

# "The Agricultural Economics of Terrorism: Markets in Peril?"

## International Trade Dimensions

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Terrorism directed towards the food system poses a number of potential threats. These include, in decreasing order of severity, the loss of human life, economic disruption, and negative impacts upon morale and consumer confidence.

Terrorism is a problem for numerous countries and for the global economic system as a whole. However, in my remarks I shall focus on threats relating to U.S international trade in food and agricultural products.

### **What is the potential threat?**

Terrorism poses potential threats to both U.S. export and import markets for food and agricultural products (roughly 18 percent of U.S. agricultural production is exported; imports account for roughly 9 percent of the volume of food consumed domestically).<sup>2</sup>

The export threat includes potential terrorist attacks on shipments of U.S. agricultural exports (contamination or destruction, in the United States, in transit or at the point of destination). It includes attacks upon the transportation infrastructure used in exporting and importing, particularly those components used in trade, such as storage facilities at ports or airports. The export dimension also extends to the general disruption of overseas demand for U.S. products due to the direct or indirect impact of terrorism.

The import threat includes the potential disruption of supply due to terrorism and contamination of product, but also extends to the use of agricultural and primary commodity trade as a vector for terrorist acts (e.g., introduction of disease or the smuggling of terrorists or terrorist weapons into the United States via shipments of agricultural products).

### **Export threats**

Key issues are the destination of US exports and how prone such exports are to disruption. An important factor is the relative importance of various transportation modes and their vulnerability to attack inside and outside the country.

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<sup>2</sup> There are also threats to the foreign operations of U.S. companies. In 2000, U.S. exports of agricultural products were roughly \$51 billion. In comparison, sales by subsidiaries or foreign affiliates of U.S. food processing companies were \$150 billion. Some U.S. companies are important players in other parts of the international food and agricultural system, such as input supply and food service. For example, in the first quarter of 2002, 47 percent of the \$9.7 billion in sales of the McDonald's restaurant chain were outside North America, and those operations accounted for over 60 percent of the corporation's total revenues of \$3.6 billion.

Internal vulnerabilities may be due to concentration of production, storage and transportation, e.g., the concentration of grain production and storage in the Midwest, and the concentration of export grain handling on the Mississippi river. Damage or destruction of shipping and handling facilities, whether targeted directly to agriculture or not, e.g., the targets could be oil refining facilities or major ports, could have important disruptive impacts in the short term, although the longer term effects might not be so great (cf. the impact of the destruction of the WTC on the financial system).

External vulnerability is a function of transportation modes (the risks that these could be compromised), concentration of shipments to particular destinations, and the level of threat at such destinations. The level of threat is related to the probability that the mode or destination would be targeted, and, in some cases, to the probability of disruption through political and social instability created by terrorist activity. Thus, for example, exports to Europe might be at greater risk through a major attack on the port of Rotterdam. Exports to Egypt might be a greatest risk from the effects of political instability created by terrorism or through U.S. counter-response to terrorism (e.g., boycotts of American goods in response to actions in other Arab countries).

Table 1. Value and Volume of U.S. Agricultural Exports, 2001

	VALUE		VOLUME	
	Million \$	Percent	MMT	Percent
World Total	53,748	100%	159	100%
Western Hemisphere	19,865	37%	50	32%
Europe	7,949	15%	20	13%
Middle East	2,231	4%	8	5%
Persian Gulf	830	2%	2	1%
North Africa	1,455	3%	12	7%
Sub-Saharan Africa	650	1%	3	2%
East Asia	20,151	37%	61	39%
South Asia	702	1%	2	1%

Source: USDA (FAS)

As may be seen from Table 1, U.S. agricultural exports are relatively concentrated in three regions – the Western Hemisphere and East Asia, each of which accounted for 37 percent of the value of exports in 2001; and in Europe, which accounted for a further 15 percent. Exports to areas with high risks of disruption, such as the Middle East, Persian Gulf and North Africa, collectively accounted for 9 percent of the value of U.S. exports. Differences between the value and volume shares for exports to various regions provide some indication of differences in transportation modes.<sup>3</sup> Thus, the significantly higher value share (37 percent) in comparison to volume share (32 percent) for the Western Hemisphere reflects a higher share of value-added exports in that trade and the fact that a significant proportion of that trade, particularly with Canada and Mexico relies on

<sup>3</sup> Volume aggregates need to be interpreted with care since (in some cases, quite literally!), they reflect the amalgamation of “apples and oranges”. Thus, for example, an average unit value for exports at this level of aggregation would be meaningless.

movements by truck or rail, rather than water. In contrast, trade with East Asia tends to be oriented more towards bulk commodities that travel by ship, as reflected by the higher volume share (39 percent) than value share (37 percent).

Threats posed to exports create the risk of economic loss for the U.S. food and agricultural industry. While such threats are not trivial, they are relatively less important, particularly in the eyes of the general public, than threats associated with agricultural imports.

### Import threats

The largest public concern in the United States appears to be the perception of the threat posed to human health through the contamination of imported agricultural products. The agricultural industry is concerned about more subtle threats, including potential risks to plant or animal health.<sup>4</sup>

Table 2. Volume and Origin of U.S. Agricultural Imports, 2001

	BULK		INTERMEDIATE		CONSUMER		TOTAL	
	000 MT	Percent	000 MT	Percent	000 MT	Percent	000 MT	Percent
World Total	10,719	27%	10,236	26%	18,580	47%	39,537	100%
Western Hemisphere	7,025	66%	7,320	72%	14,523	78%	28,869	73%
Europe	778	7%	789	8%	1,531	8%	3,098	8%
Middle East	83	1%	86	1%	115	1%	284	1%
Persian Gulf	1	0%	0	0%	2	0%	3	0%
North Africa	2	0%	20	0%	25	0%	48	0%
Sub-Saharan Africa	480	4%	293	3%	76	0%	849	2%
East Asia	2,293	21%	1,547	15%	2,208	12%	6,049	15%
South Asia	119	1%	185	2%	156	1%	460	1%

Source: USDA (FAS).

Notes: Figures are for imports for consumption. "Bulk" agricultural products are commodities that have received little or no processing, such as wheat, corn, soybeans, and cotton. Tropical products, such as green coffee, cocoa, raw sugar, and natural rubber, are also included in this category. Value-added "intermediate" agricultural products (such as wheat flour, vegetable oils, and hides and skins) receive some processing, but are generally not ready for final consumption. High-value (value-added) "consumer-oriented" agricultural products require little or no additional processing and are generally ready for final consumption at either the food retail or food service level. Percentages for world totals represent the share of each commodity group in total US imports (all commodity aggregates), the percentages by region represent the share of each region in US imports for each sub-aggregate, e.g., bulk commodities.

The nature of the contamination threat can be chemical or biological. Biological threats are more significant because of the possibility of growth and spread of contamination. Such threats can be directed towards human health, e.g. the introduction of toxins into foodstuffs (consumption threat), or to plant and animal health (production threat), or to

<sup>4</sup> There may be more subtle threats to national security associated with the linkage agricultural trade and the financing of terrorism, e.g., through the use of such trade to finance terrorism, for example, by providing access to the United States for drugs or as a vehicle for money laundering.

human health indirectly by using animals as a disease vector.<sup>5</sup> The direct risk of contamination for human health is greatest for imports that move directly into food distribution and consumption channels, such as fresh fruits and vegetables. Risks decline the higher the amount of post-import processing, due to quality control in the food manufacturing process.

Table 3. Leading Imports of Agricultural Products from Canada by Surface Modes of Transportation in 2000.<sup>1</sup>

	IMPORTS	PERCENT	RANK	PERCENT	PERCENT
	000 MT	OF TOTAL		BY TRUCK	BY RAIL
COMMODITY					
Cereals	3,720	1.9%	11	14%	86%
Live animals	885	0.5%	22	100%	0%
Edible vegetables, roots and tubers	844	0.4%	23	95%	5%
Oilseeds and oleaginous fruits	740	0.4%	24	73%	27%
Preparations of vegetables, fruit, nuts	727	0.4%	25	95%	5%
Meat and edible meat offal	683	0.4%	26	100%	0%
Animal or vegetable fats and oils	667	0.3%	27	29%	71%
Preparations of cereals	596	0.3%	30	96%	4%
Products of the milling industry	512	0.3%	33	71%	29%
Sugars and sugar confectionery	341	0.2%	35	96%	4%
Miscellaneous edible preparations	340	0.2%	36	98%	2%
Cocoa and cocoa preparations	224	0.1%	44	100%	0%
Edible fruit and nuts; fruit peel	116	0.1%	48	100%	0%
Other products of animal origin	107	0.1%	51	95%	5%
Total Imports of Goods from Canada	194,713	100.0%	NA	34%	31%

Source: U.S. Department of Transportation, Bureau of Transportation Statistics.

<sup>1</sup>Imports in excess of 100,000 metric tons per commodity group. Figures relate to shipments by rail, truck, pipeline, and mail.

Table 2 contains information on the origin of U.S. agricultural imports in 2001. In that year, roughly 47 percent of total imports by volume were consumer-ready products. The vast majority of those imports (78 percent) came from the Western Hemisphere, as did U.S. agricultural imports overall (73 percent). As is the case for agricultural exports, East Asia and Europe dominate the remainder of U.S. trade, accounting for 15 percent and 8 percent, respectively. Imports of agricultural products from the Middle East, Persian Gulf and North Africa account for roughly 1 percent of total U.S imports. Naturally, the geographical origin of imports does not necessarily correlate highly with the threat of contamination. As was demonstrated by the events of September 11, 2001, terrorists may be able to insert themselves into any country in order to carry out attacks.

<sup>5</sup> Roughly 50 percent of the approximately 1,700 known human pathogens (bacteria, viruses, fungi, and parasites) are communicable from animals to humans (zoonotic). Hence, a terrorist attack upon animal health could be directed towards inflicting economic damage on animal agriculture or spreading disease to humans.

Information is available on the relative importance of truck and rail transportation for imports into the United States from Canada and Mexico. The largest volume of agricultural imports from Canada is in cereals (Table 3), much of which enters the United States by rail. Live animals are the second most important commodity group; these are carried by truck. The volume of total imports from Canada through surface modes of transportation that is carried by truck and rail is broadly similar at 30-35 percent. The bulk of the remaining imports are via pipeline.

Truck and rail traffic from/to Canada is dispersed across a number of border crossings. In 1999 over 8 million trucks and railcars crossed the border. Over 80 percent of the total crossings were trucks. The three most important truck crossing points— two in Michigan and one in New York, accounted for 55 percent of the total movements in 1999 (Table 4). The top three rail crossing points - two in Michigan and one in Minnesota, accounted for 53 percent of total movements.

Table 4. Truck and Railcar Crossings at the U.S.-Canada Border, 1999

TRUCKS	000	PERCENT	RAILCARS	000	PERCENT
Total	6,809	100%	Total	1,475	100%
Detroit, MI	1,759	26%	Port Huron, MI	338	23%
Buffalo-Niagara Falls, NY	1,188	17%	Detroit, MI	262	18%
Port Huron, MI	791	12%	International Falls, MN	181	12%
Blaine, WA	492	7%	Buffalo-Niagara Falls, NY	160	11%
Champlain-Rouses Point, NY	398	6%	Portal, ND	130	9%

Source: U.S. Department of Transportation, National Transportation Statistics, 2000.

Agricultural imports are a much more significant part of U.S. trade with Mexico, than with Canada (Table 5). The two largest categories of imports (vegetables and fruit) account for over 12 percent of total imports from Mexico, by volume. Practically all of these imports enter the United States by truck. Truck traffic accounts for 75 percent of total surface imports of goods from Mexico.

Table 5. Leading Imports of Agricultural Products from Mexico by Surface Modes of Transportation in 2000.<sup>1</sup>

COMMODITY	ALL IMPORTS 000 MT	PERCENT OF TOTAL	RANK	PERCENT BY TRUCK
Edible vegetables, roots and tubers	2,197	8.0%	3	100%
Edible fruit and nuts; fruit peel	1,206	4.4%	7	100%
Preparations of vegetables, fruit, nuts	320	1.2%	20	98%
Live animals	231	0.8%	24	100%
Sugars and sugar confectionery	129	0.5%	33	88%
Preparations of cereals	108	0.4%	34	100%
Total imports of goods from Mexico	27,578	100.0%	NA	75%

Source: U.S. Department of Transportation, Bureau of Transportation Statistics.

<sup>1</sup> Imports in excess of 100,000 metric tons per commodity group. Figures relate to shipments by rail, truck, pipeline, and mail.

Roughly 4.8 million trucks and railcars crossed the U.S.-Mexican border in 1999; 90 percent of the total traffic was trucks (Table 6). Laredo, Texas was the most important crossing point, accounting for 36 percent of combined crossings of trucks and railcars.

Details on imports of U.S. agricultural products by sea by type of vessel are not readily available. However, statistics are available on total US imports (Table 7). Much of the traffic through U.S. ports is tanker traffic (63 percent). Roughly 23 percent is in dry bulk carriers – a type used to convey bulk agricultural commodities. Container and other specialized ships, including refrigerated transports, account for 13 percent of total imports. A relatively large proportion of the total freight moving into ports in California and the Pacific Northwest is in containers and specialized ships (45 percent).

Table 6. Truck and Railcar Crossings at the U.S.-Mexico Border, 1999

TRUCKS	'000	PERCENT	RAILCARS	'000	PERCENT
Total	4,267	100%	Total	497	100%
Laredo, TX	1,486	35%	Laredo, TX	214	43%
El Paso, TX	673	16%	Brownsville, TX	120	24%
Otay Mesa/San Ysidro, CA	546	13%	Eagle Pass, TX	90	18%
Hidalgo, TX	325	8%	Nogales, AZ	34	7%
Brownsville, TX	304	7%	El Paso, TX	33	7%

Source: U.S. Department of Transportation, National Transportation Statistics, 2000.

Table 7. US Maritime Imports by Port Region and Type of Vessel in 1999.

	TOTAL	PERCENT	REGIONAL IMPORTS BY TYPE OF VESSEL			
			Tanker	Dry Bulk	Full	Other
REGION	IMPORTS	OF TOTAL		Carrier	Container	Freighter <sup>1</sup>
	000 MT	IMPORTS				
Northeast	175,675	22%	63%	23%	9%	5%
Southeast	234,476	30%	60%	29%	7%	5%
Puerto Rico-Virgin Islands	36,027	5%	79%	15%	3%	3%
Southwest (Texas)	215,158	27%	83%	15%	2%	1%
California-PNW	97,835	12%	36%	19%	36%	9%
Alaska-Hawaii	7,195	1%	81%	16%	1%	2%
Great Lakes	18,926	2%	3%	92%	1%	5%
Total All Regions	785,292	100%	63%	23%	9%	4%

Source: U.S. Maritime Administration.

<sup>1</sup> Roll-on/roll-off, breakbulk ships, partial containerships, refrigerated cargo ships, barge carriers and specialized cargo ships.

In terms of the current response to potential threats posed by international trade, imports of consumer-ready products appear to be where there is the greatest emphasis, for example, through the tightening up of border controls and inspection. USDA is responsible for inspections of most imported meat and poultry and for live animals; FDA is responsible for other food products. Congress has provided \$35 million to the U.S.

Department of Agriculture to strengthen the Agricultural Quarantine Inspection program and \$16.5 million for the Food Safety and Inspection Service, part of which is to be allocated for additional inspection of imported meat and poultry.<sup>6</sup> Congress has authorized FDA to spend \$151 million in response to the threat of terrorism; \$97 million of which will be devoted to the food system. FDA is hiring 655 new employees; at least 400 of these will be assigned to monitor imports.<sup>7</sup> Despite these measures, the volume of inspections is, and will remain, relatively small. The increase in FDA inspectors is expected to permit the agency to make 24,000 import inspections annually, roughly double the number in the past. There has been a history of food product seizures by FDA as result of inspections – many of these seizures have not been related to identifiable health risks (e.g., contaminated products), but to procedural issues, e.g., inadequate documentation.

Congress has focused on import inspection of consumer-ready products because of the perception that the political risks of inaction in this area are high. Clearly, the publicity generated by deaths, however few, from an intentionally contaminated shipment of imported fresh food could be very damaging, even if the economic loss created by such contamination were slight. However, it should be noted that while the general economic loss from contamination of shipments of imported consumer products might not be great, the risk of economic loss to individual food system participants, particularly food retailers, could be considerable by undermining consumer confidence in their products.

The economic risks posed by production threats are far more significant for the United States as a whole than those posed by consumption threats. The introduction of damaging plant or animal diseases through contaminated imports could create substantial economic damage. However, it is unlikely that imports entering through legitimate channels would be the origin of a disease outbreak instigated by terrorists. Some other method of introduction of disease, e.g. clandestine, would be much more likely.

Because of the magnitude of the economic threat posed by the threat of disease, one might question whether money spent on tightening inspections for food products is well spent. It is in other areas, for example, improved laboratory-testing facilities for rapid detection and diagnosis of disease (human as well as plant and animal), and the organization and training of rapid response disease control teams for which expenditures would seem to be most cost-effective in terms of controlling the potential damage from terrorism.

### **Concluding remarks**

- The risks to the U.S. food system from terrorist activity would seem to be greatest in animal agriculture, through the potential for the introduction of disease.

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<sup>6</sup> USDA press release dated April 30, 2002 “USDA continues to step up homeland security efforts”. <http://www.usda.gov/news/releases/2002/04/0176.htm>

<sup>7</sup> Remarks made by Lester M. Crawford, deputy commissioner of FDA, at the USDA National Agricultural Research, Extension Advisory Committee meeting on Biosecurity” Preparedness Plans, Washington DC, March 28, 2002. <http://www.fda.gov/oc/speeches/2002/usda0328.html>

- While disease risks are associated with imports (e.g., the alleged role of imported contaminated meat in the introduction of foot and mouth in the United Kingdom), the greater risk would seem to be through direct infection of the domestic food production system.
- Large expenditures on additional import inspections are unlikely to be effective from a risk reduction-cost point of view, although there is a need to ensure that existing systems function adequately.
- Private companies have a lot to lose from terrorist events affecting the safety of food products, e.g., through the impact of public confidence and loss of sales (Tylenol tampering, Perrier). They are likely to continue to take steps to try to minimize their exposure to such risks. The trend towards the adoption of measures that achieve this, such as contracting, traceability and identity preservation, which we are already observing in Europe, is likely to intensify globally, and this will affect trading relationships.
- Currently, the risks of disruption in U.S. agricultural export markets are probably far greater from conventional trade disputes, e.g., potential response by other countries to recent U.S. actions to restrict steel imports and to increase subsidies to farmers, than the risks posed by terrorism.
- Compared to other risks to human health, e.g., contamination of the water supply or release of radioactive material by terrorists, the importance of agricultural risks may be relatively low.