Aflatoxin contamination of food commodities poses major challenges to both public health and trade. It remains a global problem in part because of the attention given to it over the past decades has been insufficient both quantitatively and qualitatively. Reducing aflatoxin contamination in a sustainable manner requires a new approach. What is required is a holistic understanding of the public health, social, market, and technological dimensions of the problem in order to construct effective solutions. This brief focuses on one of the key aspects of any solution for reducing public health and trade risks due to aflatoxin contamination: the setting and implementation of internationally agreed standards.

The Joint FAO/WHO Food Standards Programme, established by the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO) and implemented through the Codex Alimentarius Commission (CAC), establishes international standards, guidelines, and codes of practice that provide a basis for food safety management in all countries. Codex standards are explicitly recognized by the World Trade Organization as the reference for food safety in international trade.

Several Codex texts refer specifically to the management of food safety risks due to aflatoxin contamination. Effective national programs for reducing aflatoxin contamination require an awareness of these international standards and how they are developed, an adequate regulatory framework that enables implementation and enforcement of relevant standards, and the necessary support to facilitate uptake of good practices by value chain operators.

**Setting Codex standards: A science-based, global process**

FAO and WHO provide neutral and independent scientific advice that serves as the foundation of Codex’s work. Based on the risk assessments of the Joint FAO/WHO Expert Committee on Food Additives and Contaminants (JECFA), a number of Codex standards on mycotoxins have been developed, including standards for the maximum levels for aflatoxins in a number of commodities and codes of practice for preventing contamination.

Codex maximum levels (MLs) for aflatoxins in food or feed are the maximum concentration recommended by the CAC to be permitted in that commodity. These MLs are an important tool that both regulators and industry can use to demonstrate that levels of aflatoxin present in a commodity do not exceed tolerable risk. Codex establishes MLs on the basis of assessments carried out by JECFA that determine both population risk for given exposures to aflatoxins present in a commodity and also the economic possibilities of controlling aflatoxin contamination at various stages of the food chain to minimize infection by toxigenic molds and the accumulation of mycotoxin contamination in sorghum to contribute to deliberations within the Codex Committee on Contaminants in Foods. Strengthening the technical capacities within developing countries to generate, collect, and analyze reliable data on the public health and economic impacts of aflatoxin contamination can be an effective means to prevent and control aflatoxin contamination.

Recognizing this, Codex has placed emphasis on the development of Codes of Practice to guide countries in the adoption of good practices—both pre- and postharvest—in order to prevent contamination. These Codex codes are developed through expert input and are based on available evidence of hazard reduction or hazard accumulation at various points of the food chain for different production systems. The plurality of Codex guarantees an opportunity for all countries to ensure that these Codes are relevant to their particular national situation; harnessing that opportunity requires a commitment from countries to participate effectively within the Codex “system.”

**Codex Codes of Practice: An emphasis on prevention**

As outlined in the previous section, MLs are essential regulatory tools for protecting public health. It is widely recognized, however, that reliance on testing is an inefficient and ineffective approach to the control of food contaminants (FAO 2003, 2008). In particular, aflatoxin contamination is notoriously heterogeneous, which increases the difficulty of estimating true contamination levels of affected lots. Adopting good practices at all stages of the food chain to minimize infection by toxigenic molds and the accumulation of mycotoxin contamination is the best way to reduce levels of these fungal toxins in the food supply.

**Codex standards are not enough**

Codex MLs and Codes of Practice are essential tools for building a shared global view of acceptable practice. Addressing the
problem of aflatoxin contamination requires that countries actually adopt Codex MLs into national legislation and also that they adopt Codes of Practice to the local context to facilitate uptake of good practices by value-chain operators. Countries may adopt standards that differ from Codex recommendations if such action can be justified by a risk assessment and if the same level of protection applies to imports as well as to local production. Effective regulatory oversight to ensure that foods reaching the market are within established regulatory limits depends on the political will both to develop technical capacities and facilities in the country and to provide the financial resources necessary to run monitoring and surveillance programs. Furthermore, modern food control systems are based on the notion that the producers, traders, processors, and retailers have the primary responsibility for ensuring the safety of the foods they market by implementing the necessary controls at all stages of the food chain. Governments cannot address the problem of mycotoxin contamination without considering the question of how food businesses can be enabled to operate profitably while being in compliance with existing codes and limits.

Little will be gained by countries establishing food safety regulations that can neither be implemented by industry nor enforced by regulators. Key then is to determine when it is appropriate to make a requirement less stringent and when it is imperative to set ambitious goals for raising critical capacities that allow necessary requirements to be met.

In many countries, an impact assessment of regulations is an integral part of the process for proposing new or revised regulation. The high public health burden caused by aflatoxin contamination adds great urgency for governments to raise their country’s respective capacities to meet internationally agreed-upon regulation. In many developing countries diets of the poor and vulnerable tend to be less varied than diets of more affluent consumers. Consumption of staples, such as maize, that are susceptible to aflatoxin contamination is much higher in some developing countries. For example annual per capita consumption of maize in Lesotho is 150 kg compared to only 1 kg in Sweden. This fact, along with the efficacy of aflatoxin control programs, contributes to the observation that while aflatoxin exposure in Africa ranges from 10 to 180 ng/kg body weight/day, exposures in Europe and North America range from 0 to 4 and from 0.26 to 1, respectively. Correlated factors render the public health implications in Africa even more serious (Liu and Wu 2010). If the only consideration was public health, logic would support the promotion of more-stringent aflatoxin control in some low income, less developed countries.

Looking ahead

This brief underlines the fundamental role of Codex standards and well-functioning systems of food control in reducing population exposure and related public health and trade risks associated with aflatoxin contamination. There are a number of requirements to creating sound regulatory frameworks at both the international and national levels:

- Broad international commitment to contributing to the work of Codex is required to ensure that these international standards that are the reference for food safety in international trade fully consider the realities of production systems in developing countries.
- “Rational” support for developing national capacities for effective implementation of national standards and Codes of Practice is required. Such rational decisions must come from consideration of all available evidence regarding the public health, social, and economic implications of possible action or inaction regarding aflatoxin control. To this end, emerging evidence on newly recognized public health impacts of aflatoxins, such as in the area of stunting, needs to be closely considered.
- National authorities must pay careful attention to the practicability of their national regulations. Countries that recognize the imperative to reduce population exposure to aflatoxins should not only limit their attention to the ability of regulators to enforce regulation but should also consider the local industry’s ability to meet requirements while still being able to compete successfully on the market.
- There is need for foresight in understanding and reacting to the new challenges and opportunities provided by changing technological and physical environments. Climate change, for instance, is likely to lead to increased occurrence of aflatoxins and other mycotoxins (and possibly their increased co-occurrence) in many countries just as new technologies may prove effective in contributing to future efforts at aflatoxin control.

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