



## **India's Export Performance of Animal Products under New Food Safety Law Regime**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. Author SK designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors HKG and SVS managed the analyses of the study. All authors read and approved the final manuscript.*

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### **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 (quantity) of exports of different animal products exported from India collected for period 2005-06 to 2016-17. The mean of and variability in exports (quantity) of animal products were compared for pre and post FSS regime to assess the magnitude and stability in the exports of animal products after implementation of India's new food safety law. 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 issues in the sequence of the global demand. The country-wise quantity of export of animal products was analyzed and found that

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natural honey, caseins, buffalo meat and poultry products were main animal products exported to the USA as well as EU except for buffalo meat, as indicated higher mean value. Similarly, most of the animal products exported to the USA were higher in post-FSS regime in comparison to the pre-FSS regime as a significant increase in the mean value of said products during the post-FSS regime. However, the export quantity of sheep & goat meat, dairy products, caseins exported to USA decrease drastically in the post-FSS regime. Contrary, quantities of all animal products exported from India to EU were decreased in the post-FSS regime. Further, import procedure/ border check in the developed countries have made differences and restricts the import of animal products exported from India in its geographical boundaries. The shipments refusal of most of the agricultural commodities including animal products exported from India were increased in post FSS regime. The study found that imposing new food safety standards by India tend to have a positive impact on the export of animal products but food safety standard still a trade barrier for developing countries like India because of insufficiency of harmonized food safety law at a domestic level across the articles.

*Keywords: Animal; export; food safety; food law; SPS.*

**Jel Codes:** F1, F13, Q1, Q17, Q18.

## 1. 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 the 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 [1].

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 principle 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 [2].

The WTO deals with the rules for international trade; it's 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. Further, food safety governance of novel technologies and process must keep pace with their development [3].

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 05<sup>th</sup> 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 [4].

This paper, therefore, aims to examine the impact of India's new food safety legislation on exports performance of animal products in

potential trade destinations like USA and EU. Further, we attempt a comparative evaluation of food safety system prevailed in the USA, EU and India to find out the food safety barriers in the global agri-business.

## 2. DATA AND METHODOLOGY

### 2.1 Data

The study is based on the data pertaining to the period 2005-06 to 2016-17, compiled from various sources [5,6,7,8,9,10]. The data on article wise exports of livestock products were compiled from reports, published by Directorate General of Commercial Intelligence and Statistics (DGCI&S, Kolkata), Ministry of Commerce, Government of India [11] and Agricultural and Processed Food Products Export Development Authority (APEDA), New Delhi [12]. The data about Shipments detention of India's export of animal products were compiled from Operational and Administrative System for Import Support (OASIS) published by U.S. Food and Drug Administration and Food Safety and Inspection Services. U. S. Department of Agriculture. The dataset was categorized in pre (pre-FSS regime) and post (post-FSS regime) implementation of India's new food safety laws *i. e.*, Food Safety and Standard Act (FSS). The 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). Further, the comparison of food safety laws prevailed in EU, USA and India were made on the basis of regulations of respective countries.

### 2.2 Methodology

The mean of and variability in exports (quantity) of animal products were compared for pre and post FSS regime to assess the magnitude and stability in the exports of animal products after implementation of India's new food safety law. The variability in the export of animal products was analyzed using the coefficients of variation (CV%).

The *Hodrick Prescott Filter* as a data-smoothing technique was used [13,14,15] 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 it is composed of a trend component  $\tau$  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  $\tau$  of 'y' by minimizing the variance of 'y' around  $\tau$ , subject to a penalty ( $\lambda$ ) that constrains the second difference of  $\tau$ . Thus, the HP filter chooses  $\tau$  so as to minimize.

$$\sum (y_t - \tau_t)^2 + \lambda \sum [(t_{t+1} - \tau_t) - (t_t - \tau_{t-1})]^2 \quad (2)$$

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  $\lambda$  keeps track of this *trade-off* between the two. The penalty parameter  $\lambda$  controls the smoothness of the series  $\tau$ . The larger the  $\lambda$ , the smoother the  $\tau$  and if  $\lambda = \infty$ ,  $\tau$  approaches a linear trend. If  $\lambda = 0$ , the series  $\tau$  becomes the original series 'y'.

## 3. RESULTS

### 3.1 Variability in India's Animal Products Export

Variability in the export of animal products was analysed 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 the Nation's food law (FSS Act) addressed the food safety issue in the sequence of the global demand.

However, the 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 an unorganized category and therefore, policy intervention is required to shift the meat industry towards more organized.

### 3.2 Comparison of India's New Food Safety law and Food Safety Law Prevailed in Developed Countries (the 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. It is obvious from the table that India has harmonized it's its food safety law in the line of a 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 made differences and restricts the import of animal products exported from India in its geographical boundaries.

### 3.3 Quantity and Variability in India's Export of Animal Products Exported to Developed Countries (USA and EU)

Country wise magnitude and variability in the export of animal products were analyzed and presented in Table 3. Table 3 reveals that natural honey, caseins, buffalo meat and poultry products were main animal products exported to the USA as indicated higher mean value. On the other hand, the same animal products were also prime products exported to the EU except for buffalo meat. Similarly, the export of buffalo meat, poultry products and natural honey exported to the USA were higher in post-FSS regime in comparison to the pre-FSS regime as a significant increase in the mean value of said products during the post-FSS regime. However, the export quantity of sheep & goat meat, dairy products, caseins exported to USA decrease drastically in the post-FSS regime. Contrary, quantities of all animal products exported from India to the EU were decreased in the post-FSS regime. Table 3 also reveals that variability in India's export of animal products was stable only for buffalo meat, natural honey for USA and buffalo meat, poultry products exported to EU as lower CV value in the post-FSS regime. Rest products were unstable during post-FSS regime for both the USA and EU.

### 3.4 Shipments Detention of India's Export of Animal Products

Shipments refused 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 increased in Post-FSS Regime in comparison to Pre-FSS Regime. Animal products shipped from India have least volitions as compared to other agricultural commodities due to most of the trade direction of animal products 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.

## 4. DISCUSSION

There is a variation in the items wise performance (Table 1) but the average performance of all the animal products was improved in the post FSS regime in compression to pre FSS regime. It indicates that new laws of food safety significantly addressed the food safety issues and encourage the consistent in the export of animal products exported from India.

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

**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 (%)
Buffalo meat	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 & Milk)	1193.81	66.64	569.96	110.18	1817.66	13.92

**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	In 2002, the European Parliament and council adopted regulation (EC) No 178/2002 lay down the general principles and requirements of food safety.	Federal Food, Drug & Cosmetic Act, 1938 as amended (21 USC.301-392) and the New Food Safety Modernization Act, (FSMA 2011) exist to enable FDA to better protect public health by strengthening food safety system.	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 high level of protection of human life and consumers interest in relation to goods and free the movement of goods within the EU.	It enables to focus more on preventing food safety problems rather than primarily on reacting to a problem after their occurrence.	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	Food Business Importer (FBI) has responsibility for food safety.	Food Business Operator (FBO) gets the primary responsibility for food safety.	Every Food Business Operator (FBO)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 procedures	The sound border inspection system has existed in the EU and a system of RASSF to disseminate information when a member state comes across a problem with a consignment. Further, special conditions for the import of animal products have stipulated.	At the arrival of the cargo, the importer gives notice to the US customs about the cargoes arrival. Samples are collected, if the samples comply with the regulations it is passed otherwise detained and sent back. FSIS (U.S. Department of Agriculture) is responsible for assuring that U.S. imported meat, poultry and egg products are safe, wholesome, unadulterated, and properly labelled and packaged.	Step 1: Custom Clearance , Step 2: Applying FSSAI Clearance, Step 3: Consignment Inspection &Sampling, Step 4: Food Product approval
5	Checks at border	Consignment is checked at the Border Inspection Posts (BIP) 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 60% of its original shelf life at the time of import clearance.

S.No.	Dimension	Countries		
		EU	USA	India
				3. Compliance with the FSS (Packaging & Labelling) Regulations, 2011. The product-specific labelling requirements. 4. Rectification of labelling 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.	Banned to entry, returns back to the country of origin, the blacklisting of the company when the product has not complied with the regulations.	Banned to entry in the market. or withdraw from the market if unsafe.	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	Full traceability from 'farm to table' followed under Article 18 of EC regulation 178/2002.	All steps regarding traceability requirement have been set in the FSMA Act, 2011 but not as EU implements as in 'farm to table' approach.	Govern under Food Safety and Standards (Food Recall Procedure) Regulations, 2017
8	Precautionary Principle	Precautionary Principle has been well practised 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

**Table 3. Quantity and variability 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 & Milk)	-	-	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*

**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	Mean 2005-10	2011	2012	2013	2014	2015	2016	Mean 2011-16
Spices, flavors, and salts	182	211	288	323	297	610	319	526	522	309	218	296	318	365
Bakery products/ dough/mix/icing	45	63	40	35	63	57	51	140	488	379	339	264	302	319
Snack food items	90	182	93	76	101	104	108	62	60	48	59	72	63	61
Vegetables and vegetable products	84	85	86	81	123	89	91	78	106	64	88	76	91	84
Fruit and fruit products	80	95	99	49	92	77	82	83	80	95	97	82	79	86
Fishery and seafood products	87	50	51	19	45	57	52	128	84	60	48	64	71	76
Animal products	2	4	3	12	9	6	6	8	6	11	7	5	1	6
Total refusals	1023	1158	1113	916	1163	1,312	1114	1385	1710	1274	1231	1080	996	1279

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>

effective 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 reveals that wide fluctuations in variability in country wise export of animal products except buffalo meat, poultry products and natural honey for USA and poultry products and dairy products for EU. It indicates that the effectiveness of the FSS Act across animal products have to be achieved.

Further, import procedure, border check, etc are varied in the countries under study (Table 2). So these factors affect the accessibility of animal products in the USA and the EU. In the USA, imports of animal products regulated by the US Department of agriculture rather than FDA that is also an affecting factor of export of animal products to the USA. The shipments refusals (Table 4) of India's export of animal products increased during the post FSS regime in comparison to pre FSS regime. It is shown that enforcement of new food safety law in the domestic market of animal products not going on properly. The government should encourage the special export oriented units for the export of animal products as per the demand and preferences of consumers of export destinations.

## 5. CONCLUSION AND POLICY IMPLICATIONS

The study examines the impact that adopting new food safety standards as the 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 the export of animal products. But food safety standard still a trade barrier for India because of insufficiency of harmonized food safety law at a domestic level across the articles. Therefore, food safety issues restricted to explore the opportunity of export potential of animal products in India. In line with the globally accepted food safety norms, India has introduced a new food safety law. But due to country wise differential import procedure, border check norms and multi-controlling authorities for import in the potential destinations- 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 develop a 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.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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