



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*



Food Safety Improvements Underway in China

Linda Calvin
lcalvin@ers.usda.gov

Fred Gale
fgale@ers.usda.gov

Dinghuan Hu
dhhu@163bj.com

Bryan Lohmar
blohmar@ers.usda.gov



Fred Gale, USDA/ERS

- 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 cost advantage.
- Only a small portion of Chinese production for the domestic market meets the new government standards for safer food.

China emerged in the 1990s as a low-cost exporter of food products such as vegetables, apples, seafood, and poultry. But in recent years, China's exports slowed when shipments of vegetables, poultry, and shrimp were rejected for failing to meet stringent standards in Japan, Europe, and other countries, revealing a gap between Chinese and international food safety standards. Problems with food contamination within China have made 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 standards. Numerous challenges face both the export sector, where food safety efforts are the most advanced, and the domestic sector, where many food safety initiatives are more recent. Problems with food safety can influence trade flows, as evidenced by China's setbacks for some export products. China must meet the food safety standards of the developed countries to succeed in those markets. The increased costs of achieving higher food standards will dampen the growth of Chinese agricultural exports if not offset by greater demand in the export market. 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.



Fred Gale, USDA/ERS

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 farm 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 make costly investments.

Many of China's food safety problems can be traced back to the farm level. Farmers rely on heavy use of chemicals to coax production out of intensively cultivated soils and deal with pest pressures, a practice that contributes to food safety problems. China has one of the world's highest rates of chemical fertilizer use per hectare, and Chinese farmers use many

highly toxic pesticides, including some that are banned in the United States. Farm chemicals are sometimes mislabeled. The Chinese government is tackling this problem by encouraging farmers to buy 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, poultry, and aquaculture products. Industrialization and lax environmental controls have also led to concern about the potential for heavy metal contamination of food products. Untreated human and animal waste in fields and water raises the risk of microbial contamination.

China's fragmented marketing system also poses problems. Agricultural marketing is dominated by millions of small traders handling small volumes of product, often operating on a cash basis, with no documentation. In modern marketing systems, products are identified by lot 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 have tried 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 its low labor 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 involve 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 foreign firms operating in China exert careful control over raw materials to ensure that products meet the standards of the export markets. Exporting companies have been even more vigilant since 2002 when Chinese frozen spinach in Japan was found to have

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.

high levels of a pesticide and imports were banned temporarily (see box, "China's Frozen Spinach Exports to Japan Falter on Food Safety Problems"). New Japanese rules for residues of agricultural chemicals, feed additives, and veterinary drugs, implemented in May 2006, will put further pressure on Chinese exporters.

Firms have used two business models to impose more control over production: the first is a 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 chemical use and production methods. The leasing model ensures greater control over production than the contract model, but it also costs more and is limited by access to land. Developing a production model that balances low costs against the risk of a safety problem is challenging. Exporting firms sometimes use both methods—growing the crops that are most prone to excess pesticide 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 to aggregate land into a "production base"—an area that may be as large as multiple villages and hundreds of acres. Leasing land is surprisingly expensive and involves difficult negotiations since 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 type of Hazard Analysis and Critical Control Point (HACCP) system to minimize risk in processing plants. A firm selling to a wide range of countries might face numerous stan-

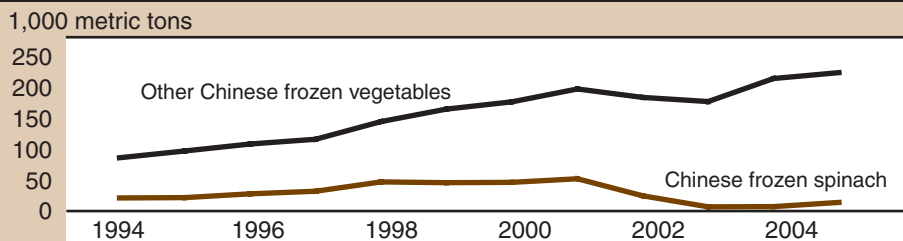
China's Frozen Spinach Exports to Japan Falter on Food Safety Problems

In the early 1990s, Japanese companies began investing heavily in vegetable production in China for export to Japan. Exports to Japan soared, and frozen spinach was gaining ground rapidly. In late 2001 and 2002, private tests organized by the Japanese National Federation of Farmers' Movements revealed 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 tests 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 leased 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 yet recovered. With heightened food safety awareness, some Chinese products may 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 feed 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 rejected any imports with residues over the existing MRLs. If an import had residues for which 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 used in the United States), Japan rejects imported commodities with residues exceeding the MRL or the default tolerance of 0.01 parts per million for those cases where a commodity does not have an MRL for that chemical. In 2005, Japan had established MRLs for 288 agricultural chemicals for about 130 commodities. The new regulations have MRLs for 799 agricultural chemicals and thousands of commodity/chemical combinations. Japan now scrutinizes products for more agricultural chemicals and testing costs have increased substantially since the introduction of the new policy.

Chinese frozen spinach exports to Japan lag while other frozen vegetable exports rebound



Source: World Trade Atlas.

dards; GAP 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 farmers. The contract typically specifies inputs, production practices, price guidelines, and minimum environmental standards for air, water, and soil. Contractors must monitor farmers to ensure compliance. With more experience, growers may need less monitoring, and costs may go down. 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 exports 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 exports that will establish China's international reputation for producing safe food. China has also been raising domestic food safety standards and implementing inspection and testing systems for consumer products and agricultural commodities. In 2005, officials announced plans to update a 1995 law 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 monitoring of agricultural products. Local governments have also been active in promoting safer food.

All land and packing/processing facilities for exports must be registered with the Chinese Government. Exporters must have laboratory facilities to test for pesticide residues (although the sophistication of the facilities varies with the riskiness of the crop). Certain processed agricultural exports—including canned food, some seafood, meat, frozen vegetables, and fruit and vegetable juices—must be produced using HACCP-type systems. The Government provides basic guidelines on food safety, but most firms must still hire food safety experts to fine-tune their operations to meet the demands of foreign buyers. Before export, the Government tests 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 Ministries 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, contribute to 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. The most visible efforts are the promotion of pollution-free (also translated as "no harm" or "safe") and green food standards intended to guarantee that food products are free of dangerous contaminants. The pollution-free standard, introduced in 2002, requires that all products comply with MRLs for agricultural chemicals. The green food program was initiated in the 1990s with an eye toward improving the safety and quality of exports, although most green food is 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 base areas, and offer trademarked symbols for use on consumer products. Packaged products carry information on the firm, providing a first step in a traceability system. Compliance is enforced by regular 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 green and pollution-free standards. In 2005, about 6 percent of the volume of agricultural production was pollution free and 1 percent was green.

Chinese food safety efforts at the farm level are primarily concerned with chemical residues; to date, less attention is paid to the potential of microbial contamination. Statistics from China's

statistics from China's



Ministry of Health, however, indicate that food poisonings and deaths from microbial contamination exceed those from farm chemical exposure. China is developing good 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 understanding and confidence in food safety labels is uncertain, as is consumers' willingness to pay higher prices for these products. Consumers in China are primarily concerned with freshness, appearance, 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, villages, and agribusinesses. As in the business model used by exporters, domestic enterprises contract with farmers, using village officials as intermediaries. Some domestic enterprises also control production by leasing land. Some of the vertically integrated enterprises are large, former state farms that have been converted to private compa-

nies, while others are newly established Chinese corporations.

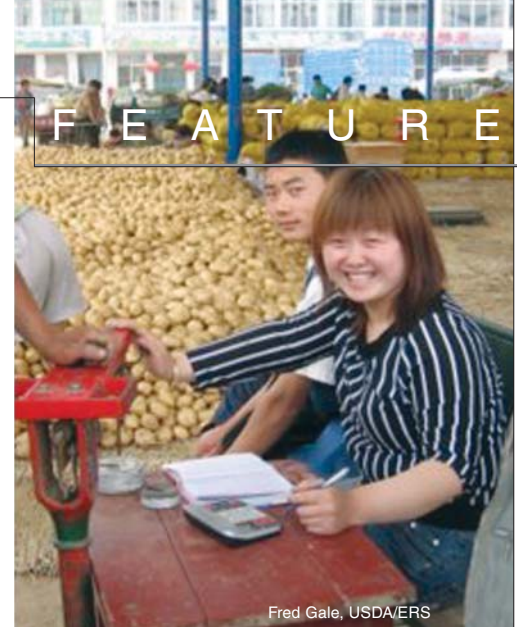
The decision to produce green or pollution-free food is usually made by local officials or agribusiness enterprises rather than individual farmers. It is not clear whether farmers find green or pollution-free food more profitable. Farmers reportedly earn price premiums of 20-30 percent for pollution-free vegetables, but they may also have to purchase more expensive 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 horticultural, meat, poultry, and aquatic products. Exports of more vulnerable products come chiefly from foreign-invested companies in coastal areas. Widespread pollution, pest and disease pressures, low domestic food safety standards, and the difficulty of ensuring product safety throughout the marketing chain may prevent export-oriented production from expanding to inland provinces and domestic companies.

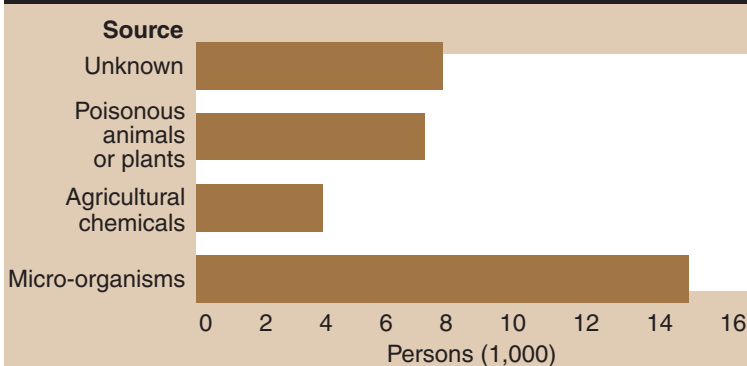
Chinese officials have resolved to improve the quality and safety of food in China. Initial efforts were aimed at export-oriented production, which has traditionally had much higher standards and often completely separate production and mar-

keting chains from products destined for the domestic market. The gap between export and domestic standards is vast although beginning to narrow, but China faces stiff challenges in



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

Microbial contamination caused more illness in China than agricultural chemical contamination in 2005



Source: China Ministry of Health, data compiled by USDA, Economic Research Service.

This article is drawn from . . .

China's Rising Fruit and Vegetable Exports Challenge U.S. Industries, by Sophia Huang and Fred Gale, FTS-320-01, USDA, Economic Research Service, February 2006, available at: www.ers.usda.gov/publications/fts/feb06/fts32001/

"A New Marketing Model: Supermarket and Processing Companies and Farm Households," by Dinghuan Hu, Fred Gale, and Tom Reardon, in *Issues in Agricultural Economy*, No. 1, 2006 (Chinese language, published in China).

You may also be interested in . . .

"Produce, Food Safety, and International Trade: Response to U.S. Foodborne Illness Outbreaks Associated with Imported Produce," by Linda Calvin, in *International Trade and Food Safety*, Jean Buzby (ed.), AER-828, USDA, Economic Research Service, November 2003, available at: www.ers.usda.gov/publications/aer828/aer828g.pdf
The ERS Briefing Room on China, www.ers.usda.gov/briefing/china/