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Editorial - ILRI SPECIAL ISSUE 75

AFLATOXINS IN EAST AFRICA: THE IMPORTANCE OF GETTING THE FULL PICTURE

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Aflatoxins are produced by moulds that contaminate a wide range of foods and feeds. Aflatoxin B1 is commonly found in maize and groundnuts, which are staples in Africa, and is a known carcinogen. Aflatoxin M1 is found in the milk of women and lactating animals if their diet is contaminated with aflatoxin B1; it is considered a particular risk to infants and young children as milk is often part of their diet. This is additional to the risk of aflatoxin B1 which has been reported from a variety of complementary and weaning foods in Africa. Although aflatoxins are mainly found in tropical and sub-tropical countries where climatic conditions are conducive to fungal growth, risk of contamination by these toxins may also be increasing in Europe and in other temperate regions as the result of climate change. This special issue of AJFAND is a contribution to better understanding several aspects of the multi-faceted problem of aflatoxins, focused on East Africa. The objectives of the research reported can be broadly categorized as:

1. Understanding the health consequences of aflatoxins
2. Characterizing the extent of the problem
3. Identifying key elements to underpin the way forward to mitigation

In terms of understanding the health consequences, there are still critical knowledge gaps to be addressed. Aflatoxins have been recognized as an important food and feed safety issue since the 1960s because of their direct harmful effects on human and animal health, and indirect effects on trade, economies and livelihoods as the result of product rejection. Consumption of high amounts of aflatoxins can result in acute poisoning and death in people and animals. The best-studied human health impact is liver cancer resulting from long-term exposure. The World Health Organization released a report in 2015 that estimated that aflatoxins were responsible for nearly 20,000 deaths each year, 3,000 of them on the African continent. As well as causing liver cancer, aflatoxins have been associated with other health problems in people such as stunting in children

and immunosuppression. In this special issue, a paper presents the results of one pilot study showing, for the first time, an association between aflatoxin exposure from milk and stunting in children in low-income urban areas.

Livestock are a mainstay to the livelihoods of millions of East Africans. The effects of aflatoxins on animal health have been well studied and, depending on the dose, species and other factors, can include death, reduced weight gain, reduced production of eggs and milk, and immunosuppression. Decreased productivity affects people's food security and livelihoods. Aflatoxins are thus considered some of the most serious hazards in animal feed. This aspect is reviewed in one paper focusing on the impact of aflatoxins on livestock health and productivity, a relevant issue for countries with a heavy reliance on agriculture and livestock farming for food security and the economy.

In order to assess the risk to the human population, it is important to find out the extent of the problem and describe the risk factors. The toxins can contaminate many different foods: as mentioned, maize and groundnuts are particularly at risk for high levels of aflatoxin accumulation. When animals eat contaminated feed, aflatoxins may also pass into livestock products derived from them. In many parts of East Africa, maize is the most important staple in the human diet, especially for subsistence farmers and the urban poor who rely on it for their survival. This cereal is, however, also an important source of aflatoxin exposure. Papers in this special issue contribute to understanding this exposure by looking at the prevalence of aflatoxin in this and other cereals. Furthermore, high milk consumption in Kenya and growing consumption in neighbouring countries has led to a focus on aflatoxins in the dairy value chain as well, which is reflected in papers showing the levels of contamination in feeds and milk collected.

With the predicted global warming, it may be assumed that the number of countries experiencing aflatoxin contamination in their crops will increase. More knowledge about the association between climate and aflatoxins is needed, which could contribute to future development of forecasting systems. East Africa is considered a hotspot for aflatoxins given the many serious outbreaks that have occurred here, and the most serious outbreak in Kenya caused the death of 125 people, with most deaths in Makueni and Kitui districts. Since then, many studies have confirmed the almost ubiquitous presence of aflatoxins in Kenya, but nevertheless the risk within the country varies depending on various factors, which are discussed in two papers here showing approaches to map the risk of aflatoxins.

After decades of research, there is still need to identify suitable mitigation strategies to find a way towards less exposure. In spite of all the years that aflatoxins have been perceived as a risk, there is little effective control of aflatoxins in afflicted low- and middle-income countries, although there are promising initiatives from researchers and engagement from policymakers. Different mitigation strategies are discussed in a review here, and a novel approach using lactic acid bacteria in gruels is presented.

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Understanding the health impacts

- Health effects on humans
- Health and productivity impacts in animals
- Indirect effects from food losses and trade bans

- Papers 1 & 2

Finding the extent of the problem

- Prevalence in foods and feeds
- Prevalence at farms, in the field and in markets
- Risk mapping

- Papers 3-9

Identifying the way forward to mitigation

- Understanding knowledge, attitudes and practices
- Identifying the most promising interventions

- Papers 10-12

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Papers in this special issue

Understanding the health impacts

1. Assessing the impact of aflatoxin consumption on animal health and productivity
2. Aflatoxin exposure among young children in urban low-income areas of Nairobi and association with child growth

Extent and location of the problem

3. Aflatoxin B1 occurrence in millet, sorghum and maize from four agro-ecological zones in Kenya
4. Prevalence of aflatoxin in feeds and cow milk from five counties in Kenya
5. Survey of informal milk retailers in Nairobi, Kenya and prevalence of aflatoxin M1 in marketed milk
6. Assessment of pre-harvest aflatoxin and fumonisin contamination of maize in Babati District, Tanzania
7. Aflatoxin and fumonisin contamination of marketed maize and maize bran and maize used as animal feed in northern Tanzania
8. Mapping aflatoxin risk from milk consumption using biophysical and socio-economic data: A case study of Kenya
9. Examining environmental drivers of spatial variability in aflatoxin accumulation in Kenyan maize: Potential utility in risk prediction models

Finding the way forward to mitigation

10. Farmer perception of moulds and mycotoxins within the Kenya dairy value chain: A gendered analysis
11. A review of agricultural aflatoxin management strategies and emerging innovations in sub-Saharan Africa
12. Potential of lactic acid fermentation in reducing aflatoxin B1 in Tanzania maize-based gruel

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