Export of buffalo meat from India: performance and prospects

ANJANI KUMAR[1], SHIV JEE[2] and CHITRA YADAV[3]

National Centre for Agricultural Economics and Policy Research, Pusa, New Delh 110 012 India

ABSTRACT

This study was undertaken to examine the performance of buffalo meat export from India, assess the export competitiveness of buffalo meat export and identify the determinants of export growth of buffalo meat from India. The study showed that the export of buffalo meat from India has registered a commendable rise during the past 2 decades and the liberalization policies seem to have further augmented its growth. India has competitive advantage in the export of buffalo meat, and long-term sustainability of buffalo meat export seems to be plausible. The domestic production of buffalo meat, GDP of the destination countries, GDP per caput of the importing and exporting countries, distance between origin and destination countries, and the trade policy index of the destination countries have been identified as important determinants of export of buffalo meat from India.

Key words: Buffalo meat, Competitiveness, Determinants, Export, JEL Classification: Q17

The economic policy reforms triggered in 1991 were reoriented towards liberalization and integration with the world economy as well as widened market opportunities for the Indian agricultural sector. Consequently, the composition of Indian agricultural export underwent a substantial change. The rising global demand for the livestock products, various trade negotiations and domestic reforms in India, improved the access to international market substantially, particularly during the post-WTO period. Such developments offered an opportunity to India to increase its agricultural exports. The buffalo meat, whose domestic demand is low, emerged as one of the important commodities in the export basket of agricultural products of India. The share of export of buffalo meat from India in the global trade has increased consistently, up from 0.5% in triennium ending (TE) 1993 to about 3.0% in TE 2010. However, a deeper understanding of the performance of buffalo meat export from India and identification of its determinants are lacking. In this backdrop, the present study was undertaken to (i) examine the performance of buffalo meat export from India, (ii) analyze the trends and volatility of domestic and international prices of buffalo meat, (iii) assess the competitiveness of India in buffalo meat export, and (iv) identify the determinants of export growth of buffalo meat from India.

MATERIAL AND METHODS

Materials: The data on export of buffalo meat were

Present address: [1]Principal Scientist (Agricultural Economics, anjani@ncap.res.in), sjncap@gmail.com, chits_yadav @yahoo.com).

compiled from the Monthly Statistics of Foreign Trade published by DGCIS, Ministry of Commerce, and Government of India. The data on GDP, AgGDP, and livestock GDP were culled from the National Accounts Statistics, published by Central Statistics Organization, Government of India. The domestic wholesale prices of buffalo meat were compiled from *Agricultural Prices in India*, published by the Directorate of Economics and Statistics, Ministry of Agriculture, Government of India, and were supplemented with the data available on the website of Economic and Statistical Advisor, Ministry of Commerce and Industry (http://www.esaindustry.nic.in/). The international prices of buffalo meat were downloaded from the FAO website. The data on geographical distances were set by the Distance Calculator accessible at http://www.indo.com/distance/.

Methods: All the values of exports were converted into US dollars to net out the effect of fluctuations in exchange rates. To analyze the performance of export of buffalo meat from India, the triennium ending averages were computed to minimize wide fluctuations. Compound annual growth rates (CAGR) was estimated to examine the growth trends in the export of buffalo meat.

Measurement of instability in export and price of buffalo meat: Several statistical measures were suggested in the literature on economics to compute the instability index. Each of these methods has its relative strengths and weaknesses and there is no consensus as to what constitutes the most appropriate method for measurement of instability. The naive approach treats all the movements as indicative of instability

by calculating standard deviation of price or export index. Coefficient of variation is also widely used as a measure of instability. However, this approach does not take cognizance of the predictable components like trends and thus, often overestimates the instability. Another measure of instability is the ratio method, which estimates standard deviation in the ratio. This method has been used in the present study. The export instability was calculated using expression (1):

Instability index of export (I_x) = Standard deviation of log

$$(X_t/X_{t-1})*100 \qquad \ldots (1)$$

where, X_t is the export value in the year t and X_{t-1} is the export value in the year t-1.

It is the unit free measure of instability and represents deviations from the trend growth line.

Similarly, the price instability was estimated as per equation (2):

Price instability index (I_p) = Standard deviation of log

$$(P_t/P_{t-1})*100 \qquad \ldots (2)$$

where, P is the price and t and t-1 denote the current and previous years, respectively.

Export competitiveness of buffalo meat: To measure the competitiveness several methods are used, in which nominal protection coefficient (NPC) is the most widely used measure (Corden 1971, Balassa and Schydlowsky 1972, Gulati *et al.* 1990, Taylor and Philips 1991, Chand 1999, Kumar *et al*. 2001, Rakotoarisoa and Gulati 2006). NPC is the ratio of a commodity's domestic price (P_i^d) to its international reference price (P_i^b), is computed as follows:

$$NPCi = \frac{P_d^i}{P_t^b} * ER$$

where, ER is the exchange rate.

The NPC basically helps in measuring divergence in domestic price from international price and thus determines the degree of export competitiveness of a commodity. Here, domestic price is the price received by the producer/processor at wholesale level and reference price is the world price adjusted for freight, marketing costs, margins and domestic transport costs. A ratio of less than unity implies a competitive advantage and of greater than unity conveys lack of competitive advantage.

NPC was computed under the exportable hypothesis. The exported commodity competes with the domestic commodity of the importing country at the foreign port or city. Therefore, in this case the reference price 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 buffalo meat export: The export of a commodity is influenced by a number of demand and supply-side factors. The gravity model was widely used to assess the influence of these demand and supply-side factors in exports. In the present study, the determinants of buffalo meat export were identified through gravity model given in equation (3):

$$\ln X_i = \alpha + \beta \ln Y_i + \beta_2 \ln Y_{ipc} + \beta_3 \ln Y_{in} + \beta_4 \ln Y_{inpc} + \beta_5 \ln TP_i \qquad \ldots (3)$$
$$-\beta_6 \ln D_{ij} + \mu_i$$

where, X_{is} the export, Y_i is the GDP of the importing country; Y_{ipc} is the GDP per capita of the importing country; Y_{in} is the production of buffalo meat; Y_{inpc} is the per capita GDP of India; TP_i is the trade policy rank of the importing country; D_i is the distance between India and the importing country; β_is are the coefficients of the explanatory variables; and μ_i is the error-term.

RESULTS AND DISCUSSIONS

Trends in export of buffalo meat: The buffalo meat is a dominant component of the animal products exported from India. Its share in total exports of animal products from India varied from 70% in TE 1992–93 to 80% in TE 2001–02. Currently, it accounts for 78% of the total value of animal products exported from India (Fig. 1).
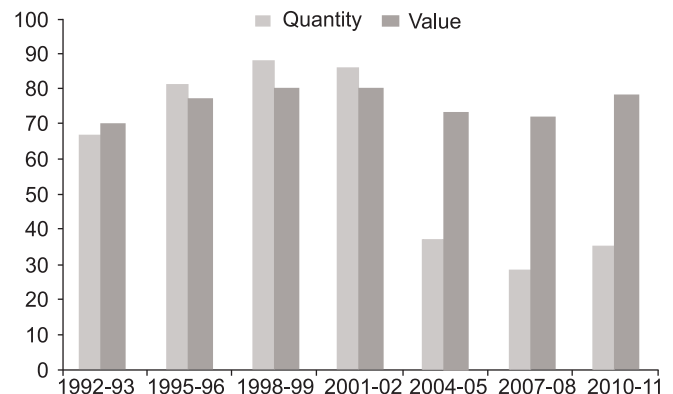

Fig. 1. Share of bovine in export of total animal products (%).

There has been a tremendous rise in the export of buffalo meat from India from 7.6 million tonnes in TE 1992–93 to about 56 million tonnes; more than 7 times in 2 decades. The increase is more revealing in value terms; it has grown from US $68.9 million in TE 1992–93 to US $1351 million in TE 2010–11, a growth of almost 20-times (Table 1). Buffalo meat in India is largely a byproduct of the main livestock-rearing system. The female buffaloes are reared primarily for milk production, while male buffaloes have traditionally been used for draught purposes, particularly in the rural areas. However, with reduction in the use of male buffaloes for draught purposes, increasing number of male buffaloes is being diverted for meat production. After the economic reforms initiated in 1991, the opportunities for export of livestock products have widened and several such measures have been taken that boost the export of buffalo

Table 1. Average annual quantity and value of export of buffalo meat from India

Period (TE)	Quantity (million tonnes)	Value (million US $)	Unit value of buffalo meat (US $/kg)
1992–93	7.6	68.9	0.91
1995–96	12.6	119.6	0.94
1998–99	16.3	178.3	1.10
2001–02	23.3	234.6	1.00
2004–05	32.6	333.0	1.02
2007–08	47.9	745.8	1.55
2010–11	55.6	1351.3	2.40

Source: Basic data from DGCI&S, Government of India.

Table 2. Compound annual growth rate (CAGR) and instability indices of buffalo meat export

Period	CAGR (%/annum)		Instability index (%)	
	Quantity	Value	Quantity	Value
1990–91 to 2000–01	13.3	15.4	19.2	24.6
2001–02 to 2010–11	10.1	25.1	16.5	18.8
1990–91 to 2010–11	11.8	17.0	17.7	21.3

Source: Basic data from DGCI&S, Government of India.

meat. The tremendous increase in the export of buffalo meat can be attributed to these initiatives.

The export of buffalo meat registered a significant annual growth rate of 12% during the past 2 decades in quantity terms and a still higher rate of 17% in value terms (Table 2). During 1990s, it grew by 13% in volume and 15% in value terms. During 2000, the growth rate of buffalo meat export was 10% in volume and 25% in value.

Thus, the export of buffalo meat has increased not only in volume and value, but the unit value realization for buffalo meat has also depicted a rise. The increase in the unit value realization of an exported commodity is an indicator of its

growing acceptability in the importing nations. The unit value of buffalo meat export stagnated around US $ 1/kg till TE 2004–05, but thereafter, it has witnessed an increase and 1 kg of buffalo meat could fetch US $ 2.4 in TE 2010–11.

Instability in the export of buffalo meat: Any instability in the export market of a commodity discourages investment in its production, affects the planning process and demolishes the sense of economic security which is necessary for any concrete policy measure as well as for long-term sustainable export growth.

On the basis of the indication provided by the instability index of a commodity to be exported, appropriate policy measures for further promotion of its export can be formulated. The export of buffalo meat has depicted a reasonable stability with an aggregate instability index of 18% in volume and 21% in value terms. Further, the export instability has declined over time (Table 2).

Export destinations for buffalo meat: Destinations for trade are determined by several factors such as geographical and political proximity, differences in comparative advantage, degree of trade barriers, etc. In order to identify the major destinations for export of buffalo meat, top 10 importers of buffalo meat from India are listed in Table 3.

These 10 importing countries accounted for 99% of the total buffalo meat exports from India in TE 1992–93, 91% in TE 2001–02 and 75% in TE 2010–11. The share of individual countries in the total import of buffalo meat from India has depicted wide variations. For instance, Malaysia was the biggest importer of buffalo meat from India during TE 1992–93, accounting for 53% of the total buffalo meat export form India, but its share started declining afterwards and it dropped to 30% during TE 2001–02. During TE 2010–11, the share in buffalo meat export from India dropped further and was 11% only. Similarly, UAE was at the second rank in the top 10 export destinations of buffalo meat from India with a share of 21% in the total export during the TE 1992–93. During TE 2001–02, UAE not only maintained its second rank but depicted a higher share of 24% in the total

Table 3. Major export destinations of buffalo meat from India: triennium ending (TE) 1991 to 2011

Destination (TE 1992–93)	Share (%)	Destination (TE 2001–02)	Share (%)	Destination (TE 2010–11)	Share (%)
Malaysia	53	Malaysia	30	Vietnam	21
UAE	21	UAE	24	Malaysia	11
Oman	6	Philippines	18	Egypt	10
Jordan	5	Iran	6	Philippines	7
Kuwait	4	Jordan	4	Saudi Arabia	7
Yemen	4	Kuwait	3	Kuwait	5
Bahrain	3	Mauritius	2	Jordan	4
Central African Republic	1	Oman	2	UAE	4
Mauritius	1	Lebanon	1	Angola	4
Singapore	1	Gabon	1	Iran	2

Source: Basic data from DGCI&S, Government of India.

buffalo meat export from India. But, during TE 2010–11, this export of buffalo meat nosedived to mere 4%. On the other hand, Vietnam has emerged as the biggest importer of buffalo meat from India with a share of 21%. The trends in export destinations indicated that India has not been able to make a dent in high-value markets of the developed countries for its export of buffalo meat. It seems that the India's access to industrial countries is restricted by the food safety and quality standards practices being followed in these countries.

Trends and volatility in domestic and international prices of buffalo meat: There is a wide gap between the domestic and international prices of buffalo meat. The prices of buffalo meat have been higher in international markets as compared to domestic prices. However, this price gap has narrowed down in recent years (Fig. 2). The trends in behaviour of buffalo meat prices in domestic and international markets have been quite different. The international prices of buffalo meat or beef declined considerably during the 1990s. In fact, the international price declined at an annual rate of 4.4% (Table 4). However, there was a surge in the prices of beef in the international market and it grew at an annual rate of 4.8% during 2000s. The domestic price of buffalo meat increased almost consistently at the rate of about 6.3%/annum during 1990s as well as during 2000s.

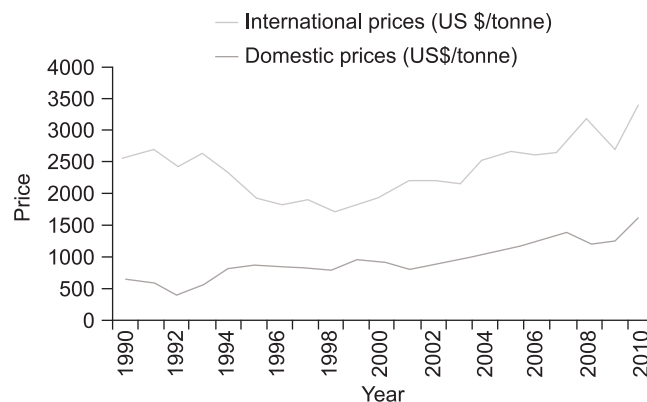A comparative picture of instabilities in the domestic and

Fig. 2. Trends in increase in international and domestic prices of buffalo meat: 1990–2010.

international markets revealed that the inter-year variations in annual prices of buffalo meat were higher in domestic than international markets. The period-wise trends in the volatility of buffalo meat prices are quite revealing (Table 4).

During 1990s, the instability index of domestic prices of buffalo meat was considerably higher (25.7%) than international prices (8.7%). However, in the subsequent decade (post–2000), the instability indices of both domestic and international prices of buffalo meat were quite close (12.5% and 13.1%, respectively). This indicated that global and domestic prices of buffalo meat have shown a tendency of convergence over time, which could be attributed to the greater integration of world markets because of growing trade liberalization.

Export competitiveness: India has the competitive advantage in production of buffalo meat. Producer prices of buffalo meat are lower in India than in the leading international exporting countries. In fact, the producer price of buffalo meat in India ranges from one-sixth to one-tenth of the price in leading exporting countries (Table 5). Further,

Table 4. Trends and volatility of buffalo meat prices in domestic and international markets: 1990–2010

Period	CAGR (%)		Instability index (%)	
	Domestic	International	Domestic	International
1990–2000	6.30	−4.40	25.73	8.74
2000–2010	6.33	4.80	12.51	13.06
1990–2010	6.31	1.20	19.69	11.75

Source: Basic data from DGCI&S, Government of India

Table 5. Producer prices of buffalo meat in india vis-à-vis major exporters of the world and SAARC countries :

TE 1992-TE 2009 (US $)

Countries	TE 1992–93	TE 1995–96	TE 1998–99	TE 2001–02	TE 2004–05	TE 2008–09
India	578	457	364	314	343	425
Major exporters						
Australia	1557	1597	1277	1517	2236	2670
Germany	3072	3178	2500	1835	3090	4580
Malaysia	3580	3725	3212	2291	1764	2256
US	3061	2654	2633	2914	3612	3709
SAARC countries						
Bangladesh	1295	1284	1175	1011	936	997
Bhutan	821	849	1042	1150	1566	2107
Nepal	858	961	893	970	1097	1289
Pakistan	2115	1982	1709	1630	1941	2477
Sri Lanka	513	634	699	608	702	1433

Source: FAOSTAT.

Table 6. Nominal protection coefficients of buffalo meat:
triennum ending 1992 to 2011

Year	NPCs
1992–93	0.28
1995–96	0.39
1998–99	0.53
2001–02	0.51
2004–05	0.48
2006–07	0.51
2010–11	0.53

Source: Basic data from DGCI&S, Government of India.

producer price in India is even lower than in the neighbouring SAARC countries like Bangladesh, Bhutan, Nepal, Pakistan and Sri Lanka. The price advantage of India vis-a-vis other SAARC countries enhances its prospects of export of buffalo meat to these countries, most of which are traditionally significant consumers of beef and buffalo meat.

A comparison of producer prices does not reveal the real strength of export competitiveness as these do not take into account several functional expenditures like freight charges, insurance costs and port handling charges. To account for these expenditures, nominal protection coefficients (NPCs) were computed under exportable hypothesis. The values of NPCs for buffalo meat have depicted a high export potential for buffalo meat. The value of NPCs was 0.28 during TE 1992–93 which increased to 0.39 during TE 1995–96, and further to 0.53 during TE 1998–99. Since then, it hovered around 0.51 till 2007 and increased again slightly to 0.53 during TE 2010–11 (Table 6). The trends in the NPCs ensure the long-term sustainability of buffalo meat export from India. Even during the period of global recession, the export of buffalo meat from India was not affected because of its sound cost competitiveness. However, besides prices, several other non-price factors are also instrumental to further expand and accelerate the buffalo meat export from India. In addition to competitive pricing of Indian buffalo meat, increasing efforts by the exporters towards addressing of quality and hygiene aspects have also supported the export growth of buffalo meat.

Determinants of buffalo meat export: In this section, an attempt has been made to identify the factors that steer the export of buffalo meat from India. The domestic production of buffalo meat, GDP of the destination countries, GDP per caput of the importing and exporting countries, distance between origin and destination countries, and the trade policy index of the destination countries have been included and given in Table 7 to explain the determinants of export of buffalo meat 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-collinearity and therefore, their ratio was included. *A-priori* a negative relationship was expected

Table 7. Determinants of buffalo meat export from India

Dependent variable: Buffalo meat export	
Explanatory variables	Coefficients
Domestic production (million tonnes)	2.225*** (3.34)
GDP per capita of importing nation (USD)	0.348*** (4.01)
GDP of importing nation (USD)	–0.142*** (–2.47)
GDP per capita of India (USD)	2.106 (1.55)
Trade Policy Index (No.)	–0.003 (–1.10)
Distance between origin and destination (km)	–0.898*** (–7.36)
Constant	–9.327 (–1.20)
log likelihood	–1263
Wald chi^2	97
Number of observations	578

Source: Basic data from DGCI&S, Government of India, FAOSTAT and http://www.indo.com/distance/. Values within the parentheses indicate T values.

between the value of buffalo meat exported and the price ratio. The GDP of an importing country describes the size of its economy and therefore correlation should be positive. However, sometimes it could be negative also, characterizing the greater self-reliance of a bigger economy (Sevela, 2002). The production of a particular 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 caput may be interpreted as the level of economic development and influences the consumption of a commodity. Generally, it is expected to have a negative relationship with the exports from country of origin.

Besides the above variables, the extensive use of non-tariff (e.g. Sanitary and Phytosanitary Measures and Technical Barriers to Trade) and other administrative barriers are also believed to significantly influence the export of food commodities, including livestock products. It is difficult to quantify the impact of average level of protection (tariff and non-tariff) on the export of a commodity or a sector. Information available even for the average tariff is inadequate. Trade Policy Index developed by the Heritage Foundation, as a part of Index of Economic Freedom, has been used to study the effect of these factors on the export of buffalo meat from India.

The results of gravity model indicated that the estimated coefficients had the expected signs with a few exceptions. The coefficients for most of the variables indicated that these factors influence the export of buffalo meat differently. The effect of domestic production of buffalo meat was observed to have a significant positive influence on its export. The GDP of the importing countries had a significant positive

influence on the overall export of buffalo meat from India. The coefficient of GDP per caput, which characterizes the levels of development and consumption of the destination country, was also positive and significant for the export of buffalo meat from India. With 1% increase in the GDP per caput of the destination country, India could enhance buffalo meat export by 0.35% (Table 7). The variable 'distance' was significant at 1% level for buffalo meat export. With 1% increase in distance between India and the importing country, India's export of buffalo meat decreased by 0.90%.

The study showed that the export of buffalo meat from India has registered a commendable rise during the past 2 decades and the liberalization policies seem to have further augmented its growth. India has competitive advantage in the export of buffalo meat, and long-term sustainability of buffalo meat export seems to be plausible. The domestic production of buffalo meat, GDP of the destination countries, GDP per caput of the importing and exporting countries, distance between origin and destination countries, and the trade policy index of the destination countries have been identified as the determinants of export of buffalo meat from India.

Strengthening of export supply capacity along with expanding world market are the important factors for enhancing export of buffalo meat from India. The generation of adequate exportable surplus complemented with demand creation would enable India to harness the benefit of expanding global meat trade. Further, India is surrounded by the countries which are deficit in production of buffalo meat and look for its import to meet their domestic demand. This offers an opportunity to India to export buffalo meat to these countries. However, India lacks access to markets in the developed countries due to their stringent food safety and quality standards. Compliance with various food safety measures needs to be taken up vigorously to ensure meeting of international hygiene standards and to harness its potential of exporting to high-paying markets of countries like USA, EU, Japan, etc. A long-term outlook on accessing these markets for export of buffalo meat should be developed. Concerted efforts are needed at the global fora to create acceptability of buffalo meat of India in the high-value international markets.

ACKNOWLEDGEMENT

REFERENCES

Balassa B and Schydlowsky D M.1972. Domestic resource costs and effective protection once again. *Journal of Political Economy* **80**: 63–69.

Chand Ramesh. 1999. *Effect of Trade Liberalization on Agriculture in India: Commodity Aspects*. The CGPRT Centre, Working Paper Series 45.

Corden W M. 1971. *The Theory of Protection*. Oxford University Press, London.

Gulati A, Hansen J and Pursell G. 1990. *Effective Incentives and India's Agriculture: Cotton, Groundnuts, Wheat and Rice*. Planning and Research Working Paper No. 332, The World Bank, Washington, DC, USA.

Kumar Anjani, Ali Jabir and Singh Harbir. 2001. Trade in livestock products in India: Trends, performance and competitiveness. *Indian Journal of Agricultural Economics* **56** (4): 653–67.

Rakotoarisoa Manitra and Gulati Ashok. 2006. Competitiveness and trade potential of India's dairy industry. *Food Policy* **31** (3): 216–27.

Sevela M. 2002. Gravity type model of Czech agricultural export. *Agricultural Economics* **48** (10): 463–66.

Taylor D S and Philips P T. 1991. Food-pricing policy in developing countries: Further evidence on cereal producer prices. *American Journal of Agricultural Economics* **73**: 1036–43.