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External Trade Performance of Indian Soymeal-A Protein Supplement of Animal Feed

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Abstract

The soymeal is rich in protein (about 48-50%) and low in fiber and the end users are live stocks, poultry, aqua and shrimp culture. Soybean meal competes with meals of rape/canola, sunflower, palm kernel as vegetable products and fish, meat and bone meal in animal protein. 82% of worlds' soymeal production is concentrated in US, Brazil, Argentina, China, India and Paraguay. India ranks near fourth position contributing 4 per cent of total soymeal production which was about 5 to 9 million metric tons. India is moderately competitive exporter (more than 0.5 RCA) of soybean meal in world market. Nearer to one Hirschman's Index and more than 0.5 Balassa RCA Index indicated that soymeal export from India is moderately competitive and oilseed meal export is highly concentrated and dependent on soymeal export. Soymeal export is exposed to international trade risk due to costlier free on board price. Nepal, Belgium, Korea, Iran, Japan, Sri- Lanka and Bangladesh together contribute more than 60 per cent to India's total soymeal turnover.

Key words : *Soymeal export , Balassa RCA Index, international trade risk turnover.*

Introduction

Foreign Agricultural Service, USDA, in 2 December 2021, Global Market Analysis, reported that global protein meal output is projected to expand by 1.4% p.a., reaching 403 MT by 2029. World production of protein meals is dominated by soybean meal, which accounts for more than two-thirds of world protein meal production. Production is concentrated in a small group of countries. Argentina, Brazil, China, the European Union, India, and the United States are projected to account for 73% of global production by 2029. In China and the European Union, most protein meal production comes from crushing of imported oilseeds, primarily soybeans from Brazil and the United States. In the other important producing countries, domestically produced soybeans and other oilseeds are the dominant raw material. Nine oilseed crops including seven edible oilseeds i.e. Groundnut, Rapeseed/ Mustard, Soybean, Sunflower, Sesame, Safflower, Niger and two non-edible oilseeds Castor and Linseed grow in assorted agroecological conditions in India as per Ministry of Agriculture. The groundnut, mustard and soybean comprise 80% of aggregated cultivated oilseed out of which Soybean is contributing nearly 30% of the total production. The crushing of soy seed results in Soybean oil (18% by weight) and Soy Meal (residue after oil extraction) / De Oiled Cake (DOC) (80% by weight) by economical solvent extraction method rather than traditional pressing method. The soybean meal is rich in protein (about 48-50%) and low in fiber and the end users are live stocks, poultry, aqua and shrimp culture. Soybean meal competes with meals of rape/canola, sunflower, palm kernel as vegetable products and fish, meat and bone meal in animal protein. (Source: Soymeal, Soybean Processors Association of India, Indore).

Materials and Methods

The study was based the secondary data availed from different sources like United States Department of Agriculture Foreign Agricultural Service PSD database, "Market Monitor" Agricultural Market Information System (AMIS), FAO, Directorate General of Commerce, Industries and Statistics, Kolkata (India), AGMARKNET, Index Mundi and SOPA for the period from 2005-2006 to 2019-2020. Different statistical tools were used to analyse the data.

Revealed comparative advantage (RCA) : To study the India's soymeal export potential and to gauge direction of soymeal external trade, the RCA index was used. The Balassa RCA index was calculated by using the formula :

$$RCAj \quad \frac{\frac{Xij}{iXij}}{\frac{jXij}{i\ jxij}}$$

where,

Xi j : the exports of sector "i" of country " j";

i Xij is the total exports of country " j";

j Xij is the world exports of sector "i"; and

i j Xij is the total "world" export.

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Export diversification index : The export diversification (DX) index for a country is defined as :

$$DXj \quad \frac{i|hij \quad hi|}{2}$$

Where, hij: share of commodity "i" in the total exports of country " j".

hi : the share of the commodity in world exports

Export concentration index or Hirschman (H) index : was used to analyze the concentration of soymeal export.

$$Hj \quad \sqrt{(\ (Xi / x)^2)}$$

Where

Xi : value of product i's export and X is value of total exports of country.

Major export category (MEC) : MEC identifies a product category "i" that accounts for 50 per cent or more of total export and in this way dominates country j's exports. For each exporting product "i" a share in total countries " j" exports are calculated and ranked. If there is a single product with a share of 50 per cent or higher, a country is deemed to be too dependent on one product category for its exports.

$$MXi \quad \frac{xij}{{}_{i\ 1}^{n} Xij} \quad 100$$

Where, *xij* is value of product "i" exports of country "j" and ${}_{i}Xij$ is value of total exports of country "j".

If no single category accounts for 50% or more of total exports, the economy is classified as diversified. Identification of dominating products in a country's trade is valuable 'back of the envelope' result for both trade policy and adjustment management.

Results and Discussion

Export competitiveness of soybean meal : The RCA measure explains countries competitiveness and also elucidates in more accurate how a country features in the context of world trade. RCA of the soybean meal has shown a revealed comparative advantage during the study period of 2006 to 2020. All the values, are more than 0.5, indicate that India is a moderate net exporter of soybean meal for the period of 2008-2009 to 2018- 2019, except in year 2007, 2016 and 2020, India was less competitive in worlds oilseed meal export. The value of index of trade concentration (Hirschman index) was closer to one for the period of 2008-2009 to 2018- 2019 with exception of 2015-16 and 2019-20 , which indicates a high concentrated trade structure of Indian soymeal in total oil meal sector. The index of trade concentration or Hirschman index indicates that the soybean meal shows higher concentration throughout the 15 years; higher concentration increases the impact of international trade risk due to the possibility of price fluctuations in the international market. Major export category per cent accounts above 50 per cent indicate that India deemed to be too dependent on soybean meal for export of oilseed meal.

Country wise soymeal export from India : India exports soy meal to over 65 countries. The country wise data on export of soymeal from India from the year 2005-2006 to 2019-20 have been collected and shares of selective top 16 countries in import from India were calculated and are shown in Table-2. The export from India has declined tremendously over the period from 50.462 lakh ton in 2005-06 to 8.962 Lakh ton in 2019-20. In 2006-2007, Vietnam was the important destination for Indian soymeal whose share in India's total soymeal export was 20.53 followed by Indonesia (12.03 per cent). Both along with Japan, Singapore and Korea contributed about 57 per cent of total exported soymeal from India. Over the period of 15 years, the import of Vietnam declined drastically from 20 per cent to 0.22 per cent of the India's total export of soymeal in the year 2019-20. While impressive growth was observed in the imports of Nepal and Iran. The per cent share of imports by Nepal and Iran to India's export was 9.39 and 10.57, respectively.

From the Table-2, it was noticed that from 2014-15 onwards, the traditional soymeal importers were now having lesser contribution in import of the soymeal from India. While the earlier minor importers like Iran, Nepal and Belgium are becoming major importer. Japan inherently is considered to be one of the largest markets for non-GMO soybean meal. Recently, Nepal, Belgium and Iran are emerged as promising markets who are also looking for the quality aspects such non GMO and Hi-protein soymeal.

Changes in country wise soymeal export turn over : The country wise data on soymeal export turnover of India have been collected and shares of selective top 16 countries there in were calculated and are shown in Table3. The overall turn over from soymeal export from India found to be depleted from 34358 million rupees to 16952 million rupees. The contribution in India's total turnover of the traditional importers *viz*; Indonesia, Korea, Bangladesh, has increased in 2019-20 over 2014-15. The per cent contribution increase of these countries indicates that they are the important value providers for Indian soymeal.

Nepal and Belgium contributed more than 36 per cent share in total value of India's turn over in 2019-20. Korea and Iran together contributed 15 per cent to the total turnover, while Japan, Sri- Lanka and Bangladesh

Table-1 : Revealed comparative advantage (RCA), Export diversification and major export category for Indian soybean meal.

Year	Worlds total oilseed meal export (million dollar)	Worlds soymeal export in (million dollar)	India's total oilseed meal export in (million dollar)	India's soymeal meal export in (million dollar)	RCA	Export Divers. Index	MEC %	Hirschman (H) index
2006	11286.41	10306.96	1198.48	763.52	0.70	0.14	63.71	0.64
2007	19177.06	17341.53	2611.84	1050.01	0.44	0.25	40.20	0.40
2008	17832.05	16361.40	2021.16	1748.82	0.94	0.03	86.53	0.87
2009	16771.41	15263.84	1419.68	1150.84	0.89	0.05	81.06	0.81
2010	21409.80	18793.21	2406.00	1366.41	0.65	0.15	56.79	0.57
2011	24784.66	21273.81	2470.39	1762.98	0.83	0.07	71.36	0.71
2012	27027.38	23645.70	2980.17	1730.67	0.66	0.15	58.07	0.58
2013	28935.85	25218.54	2392.74	2275.09	1.09	0.04	95.08	0.95
2014	22686.64	19687.75	905.11	799.94	1.02	0.01	88.38	0.88
2015	20549.13	18155.25	341.85	215.42	0.71	0.13	63.02	0.63
2016	20422.50	17765.15	800.38	190.44	0.27	0.32	23.79	0.24
2017	21552.96	18447.86	935.42	584.39	0.73	0.12	62.47	0.62
2018	20689.84	17443.02	960.85	533.50	0.66	0.14	55.52	0.56
2019	20422.99	16653.45	542.47	367.18	0.83	0.07	67.69	0.68
2020	27362.02	22277.81	1242.74	744.80	0.74	0.11	59.93	0.60

Source: fas.usda.gov/gats/ psd database and http://www.dgciskol.gov.in/

Table-2 : Country wise export of soybean meal from India (2005-2006 to 2019-2020). **(Quantity in Lakh Ton)**

Year	2005-06		2009-10		2014-15		2019-20	
Country	Qty	Per cent	Qty	Per cent	Qty	Per cent	Qty	Per cent
Vietnam	10.36	20.53	8.62	24.41	0.15	0.47	0.02	0.22
Indonesia	6.07	12.03	2.79	7.91	0.07	0.22	0.09	1.03
Japan	4.69	9.29	8.77	24.83	0.40	1.24	0.18	2.06
Singapore	4.17	8.27	0.30	0.85	0.04	0.12	0.01	0.09
Korea	3.53	7.00	1.15	3.26	0.16	0.49	0.31	3.49
China	2.78	5.51	2.15	6.09	0.20	0.61	0.09	1.02
Pakistan	2.77	5.49	0.83	2.36	1.35	4.16	0.00	0.00
Thailand	2.39	4.73	1.74	4.92	0.04	0.12	0.03	0.30
Bangladesh	1.08	2.14	0.67	1.90	0.12	0.37	0.17	1.89
Sri Lanka	0.64	1.27	0.71	2.00	0.37	1.14	0.22	2.40
Taiwan	0.53	1.04	0.36	1.02	0.03	0.09	0.02	0.22
Malaysia	0.40	0.79	0.66	1.86	0.03	0.09	0.01	0.12
Kuwait	0.34	0.68	0.61	1.74	0.36	1.09	0.06	0.68
Nepal	0.19	0.37	0.02	0.05	0.47	1.44	0.84	9.39
Belgium	0.00	0.00	0.66	1.86	0.00	0.00	0.38	4.28
Iran	0.01	0.03	0.47	1.33	0.94	2.89	0.95	10.57
Others	10.51	20.82	4.82	13.64	27.80	85.45	5.58	62.23
India	50.46	100.00	35.31	100.00	32.53	100.00	8.96	100.00

Source: http://www.dgciskol.gov.in/

contributed to the tune of 13 per cent to the total turnover in 2019-20. More than 60 per cent share in total turnover of Nepal, Belgium Korea, Iran, Japan, Sri- Lanka and Bangladesh indicated that these countries are promising and leading destinations for the Indian soymeal export and the efforts should be diverted to export more quantity to these countries through canvassing the importers (traders) on quality aspects *viz*; non GMO and Hipro protein of Indian soymeal.

Soybean Extraction in India : The global productivity of soybean is 25-30 Q/ha while that in India is about to 8 to 13 Q/ha.

The productivity of soybean is 32 to 60 per cent less than the world's productivity which indicates that the production potential of soybean is not explored to fullest by Indian farmers. During the period of 2006-07 to 2019-20, soybean production of world and India varied

Table-3 : Country wise soymeal export turnover of India (2005-2006 to 2019-2020). (Turnover in Million ₹)

Year	2005-06		2009-10		2014-15		2019-20	
Country	Turnover	Per cent	Turnover	Per cent	Turnover	Per cent	Turnover	Per cent
Vietnam	7639	22.23	15714	25.25	542	2.51	69	0.41
Indonesia	5333	15.52	5032	8.08	288	1.33	355	2.09
Japan	4354	12.67	15204	24.43	1581	7.33	782	4.62
Singapore	1997	5.81	547	0.88	126	0.58	31	0.18
Korea	3320	9.66	2257	3.63	672	3.12	1296	7.64
China	2503	7.29	3941	6.33	804	3.73	400	2.36
Pakistan	2442	7.11	1494	2.40	4219	19.56	0	0.00
Thailand	2269	6.61	3389	5.44	143	0.66	159	0.94
Bangladesh	1047	3.05	1185	1.90	381	1.76	603	3.56
Sri Lanka	663	1.93	1358	2.18	1278	5.92	839	4.95
Taiwan	517	1.50	650	1.04	116	0.54	94	0.55
Malaysia	387	1.13	298	0.48	126	0.58	50	0.29
Kuwait	333	0.97	1127	1.81	1117	5.18	219	1.29
Nepal	145	0.42	22	0.04	1489	6.90	3124	18.43
Belgium	13	0.04	855	1.37	2944	13.65	3125	18.44
Iran	234	0.68	1173	1.89	5.00	0.02	1262	7.44
others	1396	4.06	7995	12.84	5742	26.62	4544	26.81
India	34358	100.00	62240	100.00	21572	100.00	16952	100.00

Source: http://www.dgciskol.gov.in/

Table-4 : Global and Indian Production, Productivity and Yearly Crushing of soybean.

Year	World		India		Soybean Crushed (MMT)	Extraction Produced (MMT)	Oil Produced (MMT)
	Productivity (Kg/ha)	Production (MMT)	Productivity (Kg/ha)	Production (MMT)			
2005-06	2127	220.81	1073	6.876	6.388	5.238	1.149
2006-07	2190	236.24	1063	8.273	7.287	5.976	1.312
2007-08	2040	218.96	1235	8.885	9.193	7.538	1.655
2008-09	2051	212.03	1041	10.968	7.708	6.320	1.387
2009-10	2255	260.49	1024	9.905	7.502	6.152	1.35
2010-11	2253	264.74	1326	9.965	10.155	8.327	1.828
2011-12	2086	240.81	1208	12.734	10.516	8.623	1.893
2012-13	2244	268.96	1353	12.214	10.121	8.299	1.822
2013-14	2248	283.20	1012	14.666	8.126	6.664	1.462
2014-15	2405	320.73	951	11.861	6.800	5.576	1.224
2015-16	2291	315.42	738	10.374	5.750	4.715	1.035
2016-17	2564	350.18	1177	13.159	8.550	6.977	1.573
2017-18	2359	344.18	1058	10.933	8.300	6.723	1.577
2018-19	2481	361.28	1192	13.268	9.37	6.611	1.686
2019-20	2432	339.42	921	11.226	8.30	6.131	1.576

Source: fas.usda.gov/gats/ and Soybean Processors Association of India (SOPA).

from 220 to 265 million metric tons and 7 to 14 Million metric tons. In India, in spite of increasing hectares under soybean, its production has not increased significantly over the years because of the lesser productivity, which is leading to the inadequate supply of soybean to processors. With the available low supply of soybean the Indian oil extraction plants capacity utilization is only 18 to 20 per cent of their installed capacity producing about 5 to 8 million metric ton soybean meal per year. The increased cost of soybean processing due to low capacity utilization of extraction plant and souring soybean prices due to less supply in Indian market are increasing the cost of soybean meal, pushing it to the disadvantage of loss in export share in world market.

Cost and Price trends of soybean in India : Considering the low supply and high demand for soybean from processors, the market price and MSP are compared and presented in Table-5. The Minimum Selling Price (MSP) of soybean has been increased threefold in Indian rupees from ₹ 1010 per quintal to ₹ 3710 per quintal in the study period, which is one of the influencing factors in the growth in the production of soya seeds.

Table-5 : Variation in Minimum support price, Market price of Soybean & International Price of soybean meal. (In ₹ quintal^{-1})

Year	Soybean			Soybean meal	
	Domestic Market price	Minimum support Price	International Market price	International market price	FOB price
2005-06	2089	1010	1254	748	908
2006-07	2053	1020	1183	779	1093
2007-08	2061	1050	1118	1144	1529
2008-09	2120	1390	1908	1344	1756
2009-10	2162	1390	2443	1356	1845
2010-11	2168	1440	1936	1464	1847
2011-12	2186	1690	2390	2262	2617
2012-13	2262	2240	3130	2410	2544
2013-14	2337	2560	2722	3021	2736
2014-15	2408	2560	3711	2363	2852
2015-16	2457	2600	3218	2245	2756
2016-17	2499	2775	2638	2134	2540
2017-18	2510	3050	2904	2523	2447
2018-19	2543	3399	2653	2149	2474
2019-20	2583	3710	2817	2152	2322

Source : Director of Economics and Statistics, DOA&FW, Government of India, Soybean Processors Association of India (SOPA), Index Mundi.

In last few years from 2014-15, the MSP is either ruling over the international price of soy meal or close to the globally traded level soybean price. The market price of soybean in Indian market was ranging between ₹ 2100 to ₹ 2500 per quintal. From 2012-13 onwards the market prices were less than MSP. This indicates that India is out priced in the domestic as well as global market in case of soybean meal which is derived from processing soy seeds and there was no crushing parity for the processors due to the higher price of soybean in the domestic market and low realization for oil and meal.

Policy Initiatives : As many countries have instituted a general ban on GM crop cultivation and imports and looking for non GMO product, therefore an attempt was made to collect the policy initiatives made by different countries.

Policy initiatives 2017 : Argentina authorized cultivation of a new genetically-modified soybean seed resistant to herbicides other than glyphosate (Source: https://www.reuters.com)

Policy initiatives 2018 : The European Commission authorized five new varieties of genetically-modified oilseeds for ten years, including four soybean and one rapeseed varieties. All derived products will be subject to EU labelling and traceability rules.

Argentina approved the commercialization of one GM soybean variety from Bayer SA (Resolution No. 27/2018, Source: AMIS, FAO).

Brazil approved two new GM soybean varieties for commercialization from Du Pont and Monsanto.

Policy initiatives 2020 : China's agriculture ministry issued safety certificates for two new varieties of GM soybean and also renewed safety certificates for six other GM crops for import - for 5 maize varieties and another soybean.

Amidst of these policy intervention by the above mentioned countries, the major soybean export players are switching to GM soybean cultivation for the bulk production of soybean to capture the world market. In India, the soybean production is characterised by non GMO varieties under cultivation and India is seldom recognized for non GMO soybean production. The collective institutional efforts are needed to increase production and productivity potentials also crushing and price parity which will lead India to win the lost market and to capture the new export destinations for non GMO soybean meal.

Conclusions

The major soybean export players are switching to GM soybean cultivation for the bulk production of soybean to capture the world market. In India, the soybean production is characterised by non GMO varieties under cultivation and India is seldom recognized for non GMO soybean production. Nearer to one Hirschman's Index and more than 0.5 Balassa RCA Index indicated that soymeal export from India is moderately competitive and oilseed meal export is highly concentrated and dependent on soymeal export. Soymeal export is exposed to international trade risk due to costlier free on board price. Nepal, Belgium, Korea, Iran, Japan, Sri- Lanka and Bangladesh together contribute more than 60 per cent to India's total soymeal

turnover. It is therefore recommended to develop a strong value chain based on quality parameters i.e. non GMO and Hi-pro quality by relating and coordinating the soybean producers, processors, exporters and importers through FPOs and public private partnership project and to increase the soybean meal export towards traditional importers *viz*; Belgium, Korea, Japan as well as new promising buyers *viz*; Nepal, Iran which are maximum value providers for non GMO and Hi-pro quality soybean meal.

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