Food Safety in Food Security and Food Trade

Case Study: Reducing Mycotoxins in Brazilian Crops

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Mycotoxins are toxic chemical compounds produced by molds, which can have important consequences in human and animal health (see Brief 3). The most important mycotoxin types are aflatoxins B1, B2, G1, and G2; fumonisin B1; T-2 toxin; zearalenone; ochratoxin A; and deoxynivalenol. In humans the presence of mycotoxins in foods can be cumulative, leading to cancers and immune-deficiency diseases. Immediate, acute symptoms may also occur. Either way, the effects are not entirely understood. In animals, mycotoxins can reduce production efficiency, increase the death rate, and reduce feed conversion efficiency. When present in feed, some mycotoxins can pass into eggs or milk and subsequently prejudice human health.

The economic consequences of the presence of mycotoxins in food, feed, and agricultural crops can be severe. In fact, mycotoxins jeopardize the safety and availability of the food supply in many countries. The Food and Agriculture Organization of the United Nations (FAO) has estimated a worldwide loss of about one billion metric tons of foodstuff per year as a result of mycotoxins.

The control of mycotoxins is a complex process: an integrated quality control program is needed throughout the production chain, since molds producing mycotoxins can either penetrate food before harvest or contaminate food products during the postharvest stages. To protect public health, governments have implemented different types of safety control procedures, including the setting of permitted limits for mycotoxins.

On the international commercial scene, some countries have established rigid standards for mycotoxins in food and feed that have negatively affected the exports of developing countries. Although the Sanitary and Phytosanitary (SPS) Agreement of the World Trade Organization recognizes the standards established by the Codex Alimentarius Commission, countries in the European Union and some Asian countries have set maximum limits for mycotoxins that in some cases are stricter than those recommended by the Codex. This is allowed under the SPS agreement as long as it is supported by scientific risk assessment. However, these stricter standards can pose additional barriers for exporting countries. A World Bank study estimates that European Union regulation of aflatoxin costs African countries US$670 million each year in export losses (see Brief 6).

Not only has the international food market become more stringent, but in Brazil companies and consumers alike have become increasingly concerned about the dangers of mycotoxins in the diet. Both public and private initiatives have been put forward to deal with the mycotoxin problem.

Brazil has not estimated its economic losses from these contaminants, nor is there an official data bank on the occurrence of mycotoxins in food products. Although not always representative of Brazil as a whole, surveys carried out by research groups indicate that aflatoxins are present in peanuts and fumonisins in maize, and that contaminants can be found in other food crops as well.

INITIATIVES IN THE PUBLIC SECTOR

In Brazil, the only food safety standards for internal consumption defined by law are for aflatoxin. These standards are set by the Ministry of Health for industrialized products (with some exceptions such as beverages), and by the Ministry of Agriculture, Livestock and Supply for animal feeds, products of animal origin, and agricultural products, among other food and feed commodities. The standards allow a maximum of 20 micrograms of aflatoxins B1 + B2 + G1 + G2 per kilogram of peanuts, peanut butter, maize grain, or maize flour destined for human consumption. And the standards call for a maximum of 50 micrograms of total aflatoxins per kilogram of raw materials destined for feed use. The Codex Alimentarius Commission and the European Union have suggested maximum limits lower than the Brazilian standard for aflatoxins in peanut products that are subject to further processing (15 micrograms in the case of the Codex and 10 micrograms in the case of the EU). For foods for direct human consumption, the European Union recommends an aflatoxin maximum of 4 micrograms per kilogram of product.

In 2001, the Ministry of Agriculture, Livestock and Supply instituted efforts to promote better controls and monitoring throughout the food system. The new program integrates the activities of monitoring, control, inspection, and tracking of contaminants, including mycotoxins. It will be implemented throughout the production chain, promoting and instituting Good Manufacturing Practices and Hazard Analysis and Critical Control Points (HACCP) principles in order to certify conformity with national standards for mycotoxins. Given the related safety mandates of the Ministry of Agriculture, Livestock and Supply and the Ministry of Health, the program will involve joint action by these two ministries. The Ministry of Health has proposed norms for Good Manufacturing Practices for the processing industry, and these are currently in the public consultation phase.

In January 2002, changes were made in laboratory certification procedures. A laboratory authorized by the Ministry of Agriculture, Livestock and Supply must test for the presence of mycotoxins in food such as peanuts, peanut products, and Brazil nuts, if an importing country requires such tests. In addition, all batches of peanuts and peanut products, maize and maize products, dried fruits, and popcorn can only be imported after a test for mycotoxin has been conducted. Importing or exporting companies have to bear the costs for these tests.

INITIATIVES IN THE PRIVATE SECTOR

During the 1960s and until the beginning of the 1970s, Brazil produced up to 1 million tons of peanuts annually. It exported this crop largely in unshelled and shelled form, as pressed meal, and as oil. Partly because of the aflatoxin problem, peanut exports and total peanut production have fallen continuously since the 1970s. At present, Brazilian production is in the neighborhood of 197,000 tons per year, in marked contrast with other traditional producers such as India (4 million tons), China (1.9 million), and the United States (1.7 million). Brazil currently exports extremely small quantities of peanuts.

The occurrence of aflatoxins has not only reduced exports of peanuts themselves, it has also raised concerns among Brazilian consumers and businesspeople about their candy industry. Currently, Brazilian peanuts are mostly consumed in the form of sweet and savory candy. Note that Brazil is the second largest candy manufacturer in the world and an exporter to the rest of Latin America. In 2001, the Brazilian Association of Cacao, Chocolates, Candies and Byproducts Industry (ABICAB) created the "pro-peanut" program, with the objective of offering safe peanut products to consumers. As a result quality control of products on the market is carried out in a systematic and methodical way. Product samples are collected and tested for aflatoxins. If a food item is found not to be in compliance with Brazilian standards, the producer may be notified directly or even denounced to the Ministry of Health. Safe products receive the "ABICAB Peanut Quality" seal. In promoting the consumption of peanuts, ABICAB also disseminates positive information about the product and stimulates the development of new technologies throughout the peanut production chain. Peanut candy can already be found on the Brazilian market bearing the ABICAB seal, thus fulfilling a consumer demand. ABICAB hopes first to help the national market recover and then to expand exports of peanut products.

In 2001/02 Brazil produced 35.3 million tons of maize. The private sector is working to reduce mycotoxins in maize used for animal feed (about 65 percent of national production). A survey of the maize-based animal feed companies, which operate mostly in the domestic market, showed that the majority already carried out mycotoxin analyses, at least for aflatoxin, which is subject to government regulation. However, a good number of feed companies also controlled levels of unregulated mycotoxins, such as zearalenone, ochratoxin, T-2, vomitoxins, and fumonisins. They did so because they raised livestock, and mycotoxins can reduce the efficiency of livestock production. These companies also invested in broad contaminant controls to increase their competitiveness and fulfill client demands. The companies do believe, however, that the costs of mycotoxin analyses are very high, with capital investment of about US$55,900, and between US$0.02 and 0.06 per ton of feed per month.

CONCLUDING THOUGHTS

Both the public and private sectors in Brazil are making a concerted effort to control mycotoxins in foods consumed by both humans and animals. These initiatives appear to be driven by both the international food market and the domestic food and feed market. Additionally, public and private actors realize that problems arising from mycotoxin contamination can affect the market for an entire production sector and not simply the market for isolated companies that fail to implement adequate food safety controls. Therefore, incentives exist for industry-wide improvement. The public sector has played a significant role in defining standards by regulating the maximum permitted limits for all mycotoxins that represent a danger to consumer health—an important step in guaranteeing food safety. Given that mycotoxin contamination can originate either before or after harvest, it should be controlled at all stages of the production chain. To achieve this, government, in partnership with the private sector, must maintain and expand its recently implemented programs, including the principles of Good Manufacturing Practices and HACCP. ■

For further reading see T. Otsuki, J. S. Wilson, and M. Sewadeh, "Saving Two in a Billion: Quantifying the Trade Effect of European Food Safety Standards on African Exports," *Food Policy* 26 (2001): 495-514; and E. Salay and A. Z. Mercadante, "Mycotoxins in Brazilian Corn for Animal Feed: Occurrence and Incentives for the Private Sector to Control the Level of Contamination," *Food Control* 13 (No. 2, 2001): 87-92. Also see the websites of the Brazilian Sanitary Surveillance Agency (www.anvisa.gov.br), the Brazilian Association of Cacao, Chocolates, Candies and Byproducts Industry (www.abicab.org.br), and the Ministry of Agriculture, Livestock and Supply (www.agricultura.gov.br).

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