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FEATURE

Food Safety Improvements Underway in China

Facing growing demand abroad and at home for safer food, China is overhauling its food system to meet international food safety standards.

[Linda Calvin](#), [Fred Gale](#), [Dinghuan Hu](#), and [Bryan Lohmar](#)



- Adverse publicity about contaminated food exports and growing domestic concerns have prompted China to improve overall food safety.
- Producing safer food for export is expensive and reduces China's comparative advantage.
- Only a small portion of China's vegetable production for the domestic market meets the new government standards for safer food.

Fred Gale, USDA/ERS

This article is drawn from . . .

[China's Rising Fruit and Vegetable Challenge U.S. Industries](#), by Shuang Huang and Fred Gale, FTS-320 Economic Research Service, February 2006.

"A New Marketing Model: Supermarket-led Supply Chains"

and Processing Companies and Households," by Dinghuan Hu, and Tom Reardon, in *Issues in Economy*, No. 1, 2006 (Chinese published in China).

You may also be interested

["Produce, Food Safety, and International Trade: Response to U.S. Foodborne Outbreaks Associated with Imported Produce,"](#) by Linda Calvin, in *International Trade and Food Safety*, Jean Buzby (ed.), AER-828, US Economic Research Service, November 2003.

The [ERS Briefing Room on China](#)

China emerged in the 1990s as a low-cost exporter of food products such as apples, seafood, and poultry. But in recent years, China's exports slowed when vegetables, poultry, and shrimp were rejected for failing to meet stringent standards in Japan, Europe, and other countries, revealing a gap between international food safety standards. Problems with food contamination within China and food safety a top concern of Chinese consumers as well, an issue reflected in recent opinion polls and newspaper articles.

China is in the midst of a campaign to overhaul its food system and improve safety. Numerous challenges face both the export sector, where food safety efforts are advanced, and the domestic sector, where many food safety initiatives are in the early stages. Problems with food safety can influence trade flows, as evidenced by China's setbacks in exporting products. China must meet the food safety standards of the developed world to succeed in those markets. The increased costs of achieving higher food standards could slow the growth of Chinese agricultural exports if not offset by greater demand in the export markets. China's efforts are an important case study of a country's striving to elevate standards in its food and agriculture sector to international food safety standards.

China Faces Challenges in Providing Safer Food

Implementing a 21st-century food safety system in China poses a challenge. It is difficult to standardize and monitor production practices in a sector composed of 200 million households who typically have 1-2 acres of land divided into 4-6 noncontiguous plots. Farmers have only usage rights to their land, so they lack ownership incentives to invest in safety improvements.

Many of China's food safety problems can be traced back to the farm level. Farmers' heavy use of chemicals to coax production out of intensively cultivated soils and degraded lands, under pressure, a practice that contributes to food safety problems. China has one of

highest rates of chemical fertilizer use per hectare, and Chinese farmers use many pesticides, including some that are banned in the United States. Farm chemicals are mislabeled. The Chinese government is tackling this problem by encouraging farm agricultural chemicals only from approved outlets. Some farmers have little understanding of correct chemical use; for example, they may fail to wait the prescribed number of days between the last application of a pesticide and harvest, resulting in excessive residues in the harvested product. Antibiotics are widely used to control disease in livestock, and aquaculture products. Industrialization and lax environmental controls have also led to concerns about the potential for heavy metal contamination of food products. Untreated animal waste in fields and water raises the risk of microbial contamination.

Importers reject contaminated Chinese products			
Year	Product	Country	Problem
2001	Shrimp	European Union (EU)	Excessive antibiotic residues
2001	Poultry	EU, Japan	Excessive antibiotic residues
2002	Honey	EU	Excessive antibiotic residues
2002-2003	Frozen spinach	Japan	Excessive pesticide residues
2002	Tea	EU, Japan	Excessive pesticide residues
2005	Fermented cabbage	South Korea	Parasites

Source: News reports compiled by USDA, Economic Research Service.

China's fragmented marketing system also poses problems. Agricultural marketing is dominated by millions of small traders handling small volumes of product, often on a cash basis, with no documentation. In modern marketing systems, products are tracked and traced through the system with a paper trail. This process is easier in the United States than in China, since growers and buyers are fewer in number and deal in larger volumes. Vertical coordination and integration between growers and buyers also makes it easier to produce safe food and control it through the marketing chain. Chinese exporters are using various approaches to gain greater vertical control over production, and these methods are now being promoted within the Chinese domestic market.

Successful Export Industries Achieve Safety Standards, but at a Cost

China has emerged as a major exporter of agricultural products based primarily on low costs and openness to foreign investment. Many of its exports are produced by companies with investment from Japan, South Korea, Singapore, Taiwan, and Europe. Most operations are growing and processing fruit, vegetables, livestock, fish, or shrimp in coastal provinces with easy access to ports.

The influx of foreign investment has also brought foreign technology and attention to food safety. The importance of Japan, in particular, as an export market has compelled Chinese firms exporting to that country to make major improvements in food safety. Successful firms operating in China exert careful control over raw materials to ensure that products

the standards of the export markets. Exporting companies have been even more so since 2002 when Chinese frozen spinach in Japan was found to have high levels of aflatoxin. Imports were banned temporarily ([see "China's Frozen Spinach Exports to Japan Face Safety Problems"](#)). New Japanese rules for residues of agricultural chemicals, feed and veterinary drugs, implemented in May 2006, will put further pressure on exporters.

Firms have used two business models to impose more control over production: the first is the fully vertically integrated model in which the company leases land and controls production directly; the second is the use of production contracts with growers that specify inputs and production methods. The leasing model ensures greater control over production, but it also costs more and is limited by access to land. Developing a contract model that balances low costs against the risk of a safety problem is challenging. Firms sometimes use both methods—growing the crops that are most prone to export problems, such as leafy greens, on their leased land and using production contracts for other crops.

Leases are typically arranged with village officials who serve as intermediaries between the firm and the land. The firm turns the land into a "production base"—an area that may be as large as multiple villages and may consist of thousands of acres. Leasing land is surprisingly expensive and involves difficult negotiations because there is no formal market for land. Foreign companies often pay rents comparable to those in developed countries. Companies post technical experts onsite to manage production and supervise workers. These firms may test soil, water, and air for pollutants; implement Good Agricultural Practices (GAPs) to reduce the risk of microbial contamination; and use a Hazard Analysis and Critical Control Point (HACCP) system to minimize risk in production. A firm selling to a wide range of countries might face numerous standards. Requirements as well as maximum residue limits (MRLs) for pesticides vary from country to country. The exporting firm may even purchase agricultural chemicals abroad to ensure that they are genuine.

Production contracts are also generally arranged by village officials who recruit growers. A contract typically specifies inputs, production practices, price guidelines, and environmental standards for air, water, and soil. Contractors must monitor farmer compliance. With more experience, growers may need less monitoring, and costs may decrease. But the contracting model does not burden the company with land and labor expenses.

China's Government Begins To Tackle Food Safety

Awareness of food safety issues in China has been heightened by both the rejection of Chinese food in overseas markets and a series of food safety incidents in the domestic market. The Government has responded by trying to build a food safety system for export and to establish China's international reputation for producing safe food. China has also strengthened domestic food safety standards and implementing inspection and testing systems for agricultural products and agricultural commodities. In 2005, officials announced plans to update food safety standards covering consumer food products. In 2006, the Chinese legislature adopted a law that establishes a national framework for building a system that ensures the safety and quality of agricultural products. Local governments have also been active in promoting safe

All land and packing/processing facilities for exports must be registered with Government. Exporters must have laboratory facilities to test for pesticide residue (the sophistication of the facilities varies with the riskiness of the crop). Certain agricultural exports—including canned food, some seafood, meat, frozen vegetables and vegetable juices—must be produced using HACCP-type systems. The Government has basic guidelines on food safety, but most firms must still hire food safety experts to run their operations to meet the demands of foreign buyers. Before export, the Government inspects products to ensure that they meet the standards of the foreign country or contract

Food safety for the domestic market is regulated by several government entities. The Ministry of Agriculture, Health, and Commerce; the State Administration of Quality Supervision, Inspection, and Quarantine; a newly established Food and Drug Administration; and other agencies, each with different and sometimes overlapping responsibilities, control food safety policies. The State Administration of Quality Supervision, Inspection, and Quarantine is responsible for oversight and food safety standards for imports and exports.

The Ministry of Agriculture is the lead agency promoting food safety at the farm level. Visible efforts are the promotion of pollution-free (also translated as “no harm” or “green”) food standards intended to guarantee that food products are free of chemical contaminants. The pollution-free standard, introduced in 2002, requires that producers comply with MRLs for agricultural chemicals. The green food program was initiated with an eye toward improving the safety and quality of exports, although most of the products are now sold in the domestic market. The green food program is slightly more stringent than the pollution-free program.

Both programs have standards specifying tolerances for harmful materials in soil, water, and air, as well as MRLs for pesticide residues. Both also certify production bases and use the names as trademarked symbols for use on consumer products. Packaged products carry the certification in the firm, providing a first step in a traceability system. Compliance is enforced through testing of soil, water, and air, and random testing of final products for residues.

While production of safer food is increasing, little of China’s food currently meets pollution-free standards. In 2005, about 6 percent of the volume of agricultural products was pollution free and 1 percent was green.

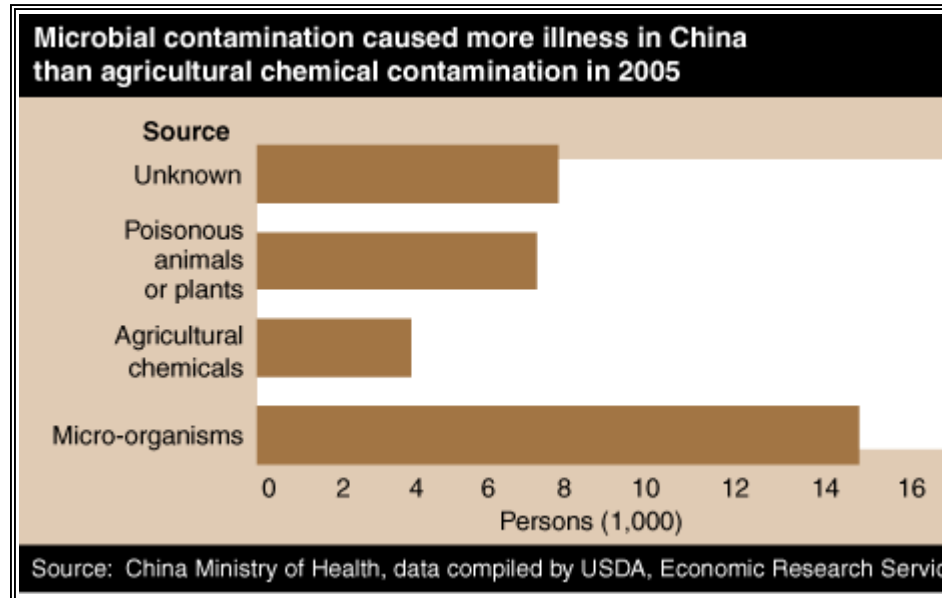
Chinese food safety efforts at the farm level are primarily concerned with chemical contamination. However, less attention is paid to the potential of microbial contamination. Statistics from the Ministry of Health, however, indicate that food poisonings and deaths from microbial contamination exceed those from farm chemical exposure. China is developing agricultural practice guidelines, ChinaGAPs, which will address minimizing the risk of microbial contamination. Initially, these guidelines are intended to aid exporters.

Government Plays a Strong Role in Implementation

Chinese consumers now commonly voice concerns about food safety, and various safety-related labels appear on food products. However, the degree of consumer confidence in food safety labels is uncertain, as is consumers’ willingness to pay for these products. Consumers in China are primarily concerned with freshness,

and taste.

The green and pollution-free standards are implemented in a “top-down” process by the Ministry of Agriculture and local agricultural bureaus working with local officials, agribusinesses. As in the business model used by exporters, domestic enterprises are often small family farmers, using village officials as intermediaries. Some domestic enterprises produce food for export production by leasing land. Some of the vertically integrated enterprises are large, modern farms that have been converted to private companies, while others are newly established Chinese corporations.



The decision to produce green or pollution-free food is usually made by local agribusiness enterprises rather than individual farmers. It is not clear whether producing green or pollution-free food is more profitable. Farmers reportedly earn a price premium of 10 percent for pollution-free vegetables, but they may also have to purchase more chemicals and incur costs to attain certification.

Safety Standards Influence China's Agricultural Trade

Foreign safety standards pose an important challenge to China's exports of horticulture, poultry, and aquatic products. Exports of more vulnerable products come chiefly from privately invested companies in coastal areas. Widespread pollution, pest and disease problems, and lax domestic food safety standards, and the difficulty of ensuring product safety through the marketing chain may prevent export-oriented production from expanding to inland and domestic companies.

Chinese officials have resolved to improve the quality and safety of food in China. Standards were aimed at export-oriented production, which has traditionally had much higher standards and often completely separate production and marketing chains from products destined for the domestic market. The gap between export and domestic standards is vast although it is narrowing, but China faces stiff challenges in producing food to higher safety standards.

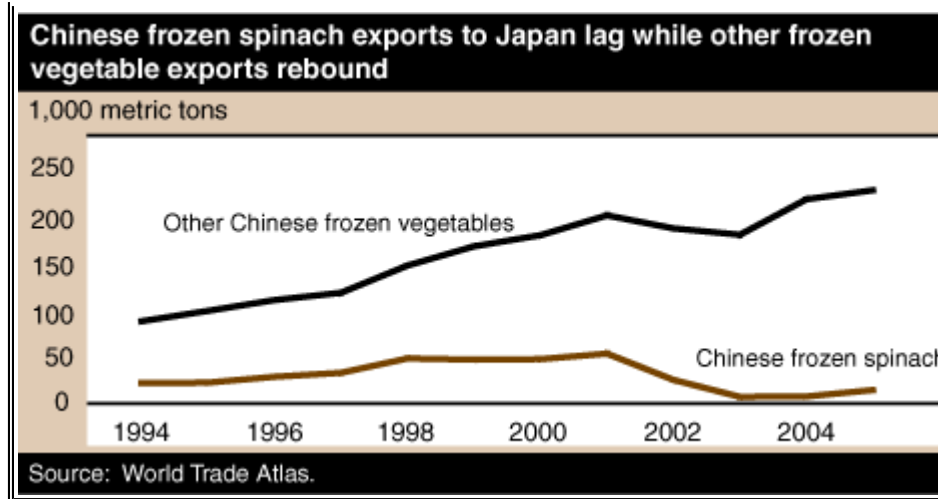
maintaining a credible inspection and monitoring system. Building consumer confidence of its food products will largely determine the competitiveness of China in both the world market and its own domestic market.

China's Frozen Spinach Exports to Japan Falter on Food Safety Problems

In the early 1990s, Japanese companies began investing heavily in vegetable production in China for export to Japan. Exports to Japan soared, and spinach was gaining ground rapidly. In late 2001 and 2002, private organizations organized by the Japanese National Federation of Farmers' Movements reported that Chinese frozen spinach showed residues of the pesticide chlorpyrifos. At that time, Japan did not have a maximum residue limit (MRL) for this pesticide on frozen spinach, so it adopted the MRL for fresh spinach. In August 2002, the Japanese Government advised firms to voluntarily stop importing Chinese frozen spinach. This adverse publicity affected imports of all frozen vegetables from China. In February 2003, the market was briefly reopened before new test results revealed continued problems with chlorpyrifos. The market was shut again in May 2003.

China worked out a protocol to meet Japanese concerns and the market reopened in July 2004. Chinese exports were initially limited to 27 firms that the Chinese and Japanese had both approved. Exporting to Japan is now more expensive than it was before the problems with chlorpyrifos. All firms are required to use their own land and cannot use production contracts, which are considered too risky for spinach. Fresh spinach is also tested for residues before harvest, as well as after processing. Japan inspects every lot of Chinese frozen spinach, which increases costs and the chance of product deterioration. While other frozen vegetable exports to Japan have rebounded, the frozen spinach market has not recovered. With heightened food safety awareness, some Chinese products can no longer be as profitable as others due to consumer and importer reluctance to purchase products associated with past problems.

Japan's new policy on agricultural chemicals (including veterinary drugs and additives) became effective in May 2006. Japan had a negative MRL list, but the new policy uses a positive MRL list. With a negative list, Japan rejects imports with residues over the existing MRLs. If an import had residues for a chemical that Japan did not have an MRL for that commodity, a case-by-case decision was made on whether it could be imported. With a positive list (like the system in the United States), Japan rejects imported commodities with residues exceeding the MRL or the default tolerance of 0.01 parts per million for cases where a commodity does not have an MRL for that chemical. In 2006, Japan had established MRLs for 288 agricultural chemicals for about 10,000 commodities. The new regulations have MRLs for 799 agricultural chemicals for about 10,000 commodity/chemical combinations. Japan now scrutinizes products for more agricultural chemicals and testing costs have increased substantially since the introduction of the new policy.



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