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Mass Spectrometry 2017: The assessment of the exposure levels to mycotoxins among dairy cattle in the two South African provinces using HPLC (ESI)-MS/MSn

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Mycotoxins can be formed on crops in the field, during harvest or during storage, processing or feeding. Many different mycotoxins exist and they affect dairy cattle in many ways, the most important is perhaps immunosuppression. Symptoms of mycotoxins may be non-specific and wide ranging which may include: Reduced production, reduced feed consumption, intermittent diarrhea (sometimes with bloody or dark manure), reduced feed intake, thriftiness, rough hair coat, reduced reproductive performance including irregular oestrus cycles and embryonic mortalities. While mycotoxins can cause acute toxicity, they are more likely to cause chronic problems of increased disease and decreased milk production. Contamination of milk by aflatoxin can cause huge economic losses. Management of crops and feeds is important to reduce mycotoxin contamination. The levels and nature of mycotoxins and some of their main metabolites in dairy feed, raw milk and urine samples collected from some dairy cattle farms are currently being assessed and will be discussed in detail. The research project aims to generate data to propose recommendation to the South African government on the threat of mycotoxins contamination to animal and human health.

A mycotoxin is a toxic secondary metabolite produced by organisms in the fungus and is capable of causing disease and death in humans and other animals. The term "mycotoxin" is generally reserved for toxic chemicals produced by fungi that easily colonize crops. One species of mold can produce many different mycotoxins and several species can produce the same mycotoxin. Most fungi are aerobic and are found almost everywhere in very small amounts due to the small size of their spores.

They consume organic matter wherever there is sufficient humidity and temperature. When the conditions are right, the fungi proliferate in colonies and mycotoxin levels become high. The reason for the production of mycotoxins is not yet known; they are not necessary for the growth or development of fungi. Because mycotoxins weaken the receptor host, they can improve the environment for additional fungal growth. The production of toxins depends on the surrounding intrinsic and extrinsic environments, and these substances vary considerably in their toxicity, depending on the infected organism and its sensitivity, metabolism and defense mechanisms.

In such cases, the distinction is based on the size of the producing fungus and human intent. Exposure to mycotoxins is almost always accidental whereas with fungi, incorrect identification and ingestion causing poisoning by fungi is generally the case. Ingestion of misidentified fungi containing mycotoxins can lead to hallucinations. Amanita phalloides, producer of cyclopeptides, is well known for its toxic potential and is responsible for around 90% of all fungal deaths.

Mycotoxin contamination can be managed by spreading knowledge about mycotoxins, predicting and preventing contamination, detecting mycotoxins in cereals, effectively using contaminated cereals and selecting crops for resistance to fungi. There is a constant need to protect the health of sensitive humans and animals by limiting their exposure to mycotoxins. Many countries regulate the levels of mycotoxins in food and feed due to their importance to public health and their commercial impact.

Spices are a substrate sensitive to the growth of mycotoxigenic fungi and the production of mycotoxins. Red pepper, black pepper and dry ginger have been found to be the most contaminated spices. Physical methods to prevent the growth of mycotoxin-producing fungi or

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remove toxins from contaminated food include temperature and humidity control, irradiation, and photodynamic treatment. Mycotoxins can also be eliminated chemically and biologically using antifungal / anti-mycotoxin agents and antifungal plant metabolites.

Contamination of medicinal plants with mycotoxins can contribute to harmful human health problems and therefore represents a particular danger. Some mycotoxins are harmful to other microorganisms such as other fungi or even bacteria; penicillin is an example. It has been suggested that mycotoxins in stored animal feeds cause rare phenotypic sex changes in hens that make them look and act like males. The symptoms of mycotoxicosis depend on the type of mycotoxin; the concentration and duration of the exposure; as well as the age, health and gender of the exposed person. The synergistic effects associated with several other factors such as genetics, diet and interactions with other toxins have been poorly studied. Therefore, it is possible that vitamin deficiency, caloric deficiency, alcohol abuse and infectious disease status can all have worsened effects with mycotoxins.

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