

# AFLATOXINS: FINDING SOLUTIONS FOR IMPROVED FOOD SAFETY

## Farmer Perceptions of Aflatoxins: Implications for Intervention in Kenya

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In 2004, the Kenyan Ministry of Health invited the US Centers for Disease Control and Prevention and the World Health Organization to investigate cases of high-fatality jaundice in Eastern Province. Testing of the maize food supply found high levels of aflatoxins, suggesting that the 125 lives lost and 317 cases reported were a result of aflatoxin poisoning.

Work began in 2008 to examine the situation on the ground and to develop technologies to reduce the risk posed by aflatoxins to both humans and animals. Surveys were carried out by AflaSTOP, a project—co-funded by USAID and the Bill & Melinda Gates Foundation and implemented by the Meridian Institute in partnership with ACDI/VOCA and Agribusiness Systems International—designed to examine storage and drying technologies that prevent further aflatoxin contamination. These surveys found that while most Kenyan farmers are aware of the dangers of aflatoxins and have ideas about preventing contamination, they still possess misinformation about the ways in which the fungus can be detected, the importance of testing, and what to do with grain when there is a problem. Furthermore, there is currently no premium offered to farmers in the marketplace for “clean” or “aflatoxin-free” maize; there is no simple, cheap testing method; and consumers lack awareness about the dangers of aflatoxins.

### Survey background

In early 2012, the International Food Policy Research Institute (IFPRI), the University of Nairobi, and AflaSTOP conducted a storage survey among 50 farmers in Eastern Province's Meru and Makueni counties. Later that year, AflaSTOP carried out a similar survey of 50 farmers in Trans Nzoia county, Rift Valley Province (North Rift). These two provinces were surveyed because they represent very different ecological environments, with Eastern Province being more drought prone, having a higher incidence of aflatoxins, and containing a larger segment of poor farmers. In North Rift, farmers are generally wealthier, less affected by extremes in weather conditions, and experience a lower incidence of aflatoxins. This brief presents the findings of these surveys.

### Aflatoxin awareness and understanding

Given that the severe outbreak of aflatoxicosis in 2004 and a second outbreak in 2010 were centered in Eastern province, it is not surprising that 93 percent of farmers surveyed in Meru and 100 percent in Makueni had heard of aflatoxins, while only 48 percent of farmers in North Rift were familiar with the term. Exactly half of the farmers in North Rift who had heard of aflatoxins thought that it was a “poison found in spoiled maize.” In comparison, 43 percent of farmers in Meru felt that it was caused by wet or rotten maize. Twenty percent of farmers in Makueni agreed with 25 percent of their counterparts in North Rift that it was a “mold that attacks maize.” These insights reveal a limited understanding of what aflatoxins are and how they are formed.

When asked specifically about the causes of aflatoxins, 65–71 percent of farmers in Makueni and Meru and 54 percent of North Rift farmers identified poorly dried and or wet maize as the cause, followed by poor storage (11 percent in Meru, 15 percent in Makueni, and 21 percent in North Rift). Twenty percent of Makueni farmers identified drying maize on the ground as a source of contamination, while 11 percent of Meru farmers identified rain on the grain as a problem. Interestingly, in North Rift, where awareness is lowest, there is a perception among 17 percent of those surveyed that shelling wet maize will cause aflatoxin contamination. Farmers, particularly in Eastern Kenya, clearly have some recognition of the connection between postharvest handling and aflatoxin contamination. In terms of threats to human health, a large percentage of farmers in all provinces agreed that aflatoxins cause death, followed by about 25 percent who felt that it causes stomach problems.

Despite some level of awareness, 57 percent of farmers in Meru stated that they did not know how to tell if maize was affected by aflatoxins, while 60 percent in Makueni and 75 percent in North Rift answered that they could tell, identifying the “discoloration of the maize” as a key tell-tale sign—even though the presence of aflatoxins cannot be detected visually. Moldiness and wetness were other indicators listed by all farmers. In Eastern Kenya, 20 percent of farmers also identified finding insects in their maize as an indicator of aflatoxin contamination. Farmers reported receiving their information about aflatoxins from extension workers and media such as radio, TV, and newspapers. Extension officers played a much more prominent role in Makueni, with 60 percent of farmers indicating that they heard about aflatoxins from this source, while 67 percent of those in North Rift and 50 percent in Meru reported receiving their information from the media.

### Prevention of aflatoxins and mold

Almost all farmers in North Rift said that they knew how to prevent aflatoxins—by “drying maize properly” and “storing it properly” on a raised platform in a dry store. The majority of farmers in Eastern answered similarly. Of the farmers in Meru, 18 percent claimed not to know any way to prevent aflatoxins—compared to zero of their counterparts in Makueni. That said, nearly all farmers surveyed were afraid to allow their own families to consume wet or discolored maize, with the majority instead feeding it to their livestock. In terms of family health problems, the majority of farmers did not believe that maize consumption was a culprit.

With regard to mold, about three quarters of farmers from North Rift and almost all farmers in Eastern Province took precautions to prevent it from affecting their maize stores by drying their grain before putting it into storage either as cobs or grain. However, within the first month of storage, 54 percent of North Rift, 50 percent of Meru, and 20 percent of Makueni farmers had mold problems, which raises questions about whether their grain is

actually dry enough for storage. Once mold was detected, farmers dealt with the problem in various ways. Airing the maize was a dominant method in North Rift, compared to Eastern Province where there was not a dominant method. All farmers indicated that they used the damaged crop for animal feed, salvaged what remained for consumption or sale, changed the storage containers used, or aired the maize.

### Willingness to pay for solutions

A second aflatoxin-control effort was Aflacontrol. This project was implemented by IFPRI in partnership with the International Maize and Wheat Improvement Center (CIMMYT), the International Crops Research Institute for Semi-Arid Tropics (ICRISAT), ACDI/VOCA, University of Pittsburgh, the Institute d'Economie Rurale (IER), and Kenya Agricultural Research Institute (KARI), and funded by the Bill & Melinda Gates Foundation. Aflacontrol found that consumers were willing to pay a premium of 20–30 Kenyan shillings (KES)—or US\$0.25–0.37—per 2kg bag for clean maize over poor quality product (presence of 5 percent moldy grains), and an additional premium of 10–15KES (\$0.13 –0.19) /2kg bag for maize that was clean and tested clear of aflatoxins. This willingness was positively influenced by consumer income and negatively by consumer age. The Aflacontrol project concluded that in order to intervene successfully there needed to be a low-cost product differentiation in the market that was also credible with consumers.

The subsequent work of the AflaSTOP project found that 28 percent of farmers in North Rift and about half of the farmers in Eastern Province claimed to be willing to pay for a drying machine or service that cost up to 225KES/90kg bag (\$29.41/mt), the higher proportion in Eastern Province perhaps reflecting a higher awareness

of the dangers of aflatoxins or difficulties faced when drying wet grains at harvest (current drying costs are estimated at \$42/mt).

### Implications for interventions

Farmers have demonstrated a willingness to pay for services that improve postharvest handling, but there is limited investment in developing such services that would have the added benefit of helping to reduce aflatoxin levels. Data shows that consumers are willing to pay for food that will not adversely affect the health of their families, but there is no credible method of ensuring that the food they buy is safe.

At the moment there is no clear consumer demand for aflatoxin-free maize. Incentives to change behavior, therefore, need to be centered around household consumption given that farmers consume large quantities of the maize they produce, store their household stocks, and sell this maize into the market. Considering the work of Aflacontrol and AflaSTOP and the respective levels of farmer awareness on the ground, it is thus clear that any intervention to reduce aflatoxin contamination and the consumption of infected grain will require the following:

- Sustained information campaign targeted at farmers via radio and other spoken media
- A comprehensive marketing campaign heightening consumer awareness and the demand for tested and labeled grain
- The establishment of a credible and low-cost system for testing and labeling grain
- Technology effectively commercialized by the private sector that addresses the harvesting constraints of smallholder farming

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