Original Research Article

India's export performances of animal products under new Food Safety Law Regime

Abstract: The study attempts an appraisal of the effectiveness of India's new food safety regulation on animal products exported to various countries. The study is based on data on quantity of exports of different animal products exported from India collected for period 2005-06 to 2016-17. The variability in the export of animal products was analyzed using the coefficients of variation. The variability and other measures in exports (quantity) of animal products were compared for two data periods, *viz*., pre-FSS Regime (2005-06 to 2010-2011) and post-FSS Regime (2011-12 to 2016-17) to assess the implications India's new food safety law i.e., *Food Safety and Standard Act*, on the exports of animal products. The result shows that most of the animal products, except sheep and goat meat, animal casing and caseins, exported from India were stable as CV values significantly decreased during Post-FSS Regime as compared to Pre-FSS Regime. It indicates that new food safety law (FSS Act) of India addressed the food safety issue in sequence of the global demand. The country wise quantity and variability in export of animal products were analyzed and found that natural honey, caseins, buffalo meat and poultry products were main animal products exported to USA as indicated higher mean value. On the other hand, same animal products were also prime products exported to EU except buffalo meat. Similarly, export of buffalo meat, poultry products and natural honey exported to USA were higher in post-FSS regime in comparison to pre-FSS regime as significant increase in mean value of said products during post-FSS regime. However, export quantity of sheep& goat meat, dairy products, caseins exported to USA decrease drastically in post-FSS regime. Contrary, quantities of all animal products exported from India to EU were decreased in post-FSS regime. Further, variability in India's export of animal products were stable only for buffalo meat, natural honey for USA and buffalo meat, poultry products exported to EU as lower CV value in post-FSS regime. Rest products were instable during post-FSS regime for both USA and EU. The evidence indicates that strengthening domestic market for the food safety standards is important prior to expecting the markets' supply chain to adapt to international standards of the food safety. The study found that imposing new food safety standards by India tend to have a positive impact on export of animal products. But food safety standard still a trade barrier for developing countries like India.

Keywords: Animal, Export, Food safety, food law, SPS.

Introduction:

Over the past three decades, there has been a notable composition shift in world food trade. The relative importance of "classical" food products, such as coffee, tea, sugar, and cocoa, has been eroded and replaced by the processed food trade particularly animal products. An increase in world demand for animal food products has been associated with evidence of diet upgrades. Changes in internationalization of food habits have been shaped mainly by rising incomes, growing health consciousness, and urbanization. Factors such as international migration, communication revolutions, and international tourism also contribute to the diet upgrades. In addition, declines in tariff and

nontariff barriers, through many rounds of international negotiations both in developed and developing countries have facilitated the expansion of processed food trade including animal food products (JuthathipJongwanich, 2009).

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. 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, the 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. (Anjani Kumar, 2010).

The WTO deals with the rules for international trade; its Sanitary and Phyto-Sanitary (SPS) and Technical Barriers to Trade(TBT) Agreements set out the framework in which international standards are applied by governments to ensure the safety and quality of internationally traded food products. It is important to note that the SPS Agreement does not prescribe a specific set of health and food safety policies that governments should adopt.However, the institutional framework, the system that governs the development and application of international food safety standards is based on the Joint FAO/WHO Food Standards Programme – the Codex Alimentarius Commission – and the WTO.

In the light of global perspective of food safety, India has initiated some degree of long-term national strategies to establish its food safety control system as Food Safety and Standards Act, 2006 come enforce on 05th August 2011. However, there are issues and challenges for India in improving the overall food security of the population and the food trade within as well as outside the country(Jairath, M.S. and Purohit,P., 2013). This paper, therefore, aims to examine the impact of India's food safety legislationon global food trade patterns, particularly exports of animal products.Further, we attempt an evaluation of food safety system of India to gauge its effectiveness and response to the global agri-business.

Material and Methods:

The study is based on data on quantity of exports of different animal products for India collected from Directorate General of Commercial Intelligence and Statistics (DGCI&S, Kolkata)/ Agricultural and Processed Food Products Export Development Authority (APEDA),New Delhi for period 2005-06 to 2016-17. The variability in the export of animal products was analyzed using the coefficients of variation (CV%). The variability and others measures in exports (quantity) of animal products were compared for two data periods, *viz*., pre-FSS Regime (2005-06 to 2010-2011) and post-FSS Regime (2011-12 to 2016-17) to assess the implications of the country's "One Nation One Food Law", i. e., Food Safety and Standard Act and its rules & Regulations (FSS Regime) on the exports of animal products, since the Food Safety and Standard legislations came into force in India during 2011.

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 yt is composed of a trend component τt and a cyclic component ct , then

$$Y_t = t + c_t \quad \text{.....(1)}$$

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.

$$\sum(y_\tau - t_\tau)^2 + \lambda \sum [(t_{\tau+1} - t_\tau) - (t_\tau - t_{\tau-1})]^2 \quad \text{.....(2)}$$

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 λ = 0, the series τ becomes the original series 'y'.

Results:

Variability in India's poultry products export:

Variability in export of poultry products were analyses using by *Coefficient of Variance* (CV). The results stipulated in table 1 shows that most of the animal products, except sheep and goat meat, animal casing and caseins, exported from India were stable as CV values significantly decreased during Post-FSS Regime as compared to Pre-FSS Regime. It indicates that Nation's food law (FSS Act) addressed the food safety issue in sequence of the global demand.

Table 1.Variability in India's export (quantity) of Animal products.

Data period/ Animal Products	**Overall data period** (2005-06 to 2016-17)		**Pre-FSS Regime** (2005-06 to 2010-11)		**Post-FSS Regime** (2011-12 to 2016-17)	
	Mean (MT)	**CV (%)**	**Mean (MT)**	**CV (%)**	**Mean (MT)**	**CV (%)**
Buffalomeat	899065.06	46.87	521007.12	19.55	1277123.01	15.10
Sheep & Goat meat	19617.42	69.38	20589.21	94.63	18645.63	27.17
Other meat	634.92	93.34	1094.21	45.59	175.63	75.53
Processed meat	532.38	44.50	616.75	37.52	448.01	51.32
Animal casing	1798.41	56.14	1205.61	81.52	2391.21	27.52
Poultry products	762233.57	40.62	973726.05	31.71	550741.10	16.47
Dairy products	53163.53	39.61	55383.54	33.15	50499.51	51.30
Natural honey	23756.08	46.34	15335.61	39.23	32176.54	24.11
Caseins	6118.20	79.40	4545.21	111.01	7691.19	58.89
Albumins (Eggs & Milks)	1193.81	66.64	569.96	110.18	1817.66	13.92

However, export of sheep and goat meat export were more volatile during Post-FSS Regime as compared to Pre-FSS Regime as reflected by high CV per cent. It was observed that sheep and goat meat industry still fall in unorganized category and therefore, policy intervention are required to shift the meat industry towards more organized.

Comparison of India's new food safety law and food safety law prevailed in developed countries:
(United State of America-USA and European Union-EU)

The food safety regulations of USA, EU and India were compared and presented in table 2.

Table 2.Comparison of food safety laws prevailed in EU, USA and India.

S. No.	Dimension	Countries		
		EU	USA	India
1	Relevant food laws & its time period	Regulation (Reg.) EC NO. 178/2002. It gave the general food law and creation of European Food safety Authority (EFSA). It is an independent agency whose job is to do risk assessment. European institutes and member states are responsible for risk management. Reg. EC No. 852/2004 and EC No. 853/2004 laws gave safety foods as top priority and give the HCCP guide lines to be followed.	Federal Food, Drug & Cosmetic Act, 1938 as amended (21 USC.301-392). 2. Food Drug & Administration (FDA) is responsible for formulating rules and regulatory policies. 3. Seafood Rules, 1995. (HACCP introduced) 34. Public Health Security and Bioterrorism Preparedness and Response Act of 2002. 5. The New FDA (Food Safety Modernization Act), (FSMA 2011).	Food Safety and Standards Act received the assent of the President on 23rd August, 2006 and came into effect on 5th August, 2011. It is a comprehensive legislation for the sector and subsumes the then existing acts and standards like Prevention of Food Adulteration Act(PFA) of 1954 ,Fruit Products Order of 1955, Meat Food Products Order of 1973, Vegetable Oil Products (Control) Order of 1947, Edible Oils Packaging (Regulation)Order of 1988, Solvent Extracted Oil, De- Oiled Meal and Edible Flour (Control) Order of 1967, Milk and Milk Products Order of 1992 and also any order issued under the Essential Commodities Act, 1955 relating to food .
2	Purpose of law	A great level of protection of human life and health. Protection of the consumer and free the movement of goods within the EU.	Food safety, consistent food supply, security reasons. In case of FSMA, 2011 the purpose is to ensure safe food supply by way of rigorous preventative controls.	Endeavour to achieve an appropriate level of protection of human life and health and the protection of consumer's interests, including fair practices in all kinds of food trade with reference to food safety standards and practices
3	Responsibility to oversee that the laws are complied with	The food business importer gets the responsibility for food safety.	Food business operator gets the primary responsibility for food safety.	Every food business operator shall ensure that the articles of food satisfy the requirements of this Act and the rules and regulations made thereunder at all stages of production, processing, import, distribution and sale within the businesses under his control.
4	Import procedure	EU has a well developed Border inspection system along with Documentary, identity and physical check. A system of RASSF to disseminate information when a member state comes across a problem with a consignment.	At the arrival of the cargo, the importer gives notice to the US customs about the cargoes arrival. Documentary check is done followed by a physical examination, if required. Samples are collected, if the samples comply with the regulations it is passed otherwise detained and sent back. Sometimes the product may be subjected to detention without physical examination (DWPE) until shipper/importer proves	Step 1: Custom Clearance ,Step 2: Applying FSSAI Clearance, Step 3: Consignment Inspection &Sampling, Step 4: Food Product approval

			that the product meets the FDA norms.	
5	Checks at border	Checks at the Border Inspection Posts (BIP). Consignment is checked with respect to documentary check, identity check, and the physical check.	Consignments are checked at the border with risk assessment procedures.	1. The physical condition of the consignment for visible insects and fungal infestation. 2. The valid remaining shelf life of the product is more than the 60% of its original shelf life at the time of import clearance. 3. Compliance with the FSS (Packaging &Labelling) Regulations, 2011. The product-specific labeling requirements. 4. Rectification of labeling deficiencies, namely 5. Name and address of the importer 6. FSSAI logo and license number 7. Veg / Non-Veg Symbol.
6	Punitive action to ensure compliance.	Refuse entry, sent back to the country of origin, black listing of the company or even incineration of the product when the product has not complied with the regulations.	Refuse entry in the market. Or withdraw from market if not safe.	On receipt of non-conformance report, the remaining parts of the sample shall not be released to the Food Importer or his Custom House Agent and the same shall be retained in the safe custody of the Authorised Officer for a period of thirty days
7	Traceability systems	Article 18 of EC regulation 178/2002. Mandate of full traceability from farm to table.	Traceability for the first time was introduced at the most basic level in 2003, (not as EU implements as in 'farm to table' approach). All steps regarding traceability requirement has been set in the FSMA Act, 2011. Detailed regulations are yet to be made.	Govern under Food Safety and Standards (Food Recall Procedure) Regulations, 2017
8	Precautionary Principle	The principle has been well practiced Under the EU regulations	The Principle has not been put into practice but in the FSMA Act 2011 it has a prominent role.	Section 16(2)(c), of the FSS Act, 2006 provides for the mechanism for accreditation of certification bodies for Food Safety Management Systems. The Key elements of any FSMS are: Good Practices/ PRPs, Hazard Analysis /HACCP, Management Element / System, Statutory and regulatory requirements, Communication

130

131

It is obvious from the table that India has harmonized it's its food safety law in the line of globally accepted standard. All are dimensions of India's food safety law almost similar to developed countries like USA, EU. However, import procedure/ border check in the developed countries have make differences and restricts the import of animal products exported from the India in its geographical boundaries.

Quantity and variability in India's export of animal products exported to developed countries (USA and EU):

In the global trade of livestock, India is still a very small player. But being one of the largest producers of most of the livestock production, India has the potential to significantly increase and expand the export of livestock export particularly in USA and EU. Food safety norms are one of the major trade barriers that are effect the export potential of the countries. in the light of globally accepted food safety norms, India adopted a new harmonized food safety law to protect the consumers and food industry. Therefore, comparison (pre and post FSS regime) of quantity exported and variability in export were analyzed and presented in table 3.

Table 3.Quantity andvariability of animal products exported to USA and EU from India.

Data period/ Animal Products	**Pre-FSS Regime** (2005-06 to 2010-11)				**Post-FSS Regime** (2011-12 to 2016-17)			
	USA		**EU**		**USA**		**EU**	
	Mean (MT)	**CV (%)**	**Mean (MT)**	**CV (%)**	**Mean (MT)**	**CV (%)**	**Mean (MT)**	**CV (%)**
Buffalo meat	60.85	164	2424.41	135	1629.20	62	41	50
Sheep & Goat meat	49.05	115	92.25	125	0.65	178	0.54	198
Other Meat	4.01	147	79.10	95	0.5	167	6.9	142
Processed meat	-	-	-	-	-	-	-	
Animal casing	-	-	322.54	97.22	-	-	123.99	97.52
Poultry products	27.955	88	8735.528	68	775.3933	120	3970.813	36
Dairy products	814.72	58	194.48	131	610.45	274	50.51	80
Natural honey	5645.86	55	1117.62	39	7034.83	25	134.87	94
Caseins*	5620.21	19	1619.01	35	4492.09	77	1548.28	78
Albumins* (Eggs & Milks)	-	-	46.61	135	-	-	30.74	173

**only three year data (2008-09 to 2010-11) of these products were available for Pre-FSS Regime and analyzed accordingly.*

The table 3 reveals that natural honey, caseins, buffalo meat and poultry products were main animal products exported to USA as indicated higher mean value. On the other hand, same animal products were also prime products exported to EU except buffalo meat. Similarly, export of buffalo meat, poultry products and natural honey exported to USA were higher in post-FSS regime in comparison to pre-FSS regime as significant increase in mean value of said products during post-FSS regime. However, export quantity of sheep& goat meat, dairy products, caseins exported to USA

decrease drastically in post-FSS regime. Contrary, quantities of all animal products exported from India to EU were decreased in post-FSS regime. Table 3 also reveals that variability in India's export of animal products were stable only for buffalo meat, natural honey for USA and buffalo meat, poultry products exported to EU as lower CV value in post-FSS regime. Rest products were instable during post-FSS regime for both USA and EU.

Shipments detention of India's export of animal products:

Shipments refused of India's export of animal products were identified and presented in table 4. The tables 4 revealed that shipments refusal of most of the agricultural commodities including animal products exported from India were decreased in Post-FSS Regime in comparison to Pre-FSS Regime. In the international context, animal products shipped from the India have least volitions as compared to other agricultural commodities due to most of trade direction of said product were towards Arabian countries rather than advanced countries like USA, EU. The food safety norms have liberal in Arabian/Gulf countries in comparison to advanced countries.

Table 4. Shipments refused from India by US FDA due to food safety issues.

Food articles	Periods												
	Pre-FSS Regime						Post-FSS Regime						
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Spices, flavors, and salts	182	211	288	323	297	610	526	522	309	218	296	318	301
Bakery products/ dough/mix/icing	45	63	40	35	63	57	140	488	379	339	264	302	299
Snack food items	90	182	93	76	101	104	62	60	48	59	72	63	76
Vegetables and vegetable products	84	85	86	81	123	89	78	106	64	88	76	91	79
Fruit and fruit products	80	95	99	49	92	77	83	80	95	97	82	79	77
Fishery and seafood products	87	50	51	19	45	57	128	84	60	48	64	71	59
Animal products	2	4	3	12	9	6	8	6	11	7	5	1	4
Total refusals	1023	1158	1113	916	1163	1,312	1385	1710	1274	1231	1080	996	1019

Data Sources: The Operational and Administrative System for Import Support (OASIS). U.S. Food and Drug Administration.https://www.accessdata.fda.gov/scripts/importrefusals/ and Food Safety and Inspection Services. U. S. Department of Agriculture. https://www.fsis.usda.gov/wps/portal/fsis/home

Conclusion and policy implications:

The study examines the impact that adopting new food safety standards as FSS Act in India, would have on global food trade of India's animal products. The study found that imposing new food safety standards by India tend to have a positive impact on export of animal products. But food safety standard still a trade barrier for India.Therefore, food safety issues restricted to explore the opportunity of export potential of animal products in the India. In line with the globally accepted food safety norms, India has introduced new food safety law. But due to import procedural/border check norms prevailed in of various developed countries like USA and EU, the effectiveness of India's new harmonized food law on export of animal products have limited. The developing countries like India should developed sound mechanism to address the issues involved in import procedures, punitive action to ensure the compliance, precautionary principle and traceability system. The effectiveness of food safety law on export of animal products has also significantly depended on consumer perceptions, product design, packaging etc.The food quality for the export market varies from the food marketed in the domestic market. The level of harmonization of food safety standards for the domestically marketed produce in India differs extensively, animal meat products in particular, which has implications for India's global trade of animal products.

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