
TE 1999	2.2	1.3	1.3	0.5	0.9	2.6	0.5
TE 2002	2.6	1.2	1.0	0.5	1.0	2.7	0.6
TE 2005	2.1	1.3	1.1	0.5	0.8	2.4	0.7
TE 2007	1.8	1.2	1.0	0.5	1.0	2.4	0.8
			Importable Hypothesis				
TE 1993	1.9	1.1	0.9	0.3	0.6	1.4	0.3
TE 1995	1.7	1.1	1.0	0.4	0.7	1.7	0.4
TE 1996	1.8	1.1	1.0	0.5	0.8	1.8	0.5
TE 1999	2.0	1.2	1.2	0.5	0.9	2.3	0.5
TE 2002	2.4	1.1	1.0	0.5	0.9	2.3	0.6
TE 2005	2.0	1.2	1.1	0.5	0.8	2.2	0.7
TE 2007	1.7	1.1	1.0	0.5	1.0	2.2	0.8

SMP = Skimmed milk products, WMP = Whole milk powder

export markets. The major impetus to exports of dairy products came after the removal of quantitative restrictions, which facilitated the exporters to tap the emerging opportunities in the global market.

Sincere efforts by the government and exporters to comply with sanitary and photo-sanitary standards (SPS) also seemed to have promoted the export of these commodities. The export of eggs declined till 1988, but thereafter there has been a continuous upward trend due to the boost in commercialization of the poultry sector in India. Further, reduction in the excise duty on meat products from 16 per cent to 8 per cent and complete waiving off the excise duty subsequently seems to have a positive influence on their production and consequently, their exports.

The Indian poultry industry has come a long way from a backyard activity to an organized, scientific and vibrant industry. Poultry meat and egg production have witnessed tremendous growth in India. However, consumption of poultry meat also increased at the very high rate and thus precludes the higher growth in export of poultry meat. Poultry meat production in India is also not very competitive, which can be partly attributed to a distortive international market because of heavy subsidies given by the developed countries (Singh, 2004).

Like-wise, some positive trends are apparent in the exports of non-edible livestock products, such as hides and skins. The export of hides and skins was negligible in TE 1982, but accounted for 4.3 per cent of the total livestock exports in TE 2007. The current contribution of live animals to the total export earnings from the livestock sector has also increased in absolute terms. The share of other animal products (non-edible products) during TE 2007 was 5.2 per cent.

Export Competitiveness of India

India has a competitive advantage in production of different livestock products. (Kumar *et al*., 2001; 2007; Birthal and Taneja, 2006)

Nominal protection coefficients (NPCs) under exportable and importable hypotheses were computed to assess the export competitiveness of different livestock products. The triennium ending average estimates of NPCs for livestock commodities under exportable and importable hypotheses are presented in Table 4 and the trends over time are depicted in Figures 1 and 2.

The results indicate that the Indian dairy industry has been protected from the distorted world prices. The value of NPCs hovered around 1.0 to 1.3 for skimmed milk products (SMP) and 1.2 to 1.3 for whole milk powder (WMP). The NPCs for SMP and WMP were 0.7 and 0.8, respectively in 2007 due to high spurt in international prices of these commodities. The price increase for these commodities in 2007 was relatively

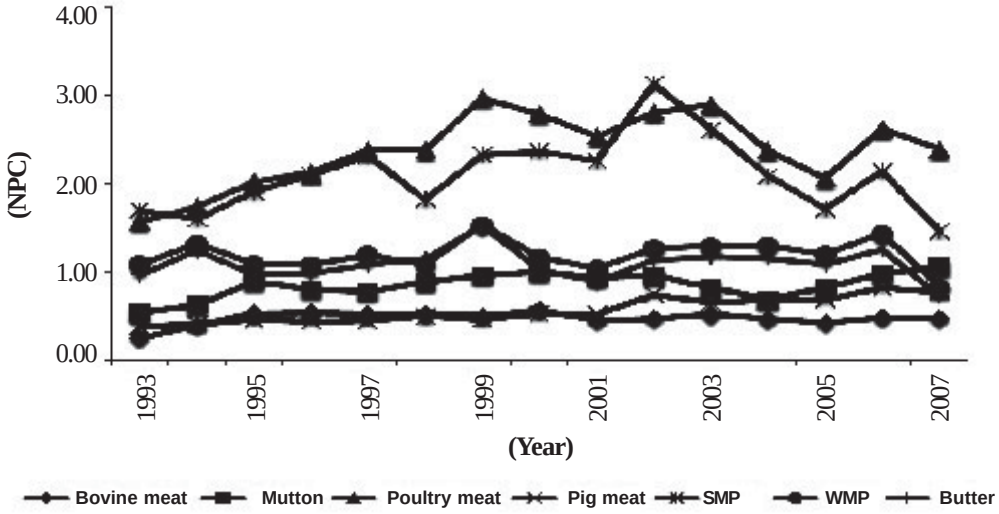

Figure 1. Nominal protection coefficients (NPCs) of livestock products under exportable hypothesis: 1993-2007

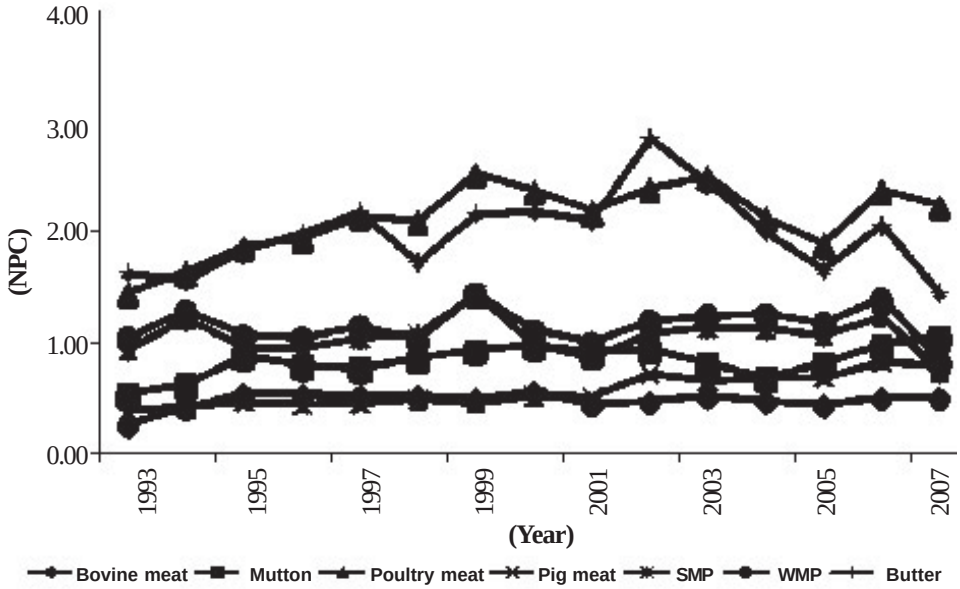

Figure 2. Nominal protection coefficients (NPCs) of livestock products under importable hypothesis: 1993-2007

less in India as compared to the world market. However, these figures do not inspire much confidence for India to record significant export of these commodities under the existing world prices. India can emerge as a significant exporter by subsidizing its own exports to compete with other exporters or negotiate in the WTO for substantial reduction in subsidies by the major exporters of WMP and SMP (Rakotoarisoa and Gulati, 2006). But, the possibility of export of butter does not exist. The NPC for butter, which was 2.0 in TE 1993, reached 2.6 in TE 2002 and then declined to 1.8 in TE 2007. This implies that butter prices have been possibly more protected than those of SMP and WMP or the world market prices for butter have been heavily subsidized. The higher values of NPCs for dairy products could also be attributed to the fact that the demand for milk and butter fat was high in India because of lack of alternatives to obtain animal fat. It may be noted that significant proportion of population in India is vegetarian.

The values of NPCs for meat products are quite different from those of the dairy products. The values of NPCs for bovine meat indicate very high export potential. However, the NPCs for bovine meat has been

witnessing an increasing trend, especially after TE 1993, indicating an erosion of competitiveness. However, it still hovers around 0.5 and India has much leverage to expand its bovine export further. India is also competitive in pig export, though its competiveness has deteriorated dramatically in recent years. The NPC of pig meat was 0.3 in TE 1993, which rose to 0.8 in TE 2007.

The increasing domestic demand devoid of commensurate supply seems to have fuelled the domestic prices of pork. On the other hand, the international prices of pig meat have remained relatively stagnant. These developments may be attributed to the successive erosion in the competitiveness of India in pig export. In the case of mutton, India does not enjoy much competitiveness to emerge as a significant exporter in the world market. Domestic demand for mutton also has been increasing consistently, which may further preclude it to expand mutton export. The NPCs for poultry meat indicates that India has protected its poultry sub-sector heavily or the international prices have been depressed due to price distortion in the world market. These results suggest that India does not have potential to increase its poultry export under the existing scenario. The divergence of NPCs between poultry meat and porks can be elucidated by the fact that poultry production in India has been commercialized and is based on intensive feeding system, while pig rearing is still based on extensive pork production and primarily use household wastes.

Determinants of Livestock Exports

In this section, an empirical analysis on the determinants of exports of livestock sector/commodities has been presented. The GDP or production of commodity in India, GDP of the destination countries, GDP per capita of the importing and exporting counties, distance between origin and destination countries and the trade policy index of the destination countries have been included to explain the determinants of exports of livestock products from India.

Since domestic price is determined by the factors of supply and demand, joint inclusion of domestic and international prices may lead to multi-colinearity and therefore, their ratio were included. *A priori*, a negative relationship was expected between the value of livestock products exported and the price ratio. The GDP of the importing countries describes the size of the economy and the correlation should be positive. However, sometimes it may be negative also and characterizes greater self reliance of a bigger economy (Sevela, 2002). The exporter's GDP or production of a commodity in the gravity model framework essentially denotes the supply capacity of the exporting country and is expected to have a positive sign.

On the other hand, the geographical distance characterizes the obstacles to trade; its higher value leads to decrease in bilateral international trade, indicating an inverse relationship with the export. The GDP per capita may be interpreted as the level of economic development and influence the consumption of the commodity. Generally it is expected to have a positive relationship with the exports from the country of origin. Besides these variables, the extensive use of non-tariff barriers (e.g. SPS measures, TBT) and other administrative barriers are also believed to influence the export, especially of food commodities including livestock products, significantly. It is difficult to quantify the impact of average level of protection (tariff and non-tariff) on the export of a commodity or sector. Information available even for the average tariff is inadequate. Trade Policy Index developed by Heritage Foundation, as a part of Index of Economic Freedom, has been used to take into account the effect of these factors on the export of livestock products from India.

Different regression models were tried and the least squares regression results of the best fitted model are summarized in Table 5. The gravity model results indicate that the estimated coefficients had the expected signs, with a few exceptions. The coefficients for most of the variables indicate that different factors influence the export of livestock products differently. The livestock GDP or production of the livestock commodities, which indicates the higher availability of domestic surplus, was observed to play a significant role in increasing the export of livestock products. The domestic production had a significant positive influence on exports of dairy products and meat products, while its effect on exports of eggs was not significant. The GDP of the importing countries had a significant and positive influence on the overall exports of livestock products from India. This implies that India tends to export more livestock products with larger economies. India's export will increase by 0.21 per cent as a result of one per cent increase in the GDP of the destination countries. Similarly, for dairy products and eggs, India has the propensity to increase

Table 5. Gravity model estimates of the determinants of exports of livestock products from India

Explanatory variables	Total livestock products	Dairy products	Meat products	Eggs
GDP livestock (India)	2.482***	-	-	-
	(3.67)			
Production (Mt)	-	3.644***	2.225***	0.564
		(3.74)	(3.34)	(1.06)
Producers price ratio	-	0.050	-	0.306
		(0.22)		(1.31)
Importer GDP per capita	0.224***	-0.183*	0.348***	0.166*
	(3.28)	(-1.82)	(4.01)	(1.79)
Importer GDP	0.205***	0.322***	-0.142***	0.275***
	(4.27)	(4.56)	(-2.47)	(3.99)
India GDP per capita	-0.575	2.862**	2.106	1.261
	(-0.47)	(2.18)	(1.55)	(0.90)
Trade policy index	-0.006***	-0.003	-0.003	-0.001
	(-2.68)	(-0.95)	(-1.10)	(-0.26)
Distance	-1.186***	-0.742***	-0.898***	-0.282**
	(-11.46)	(-6.76)	(-7.36)	(-2.39)
Constant	-16.060**	-30.041***	-9.327	-12.123
	(-2.25)	(-3.77)	(-1.20)	(-1.52)
log likelihood	-1601	-446	-1263	-502
Wald chi^2	281	85	97	61
Number of observations	764	247	578	275

Notes: *** significant at 1 per cent level; ** significant at 5 per cent level; *significant at 10 per cent level.
Figures within the parentheses indicate t values.

export of dairy products and eggs by 0.32 per cent and 0.28 per cent, respectively with one per cent increase in the GDP of the destination countries. However, its effect on exports of meat products was negative, implying the importing countries tend to import less meat products with the increase in the size of the economy.

The bigger economies may tend to be self-reliant in the case of meat products. The coefficient of GDP per capita of the destination countries, which characterizes the level of development and the level of consumption, is also positive and significant for overall India's livestock exports, including meat and eggs exports. With one per cent increase in the GDP per capita in the destination countries, India tends to enhance livestock exports by 0.22 per cent, while its exports of meat and eggs would be increased by 0.35 per cent and 0.17 per cent, respectively. The GDP per capita of the destination country has a negative influence on the export of dairy products from India.

The distance variable is significant at 1% level for the overall livestock exports, dairy products and meat products, while it is significant at 5% level for egg products. The distance variable had the expected negative sign in all the cases, indicating that India may be inclined to export livestock products more with its neighbouring countries. The coefficient value for livestock export is -1.186, which indicates that when distance between India and the destination country increases by 1 per cent, the export of livestock products to the importing country decreases by 1.19 per cent. Fortunately, India's neighbouring countries are deficit in most of the livestock products which offers opportunities to it for expanding export of livestock commodities. Further, with the 1 per cent increase in distance between India and the importing country, India tends to decrease exports of dairy products, meat products and eggs by 0.74 per cent, 0.90 per cent and 0.28 per cent, respectively. It seems that the effect of distance variable is less on the export of eggs.

The ratio of international and domestic prices did not influence the export of livestock products, implying that other factors were more important in influencing the export of livestock commodities from India. It further suggests that the issue of cost competitiveness might have been captured in the distance variable. The trade policy index, which represents the openness of a country or the foreign market access by considering tariff, non-tariff and other administrative policies of the countries, was significant only for the aggregate exports of livestock products. For export of individual commodities, its effect was not significant, though it had expected signs for each product. The above results indicate that strengthening of export supply capacity domestically holds the key for enhancing the export of livestock products rather than an expanding world market. The generation of adequate exportable surplus accompanied with demand creation for specific products would enable India to tap the benefit of expanding global livestock market.

Conclusions and Policy Implications

The study has explicitly deciphered that the livestock exports have registered a commendable rise and liberalization policies too seem to have further augmented their growth. The exports of bovine meat, dairy products, and eggs have shown promising signs during this period. On the other hand, import of most of the livestock products has been insignificant.

India is competitive in the export of meat products, except poultry. The export of buffalo meat has been increasing consistently and the lower domestic demand has fuelled its export. But, the export of mutton does not seem to have much prospects in the short-run, as even the domestic demand is not met by domestic production. In fact, domestic production could not keep pace with the rise in domestic demand for this commodity and thus may not be able to export significantly in spite of being competitive. In milk and milk products India has some advantage at farm level, but is not competitive in export of these products under the prevailing world market situation. The improvement in efficiency in the processing of dairy products along with reduction in support to the dairy industry in developed countries can increase the prospects of dairy exports from India. By and large, India has become self-sufficient in milk production and is able to generate some export surpluses also.

In the global trade of livestock products, India is still a very small player. But being one of the largest producers of most of the livestock products, India has the potential to significantly increase and expand the export of livestock products. Further, it seems that domestic policy initiatives and increased production and productivity are the important factors in enhancing the export of livestock products. Strengthening of export supply capacity domestically holds the key for enhancing export of livestock products rather than the expanding world market. The generation of adequate exportable surplus accompanied with demand creation for specific products would enable India to tap the benefit of the expanding global livestock trade.

India is surrounded by the countries which are deficit in production of livestock commodities to meet their domestic demand and thus India has the opportunity to export livestock products to these countries. A-long term outlook for the export of livestock products to these countries should be developed, which can provide a continuum to the policy thrust. The tendency of *adhocism*, which affects the long-term prospects of livestock exports, should be done away with. Besides, concerted efforts and lobbying are needed at the global forum to reduce support for production and export of livestock especially by developed countries.

Further, India may be constrained in having an easy access to developed country markets due to stringent food safety and quality standards followed there. To give a boost to livestock exports, compliance with various sanitary and phyto-sanitary measures should be taken up vigorously to ensure international hygiene standards and to harness the untapped potential of exporting to developed countries like USA, EU and Japan.

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