India's exports performance in poultry products and the potential exports destinations

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Abstract: The study analyzes the trends in the Indian poultry products' exports during the pre- and the post-WTO periods using the Hodrick-Prescott (HP) filtered data. The Simpson Diversity Index (SDI) was used to measure the export diversity, whereas the Revealed Comparative Advantage (RCA) and the Revealed Symmetric Comparative Advantage (RSCA) ratios assessed the competitiveness of poultry products in the international market. India has been highly competitive in the exports of hen-eggs-in-shell and eggs-dried, whereas India needs to maintain its competitive position with respect to eggs-liquid and live-ducks. India could not retain its competitive position in live chicken exports due to the rising production cost coupled with the onslaught of the Avian Influenza (AI) in the recent years. Spreading of the AI put a heavy toll on poultry exports, especially chicken meat and eggs-liquid due to a complete ban on Indian poultry products imposed by many of the importing countries. The SDI indicated that poultry products' exports were more diversified during the post-WTO period. On the basis of the available data on the average ad-valorem applied duties faced by the Most Favoured Nations (MFN), the producers' price in various countries for chicken meat and eggs (hen-egg-in shell) and shipping charges from India to various countries, the lucrative export destinations for such poultry products were identified.

Key words: competitiveness, diversity, exports, Indian, poultry, margins, trade, WTO

Poultry has been one of the high growth segments of the agricultural sector in India with the compound growth rates of 5.57 and 11.44% per annum in egg and broiler production, respectively, during the period 1999 to 2009. Poultry industry contributed about Rs. 500 billion, accounting for about 0.70% of the national GDP (2010–2011) and provided either direct or indirect employment to over five million people in the country. Globally, India ranked 3rd after China and the USA with the production of 61.45 billion eggs and 5th after the USA, China, Brazil, and Mexico with the production of 3.6 million tonnes of chicken meat according to the 2010–2011 figures.

In India, the rising disposable incomes, changing lifestyles, the dominant young population and the growing non-vegetarianism etc. offered excellent opportunities for fuelling the growth of the poultry sector. However, the consumption of poultry products has been skewed in favour of the urban population. Despite higher prices of poultry products in rural areas, the penetrability and reach of poultry products has remained limited in rural India owing to the fragmented markets and infrastructural bottlenecks. The growth in consumption of chicken and poultry eggs in both rural as well as urban populations remained subdued during 1999–2004 *vis-à-vis* their production growth. The average growth rates in the consumption of eggs during 1999 to 2004 were –1.47% and –1.75% in rural and urban, respectively based on the data compiled from various reports of the National Sample Survey Organization (NSSO 1997, 2001, 2007). Likewise, the average growth rates in consumption of chicken were 5% and 10% in rural and urban areas, respectively, during the same period. Therefore, due to a poor absorbability in rural areas and a slow consumption growth amongst urban population, the prices of poultry products have been under pressure leading to the thinning of margins. Hence, the poultry industry urgently needed to look for venues for channelizing its ever growing production which has been consistently out-growing its consumption pace.

India being a founder member of the WTO, it became its signatory in 1994. Since then, the globalization of agri-food markets under the WTO regime has been creating both an opportunity and a threat for livestock producers. The increasing global demand due to opening up of newer markets for poultry products offered an opportunity to export. It has also enabled access to the domestic markets for competition against the imported products. However, at present Indian im-

ports of poultry products are meagre. In quantitative terms, India's average annual imports stood at 110 t of hen-eggs-in-shell followed by 109 000 numbers of live chicken; 61 t of canned chicken and 47 000 numbers of live ducks during the triennium 2008–2010. In the value terms, India's average annual imports during the same period were $2 845 000 of live chicken followed by $689 000 of live ducks, $434 000 of hen-eggs-in-shell and $142 000 of canned chicken (http://faostat.fao.org...). On the other hand, apprehensions of the Indian poultry sector *vis-à-vis* its ability to tap the international markets are not unfounded in the face of non-tariff barriers like the stringent sanitary and phyto-sanitary (SPS) standards, the technical barrier to trade (TBT), the anti-dumping and countervailing duties etc. (Kumar et al. 2007) thought there has been a consistent decline in the import tariff of livestock products in general. Hence, it is pertinent to have a deep insight into the potential export destinations for Indian poultry products under the changed international trade regime bolstered by the WTO as an opportunity to tap the international markets which also provide an effective way to ease out the domestic supply pressures.

Hence, it was considered appropriate to analyze the impact of the WTO on poultry exports, notwithstanding the fact that India needs to be more competitive internationally not only in terms of production cost but also with respect of the acceptable quality standards for effectively tapping the poultry export markets. James et al. (1987) have opined that the intensification and enhancement of competitiveness is an essential ingredient of a successful trade strategy. There is evidence to suggest that a country whose trade strategy has been guided by the principle of comparative advantage have prospered by trade (Jha 2000). According to Fugazza (2004), the supply conditions are fundamental in defining the export potential of a sector or an economy.

Therefore, with a view to analyze India's international poultry trade performance, the present study was undertaken with the specific objectives (i) to analyze the trends, variability, composition and diversity of exports of India's poultry products, (ii) to assess the competitiveness of Indian poultry products in the international market and (iii) to explore the potential destinations for eggs and poultry meat exports from India.

DATASET AND METHODOLOGIES

The study is based on the time series data on quantity and value of exports of different poultry products for India collected from the FAOSTAT database for the period 1984 to 2009. The time series export (values) data were arranged in the trienniums beginning 1984–1986 to analyze the composition, diversity and comparative advantage in export of poultry products such as, chicken meat, duck meat, chicken-canned, turkey meat, hen-eggs-in-shell, eggs-dried, eggs-liquid, live chickens, live ducks and live turkeys.

The export trends in different poultry products were analyzed using the compound growth rates which were estimated employing the semi-log function with time trend as the independent variable. The variability in the export of poultry products was analyzed using the coefficients of variation (CV%). The trends and variability in exports (quantity) of poultry products were compared for three data periods, viz., overall (1984–2009), pre-WTO periods (pre-1996) and post-WTO periods (1996–2009) to assess the implications of the WTO on the exports of poultry products, since the WTO agreement came into force in India during 1995. The Hodrick Prescott Filter (en.wikipedia.org...) introduced in 1980 as a data-smoothing technique was used to determine the long term trend of the time series by removing the short-term fluctuations associated with the business cycle, thereby revealing the long-term trends.

If the original series y_t is composed of a trend component τ_t and a cyclic component c_t, then

$$y_t = \tau + c_t \quad (1)$$

Technically, the Hodrick-Prescott (HP) filter is a two-sided linear filter that computes the smoothed series τ of '*y*' by minimizing the variance of '*y*' around τ, subject to a penalty (λ) that constrains the second difference of τ. Thus, the HP filter chooses τ so as to minimize.

$$\sum_{t=1}^{T}(y_t - \tau_t)^2 + \lambda \sum_{t=2}^{T-1}[(\tau_{t+1} - \tau_t) - (\tau_t - \tau_{t-1})]^2 \quad (2)$$

The first term is a measure of the fitness of the time series while the second term is a measure of the smoothness. There is a conflict between the "goodness of fit" and "smoothness". The penalty parameter λ keeps track of this "trade-off" between the two. The penalty parameter λ controls the smoothness of the series τ. The larger the λ, the smoother the τ and if $\lambda = \infty$, τ approaches a linear trend. If $\lambda = 0$, the series τ becomes the original series '*y*'.

To study the changes in the composition of the India's poultry products' export basket over time, percentage shares of the specific poultry products in the total average poultry exports in different trienniums

were worked out. The Simpson Diversity Index (en.wikipedia.org...) was used for measuring the extent of the export diversification of poultry products.

$$SDI = 1 - \sum \frac{A_i^2}{A^2} \quad (3)$$

where:
A_i = value of exports of i^{th} poultry product from India
A = value of total poultry products exports from India

The SDI takes into account the number of items exported, as well as the quantity of each of the exported item. It varies from 0 to 1. The value of 1 indicates a total diversification, whereas the value of 0 indicates a perfect concentration of trade towards a particular product in the particular triennium.

The comparative advantage of India's poultry products export was measured on the basis of the observed pattern of trade termed as the Revealed Comparative Advantage (RCA) or the Export Performance Ratio (EPR), one of the most widely used methods (Balassa 1965; Bardhan 2007; Kumar 2008) applied to measure the comparative advantage. The EPR of i^{th} poultry product (EPR_i) in a triennium was measured as follows:

$$EPR_i = (E_i/CE)/(W_i/WE)$$

where:
E_i = value of export of i^{th} poultry product from India in a triennium
CE = value of aggregate exports of poultry products from India in a triennium
W_i = value of total world exports of i^{th} poultry product
WE = value of total world exports of all poultry products in a triennium

A value of EPR greater than unity implies that India has a comparative advantage in the export of poultry product and *vice versa*.

However, the EPR worked out using the above expression returned a ratio which could take any value and hence it was not comparable for different poultry products over different trienniums. Therefore, in order to make it comparable, the Revealed Symmetric Comparative Advantage (Laursen 1998) was worked out as follows:

$$RSCA = (RCA - 1)/(RCA + 1)$$

The RSCA ranged from –1 to +1. The positive value of the RSCA indicated a comparative advantage in exporting a particular poultry product whereas its negative value indicated that India had no comparative advantage in the exports of the product.

On the basis of the available data on the average ad valorem applied duties (http://tariffdata.wto...) faced by the Most Favoured Nations (MFN) under the WTO, the producers' price in various countries (http://faostat.fao.org...) for chicken meat and eggs (hen-egg-in shell) for the year 2008 and freight charges from India to various countries obtained from some of the shipping companies in India, the landing cost of Indian poultry eggs and meat at the destination port per reefer container (Twenty feet Equivalent Unit –TEU) having the full container load (FCL), i.e., 20 t payload, was estimated along with net margins so as to find out the most lucrative export destinations for Indian poultry products. The cost of the documentation for shipping of poultry products from India was assumed to be, by and large, similar for all destination ports.

RESULTS AND DISCUSSION

Variability in India's poultry products export

Among the poultry products exported from India, the hen-eggs-in-shell occupied the pivotal position (Table 1), followed by the eggs-liquid and eggs-dried as reflected by their mean quantities. The export of all the poultry products took a leap during the post-WTO era as reflected by the percentage increase in the mean quantities exported in the post-WTO era over those in the pre-WTO period. The prominent items making place in the exports basket of poultry products baskets in the post-WTO period were the eggs-liquid followed by the chicken meat, eggs-dried, duck meat, hen-egg-in-shell and chicken canned. However, the exports of almost all the poultry products became more volatile during the post-WTO period as reflected by the respective higher CV% values during the period as compared to those in the pre-WTO period mainly due to frequent outbreaks of the AI resulting in distortions in the traditional routes of the poultry trade. Noticeably, the exports of chicken canned, hen-eggs-in-shell and live ducks exhibited a greater stability during the post-WTO period as evidenced by the reduced CV% values. Live ducks, live chicken and chicken meat were other promising items of the exports from India.

Growth of India's poultry products' export

As discussed above, poultry eggs in different forms constituted a major portion of poultry exports from India. Based on the analysis of the HP filtered data for the respective data periods as indicated in Table 2 against each of the poultry products, the growth

Table 1. Variability in exports (quantity) of India's poultry products

Items	Data period	Overall data period		Pre-1996 (pre-WTO)		1996–2009 (post-WTO)	
		mean*	CV (%)	mean*	CV (%)	mean*	CV (%)
Chicken meat	1984–2009	392.54	231.63	30.08	128.43	703.21 (2237%)	166.04
Duck meat	1992–2009	124.50	171.26	17.00	118.62	155.21 (813%)	150.80
Chicken canned	1990–2009	201.20	61.94	106.00	66.71	242.00 (232%)	50.27
Hen-eggs-in-shell	1986–2009	18 662.15	114.68	3 534.50	114.83	3 1628.71 (795%)	68.88
Eggs dried	1995–2009	3 743.27	79.87	305.00	–	3 988.86 (1 208%)	73.74
Eggs liquid	1987–2009	1 942.65	169.53	12.67	109.75	3 183.36 (25 025%)	118.03
Live chickens**	1984–2009	847.23	75.64	661.67	67.75	1 006.29 (52%)	74.42
Live ducks**	1987–2009	1 842.00	112.80	1 526.11	154.91	2 045.07 (34%)	94.74

*Quantity in tonnes except for ** which are in 1000 heads; figures in parentheses indicate increase over mean values in the pre-WTO period

rates were worked out for the whole data period as also for the pre- and post-WTO periods. The poultry eggs exported in the form of the hen-eggs-in-shell, eggs-liquid and eggs-dried exhibited a mixed scenario during the pre- and the post-WTO periods. The growth in the hen-eggs-in-shell during the post-WTO

Table 2. Growth trends in exports (quantity) of India's poultry products (using HP filtered data series)

Items	Over all data period[1]	Coefficient (S.E.)	CGR (%)	$\bar{R}^2$	Pre-1996 (pre-WTO)			1996–2009 (post-WTO)		
					coefficient (S.E.)	CGR (%)	$\bar{R}^2$	coefficient (S.E.)	CGR (%)	$\bar{R}^2$
Chicken meat	1992–09	0.25* (0.03)	28.74	0.75	–	–	–	0.13* (0.02)	14.30	0.76
Duck meat	1993–09	0.23* (0.02)	25.35	0.87	–	–	–	0.20* (0.02)	21.78	0.89
Chicken canned	1986–09	0.06* (0.003)	5.96	0.95	0.10* (0.002)	11.50	0.99	0.04* (0.0004)	4.47	0.99
Hen-eggs-in- shell	1986–09	0.20* (0.01)	22.14	0.94	0.32* (0.03)	38.17	0.91	0.15* (0.007)	15.78	0.97
Eggs dried	1991–09	0.20* (0.01)	22.04	0.93	–	–	–	0.18* (0.01)	19.78	0.96
Eggs liquid[2]	1990–09	0.07*** (0.04)	7.72	0.12	0.61* (0.008)	83.44	0.92	–0.08** (0.04)	–7.60	0.22
Live chickens[3]	1984–09	–0.02 (0.02)	–	0.01	0.05* (0.008)	5.63	0.81	–0.19** (0.05)	–17.61	0.51
Live ducks[4]	1987–08	–0.007 (0.031)	–	0.00	0.37* (0.07)	45.81	0.80	–0.17* (0.028)	–15.55	0.75

*, **, *** significant at 1%, 5% and 10% probability levels, respectively; else non-significant

[1]The inconsistent data for previous years were ignored while estimating the growth rates

[2]The quadratic form of fitted equation for the post-WTO period was $Y = 1037.30 + 986.90\times t - 74.76 \times t^2$ with Adj $R^2 = 0.98$ The CAGR at t and Y was worked out to be –33.41%

[3]The cubic form of fitted equation for the overall data period was $Y = 690.62 - 91.49 \times t + 17.19 \times t^2 - 0.57\times t^3$ with Adj $R^2 = 0.97$. The CAGR at t and Y was worked out to be 19.89%

[4]The quadratic form of fitted equation for the overall data period was $Y = -1141.81+717.00 \times t - 29.89\times t^2$ with Adj $R^2 = 0.98$. The CAGR at t and Y was worked out to be –0.23%

period came down from 38% in the pre-WTO period to about 16% mainly due to expansion of the base (mean quantity exported) by almost 9 times as compared to the pre-WTO period. However, the export of the eggs-liquid growing at the rate of over 83% per annum suddenly lost its momentum during the post-WTO period, especially 2005 onwards, thereby registering a negative growth of 7.6% per annum. The export of the eggs-dried which was almost negligible during the pre-WTO period also increased sharply ≅ 20% per annum during the post-WTO period, suggesting the replacement of the eggs-liquid by the eggs-dried in the wake of the frequent bird flu outbreaks (Table 2).

The exports of the chicken meat and duck meat had picked up sharply as reflected by the high growth rates (over 28% and 25%, respectively) reported for the overall data period. However, their growth was again hurdled during the post-WTO period due to the trade distortions by the importing countries owing to the bird flu in India. The export of the chicken canned has been the most stable in quantitative as well as the CV% value terms. Consequently, the CGARs have also been hovering around 5–6% during the overall as well as the post-WTO periods. Exports of the live chicken which reflected a CGAR of about 6% during the pre-WTO period plummeted to about –18% during the post-WTO period, again due to the spread of the bird flu in the mid of 2000–2009. Similarly, the exports of live ducks registered a high negative growth (–15.55%) during the post-WTO period as against the high positive growth of over 45% per annum during the pre-WTO period. The sudden changes in the growth patterns in the exports of poultry products after 1996 when India joined the WTO' could be attributed partially to the spread of zoonotic diseases like the bird flu and also to the consequent distortions in the traditional trading routes for poultry products.

Composition and diversity in the export of India's poultry products

The export of the hen-eggs-in- shell and eggs-dried, together accounting for the greatest share in poultry exports earnings, have gone up (Table 3) from 69% during 1984–1986 to 95% during 2008–2009 in value terms. Wide fluctuations were observed in the export of all other poultry products during the period. The share of earnings from live chicken exports declined considerably during the period. The exports of the

Table 3. Exports (value) composition and diversity of India's poultry products (US $1000)

Years/items	TE								BE
	1984–86	1987–89	1990–92	1993–95	1996–98	1999–01	2002–04	2005–07	2008–09
Chicken meat	20.6 (3.0)	8.6 (1.3)	68.6 (1.6)	56 (1.1)	10.3 (#)	47.6 (0.2)	2 078 (3.9)	652 (0.7)	1 331 (1.5)
Duck meat	–	3.6 (0.5)	3.6 (#)	22 (0.4)	9 (#)	1 (#)	349 (0.6)	176 (0.2)	277 (0.3)
Chicken (canned)	–	14.3 (2.1)	248 (5.8)	234 (4.5)	632 (2.4)	244 (1)	366 (0.6)	495 (0.5)	604 (0.7)
Turkey meat	–	–	–	–	–	–	326 (0.6)	716 (0.8)	–
Hen-eggs-in-shell	465 (68.4)	397 (60.4)	3 623 (84.8)	3 064 (60.0)	12 847 (50.2)	12 477 (52.1)	27 045 (50.9)	47 887 (57.3)	50 663 (57)
Eggs dried	3.3 (0.4)	–	6.3 (0.1)	416 (8.1)	6 959 (27.2)	3 340 (13.9)	8 625 (16.2)	31 981 (38.3)	33 966 (38)
Eggs liquid	–	14 (2.1)	17.3 (0.4)	42.6 (0.8)	4 076 (15.9)	6 753 (28.2)	13 188 (24.8)	1072 (1.2)	815 (1.0)
Live chickens	190 (28)	173.6 (26.4)	149 (3.5)	207 (4.0)	328 (1.2)	312 (1.3)	449 (0.8)	290 (0.3)	45.5 (0.5)
Live ducks	–	46 (7)	154 (3.6)	1 058 (20.7)	681 (2.6)	769 (3.2)	672 (1.2)	185 (0.2)	54.5 (0.6)
Live turkeys	–	–	–	–	–	–	1.67 (#)	66 (0.1)	116 (0.1)
Poultry products	679 (100)	657 (100)	4 271 (100)	5 101 (100)	25 543 (100)	23 945 (100)	53 102 (100)	83 523 (100)	87 874 (100)
SDI	0.45	0.56	0.27	0.59	0.65	0.63	0.65	0.52	0.52

TE = Triennium; BE = Biennium

eggs-liquid grew during 1996–2004 and thereafter declined suddenly due to the outbreak of the bird flu in the country. Overall, the annual export of poultry products registered a remarkable increase (over 128 times) from US$ 679.67 million in TE 1984–1986 to US$ 87 874 million in BE 2008–2009 at current prices.

The SDI, as a measure of the export diversification, revealed that India's poultry export portfolio has widened due to the inclusion of the live turkey and turkey meat in the list of the exported products and the relative abundance of each of these items in the total poultry exports during the post-WTO period as compared to the period 1984–1995, during which the poultry products exports were moderately diversified as reflected by the relatively lower values of the SDI. During the triennium 1990–1992, the poultry export trade was more concentrated towards the hen-eggs-in shell. The SDI was lower for poultry exports during the TE 2005–2007 and the BE 2008–2009, as many of the importing countries imposed an import ban on Indian poultry products due to the reported incidences of the avian influenza (bird flu). The SDI for poultry exports ranged between 0.52 to 0.65 during 1996–1998 to 2008–2009.

International competitiveness

The international competitiveness of the Indian livestock products has already been established (Kumar et al. 2001, 2007; Birthal and Taneja 2006). During the recent years, India has been highly competitive in exports of the hen-eggs-in-shell, eggs-dried, eggs-liquid and live ducks as revealed by the high values of the RCA (greater than unity) or the positive RSCA (Table 4). However, in other poultry products such as the chicken meat, duck meat, turkey meat, live turkey and live chicken, the RCA has been less than unity (RSCA taking negative values), indicating that India has not been competitive to export these products.

Table 4. Comparative advantage indices of India's poultry products' exports

Periods/items		TE								BE
		1984–86	1987–89	1990–92	1993–95	1996–98	1999–01	2002–04	2005–07	2008–09
Chicken meat	RCA	0.06	0.03	0.03	0.02	0.00	0.00	0.08	0.02	0.03
	RSCA	–0.89	–0.95	–0.94	–0.96	–1.00	–0.99	–0.86	–0.97	–0.94
Duck meat	RCA	0.00	0.23	0.03	0.14	0.02	0.00	0.36	0.15	0.28
	RSCA	–1.00	–0.63	–0.94	–0.75	–0.97	–1.00	–0.47	–0.74	–0.56
Chicken canned	RCA	0.00	0.35	0.71	0.49	0.22	0.07	0.04	0.11	0.03
	RSCA	–1.00	–0.48	–0.17	–0.34	–0.63	–0.87	–0.93	–0.81	–0.94
Turkey meat	RCA	–	–	–	–	–	–	0.06	0.19	–
	RSCA	–	–	–	–	–	–	–0.88	–0.68	–
Hen eggs	RCA	3.06	3.25	5.83	6.13	5.62	6.80	6.57	2.57	6.32
	RSCA	0.51	0.53	0.71	0.72	0.70	0.74	0.74	0.44	0.73
Eggs dried	RCA	0.55	0.00	0.14	9.26	29.46	20.26	18.78	42.74	40.72
	RSCA	–0.29	–1.00	–0.75	0.81	0.93	0.91	0.90	0.95	0.95
Eggs liquid	RCA	0.00	0.80	0.17	0.49	10.12	19.07	13.93	0.44	0.55
	RSCA	–1.00	–0.11	–0.70	–0.34	0.82	0.90	0.87	–0.39	–0.29
Live chickens	RCA	2.64	2.70	0.40	0.52	0.20	0.21	0.14	0.03	0.01
	RSCA	0.45	0.46	–0.42	–0.31	–0.67	–0.66	–0.75	–0.94	–0.98
Live ducks	RCA	0.00	16.57	8.30	65.76	7.74	10.21	5.68	1.01	0.97
	RSCA	–1.00	0.89	0.78	0.97	0.77	0.82	0.70	0.01	–0.02
Live turkeys	RCA	–	–	–	–	–	–	0.00	0.12	0.17
	RSCA	–	–	–	–	–	–	–0.99	–0.79	–0.71
No. of items with positive RSCA & RCA > 1		2	3	2	3	4	4	4	3	2

TE = Triennium; BE = Biennium

Table 5. Producers' price for poultry eggs in increasing order

Country	Producers' price (US $/t)	Total egg production (1000 t)
Ecuador	76.7	88
Belarus	77.8	184
Croatia	147.9	47
Costa Rica	608.9	52
Lao People's Democratic Republic	697.9	15
India	723.8	3 060

Data Source: FAOSTAT database, data year 2008

The RCAs for the live chicken and live ducks have been continuously declining indicating their eroding competitiveness in international markets. Greater investments in the disease control and safe meat and egg production so as to adhere to the SPS standards of the WTO would help in the sustainable poultry products' export.

Potential export destinations for India's poultry products

The analysis to explore the potential export destinations for Indian poultry products was restricted to poultry meat and eggs, since the required information/data pertaining to various countries to carry out such an analysis was available only for these two items and as also the presence of India in the export market in items other than chicken eggs and meat is meagre.

Evidently, India ranked 6th but the lowest (Table 5) in the world in terms of the producers' price of poultry eggs. Therefore, India enjoyed a distinct advantage in the export market due to the fact that the countries having lower producers' prices than those in India are not the major producers of poultry eggs. Hence, it can be concluded that among the major producers (and hence exporters) of poultry eggs, India's cost of production of poultry eggs is actually the lowest in the world.

Table 6 indicates the countries which can be the possible lucrative destinations for the export of Indian hen-eggs-in-shell, based on the estimated net margins per the TEU container basis. The countries have been identified on the basis of their respective imports of poultry eggs in addition to the net margins which can be reaped by exporting a TEU reefer container load to the destination country. In addition to the cost factors, the SPS standards adopted by the importing countries also act as non-tariff barriers. Most European countries, Canada and Australia have stringent SPS linked tariff barriers to trade. However, no such stringent restriction could be observed for the African countries. Some of the important export destinations identified for the Indian hen-eggs-in-shell were Switzerland, Venezuela, Mongolia, Honduras, Nicaragua, Latvia, the Czech Republic, Singapore, Estonia, Hungary, Trinidad and Tobago, the Russian Federation and Canada providing a gross margin of about $14 721 to $75 666 per reefer container with a payload of about 20 t eggs (about 4.13 lakh eggs).

India has not been competitive with respect to chicken meat as reflected by its countrywise producers' prices (ranked 50th in the world). Therefore, India faced a stiff competition from the major exporting countries of chicken meat as listed in Table 7. The

Table 6. Export destinations for Indian hen-eggs-in-shell

Country	Indian hen-eggs-in-shell (HS Code 0407)	
	net margin/TEU (20 t payload) US $	total imports (t)
Switzerland	75 666	34 370
Venezuela	38 189	15 909
Mongolia	31 601	2 368
Honduras	39 024	3 342
Nicaragua	22 583	3 069
Latvia	19 878	3 808
Czech Republic	19 139	12 555
Singapore	18 581	69 127
Estonia	17 762	5 719
Hungary	17 548	13 396
Trinidad and Tobago	17 521	2 989
Russian Federation	17 004	9 926
Canada	14 721	24 933

Table 7. Producers' prices for chicken meat in increasing order

Major exporting countries	Producers' price (US $/t)
No major exporters	< 1000
USA, Uruguay	1000–1500
Denmark, Netherlands, Ireland, Korea, Brazil, Czech Republic, UK, Australia, Thailand, Belgium, Germany, Chile, Finland, Poland, Belarus	1500–1996
India	1996.60

Source: FAOSTAT database, data year 2008

Table 8. Export destinations for Indian chicken meat

Country	Chicken meat (HS Code 0408)	
	net margin/TEU (20 t payload) US $	total imports (t)
Congo	106 537	56 169
Cyprus	27 170	4 583
Panama	27 145	4 336
Saint Lucia	26 961	7 059
Armenia	26 703	36 044
Antigua and Barbuda	26 622	6 273
Switzerland	21 011	35 072
Indonesia	17 936	5 294
Albania	13 417	18 412
Cape Verde	13 109	5 889
Georgia	12 995	36 012
Suriname	11 785	13 442
Russian Federation	5 711	1 139 100

countries having higher producers' prices than those in India were not considered as competitors in international market for obvious reasons.

Table 8 presents the possible export destinations identified for Indian chicken meat on the basis of the estimated net margins per TEU reefer container and the quantity of imports by the respective countries. Stringent SPS trade barriers have been imposed by the European Union, Canada, Australia and the Russian Federation, whereas African countries constituted better trade destinations for exporting the Indian chicken meat. Some of the important possible destinations for chicken meat exports were Congo, Cyprus, Panama, Saint Lucia, Armenia, Antigua and Barbuda, Switzerland, Indonesia, Albania, Cape Verde, Georgia, Suriname and the Russian, Federation providing a net margin ranging from $5711 to over $106 500 per TEU reefer container with 20 t payload.

CONCLUSION

The prominent items making place in the exports basket of poultry products baskets in the post-WTO period were the eggs-liquid followed by the chicken meat, egg-dried, duck meat, hen-egg-in-shell and chicken canned. However, exports of almost all the poultry products became more volatile during the post-WTO period as reflected by the respective higher CV% values during the period as compared to those in the pre-WTO period mainly due to the frequent outbreaks of the AI resulting in distortions in the traditional routes of poultry trade. Further, the exports of poultry eggs in the form of hen-eggs-in-shell and eggs-dried exhibited a positive growth throughout the data period whereas eggs-liquid showing a high growth during the pre-WTO period registered a negative growth during the post-WTO period. Similarly, the exports of chicken meat and duck meat plummeted owing to the frequent outbreaks of the AI in the country during the post-WTO period.

The study also revealed that India has been highly competitive with respect to the exports of the hen-eggs-in-shell, eggs-dried, and eggs-liquid as revealed by high values of the RCA (greater than unity) or positive RSCA. Therefore, cashing on the competitiveness of poultry products in the international market would help improving India's export performance. With a better access to the international markets post-WTO, the exports of Indian poultry products could be increased substantially with greater investments in the disease control, the application of safer production techniques and the quality control conforming to the international standards. The poultry entrepreneurs may be educated to channelize their exports to the countries as suggested in the study; offering better margins and not having so stringent non-tariff or technical barriers to trade.

REFERENCES

Balassa B. (1965): Trade liberalization and revealed comparative advantage. Manchester School of Economics and Social Studies, *33*: 99–124.

Bardhan D. (2007): India's trade performance in livestock and livestock products. Indian Journal of Agricultural Economics, *62*: 411–25.

Birthal P.S., Taneja V.K. (2006): Livestock sector in India: Opportunities and challenges for smallholder. In: Proceedings of an ICAR-ILRI International Workshop, National Centre for Agricultural Economics and Policy Research, New Delhi, India and International Livestock Research Institute, Nairobi.

FAOSTAT database. Available at http://faostat.fao.org

Fugazza M. (2004): Export performance and its determinants: Supply and demand constraints. In: Proceeding of United Nations Conference on Trade and Development, Geneva, Switzerland.

Hodrick Prescott Filter. Available at http://faostat.fao.org/site/535/default.aspx#ancor

James W.E., Naya S., Meir G.M. (1987): Asian Development: Economic Success and Policy Lessons. University of Wisconsin, Madison.

Jha B. (2000): Towards measuring comparative advantage of agricultural commodities in India. Agricultural Economics Research Review, *13*: 159–168.

Kumar A., Ali J., Singh H. (2001): Trade in livestock products in India: trends, performance and competitiveness. Indian Journal of Agricultural Economics, *56*: 653–567.

Kumar A., Stall S.J., Singh N.P., Singh D.K. (2007): Livestock sector trade of India: Surging momentum in the new liberalized regime. Indian Journal of Agricultural Economics, *62*: 395–410.

Kumar N.R. (2008): Export of cucumber and gherkin from India: performance, destinations, competitiveness and determinants. Agricultural Economics Research Review, *21*: 130–138.

Laursen K. (1998): Revealed Comparative Advantage and the Alternatives as Measures of International Specialisation. DRUID Working Paper No. 98-30. Copenhagen Business School, Copenhagen.

NSSO (1997): Consumption of Some Important Commodities in India, 1993–94. Report No. 404. Ministry of Statistics and Programme Implementation, Government of India, New Delhi.

NSSO (2001): Consumption of Some Important Commodities in India, 1999–2000. Report No. 461. Ministry of Statistics and Programme Implementation, Government of India, New Delhi.

NSSO (2007): Consumption of Some Important Commodities in India, 2004–05. Report No. 509. Ministry of Statistics and Programme Implementation, Government of India, New Delhi.

Simpson Diversity Index. Available at en.wikipedia.org/wiki/Diversity_index

http://tariffdata.wto.org/ReportersAndProducts.aspx

http://faostat.fao.org/site/703/default.aspx#ancor

en.wikipedia.org/wiki/Hodrick%E2%80%93Prescott_filter

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