A survey of mycotoxins in livestock feeds in Ethiopia

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Abstract
Mycotoxins in feeds are a risk factor in the production of livestock due to potential adverse health effects in exposed livestock and human exposure through animal-derived foods, particularly aflatoxin exposure via milk. A survey of commodities commonly used in livestock feeds in Ethiopia was conducted to provide information on the risk-potential associated with feed commodities. Mycotoxins included in the survey were aflatoxin, fumonisin, ochratoxin, and vomitoxin. Levels of concern (LOC) were defined as 20 ppb for aflatoxin, 5 ppm for fumonis in, 100 ppb for ochratoxin, and 5 ppm for vomitoxin. A total of 933 samples were analyzed from 22 feed distribution locations spread throughout the major livestock-producing regions of Ethiopia (Figure 1). The samples were ground, and analyzed in Ethiopia using lateral mycotoxin strip test kits and analysis using HPLC methods.

Results
Aflatoxin was the most problematic mycotoxin in livestock feed ingredients, with concentrations at or above the LOC found in 31.9% of samples. Proportions of samples testing at or above LOC levels were much lower for the other toxins, with 0.1% for fumonisin, 2.3% for ochratoxin, and 0.0% for vomitoxin.

Mycotoxin concentrations at or above the LOCs were strongly associated with oil seed cake samples, including oil seed cakes prepared from nout (Niger) seed, sesame seed, cottonseed, linseed, and soybeans. Non-oil seed cake samples, including maize, rice, wheat, sorghum, and raw soybean, were generally associated with low or non-detectable mycotoxin concentrations. There was no regional bias in the distribution of feed ingredient samples with mycotoxin concentrations (Figure 1).

Discussion
Ethiopian livestock feeds are typically sold in bagged form, from distribution facilities located in livestock-producing regions (Figure 2). Bagged feeds were therefore key sampling points to represent this type of feed. Although storage conditions at feed distribution facilities were generally good, problems that could be considered risk factors for mycotoxin production were observed during the sampling campaign (Figure 3). Poor storage conditions at feed distribution facilities were, however, not generally correlated with mycotoxin concentrations at or above LOCs. Factors that determine the risk of mycotoxin contamination of oil seed cakes are therefore more likely to be associated with earlier stages of the production and distribution chain. Future studies should investigate the production and distribution chain of oil seed cakes in Ethiopia to identify mycotoxin—production risk factors and potential risk mitigation opportunities.