



Aflatoxin: Toxicity to Dairy Animals and Harmful Effect of milk to Human

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Introduction

A collection of naturally occurring toxins known as aflatoxins, or mycotoxins, are mostly produced by the molds *Aspergillus flavus* and *Aspergillus parasiticus*. They have harmful effects on people, animals, and crops and can cause sickness as well as financial losses. Aflatoxin M1 (AFM1) is a hydroxylated metabolite of aflatoxin B1 (AFB1) that can be discovered in milk or milk products from livestock who have consumed contaminated feed. AFM1 is about an order of magnitude less potent than AFB1 in terms of strength. Children mostly consume milk and milk products, which are good sources of several nutrients like proteins and calcium. The production of agricultural commodities is barely keeping up with the world's growing population, according to the Food and Agricultural Organization of the United Nations, which estimates that at least 25% of the world's food crops are polluted by mycotoxins. As a result, it's important to be concerned about AFM1 in milk. On the other hand, milk is used to make newborn formula, yoghurt, cheese, and milk-based desserts like chocolate and pastries in addition to being drunk as liquid milk. As a result, it's critical to establish the presence of AFM1 in milk and dairy products in order to safeguard consumers of all ages from any potential risks. AFM1's high toxicity and cancer-causing qualities make its presence in milk a cause for concern. AFM1 is resistant to a variety of food processing techniques, including thermal inactivation, pasteurization, autoclaving, and others. As a result, it's crucial to prevent AFB1 contamination of diets in order to provide milk of the highest quality.

Occurrence Of Aflatoxin in Feeds of Dairy Cattle

Environmental elements related to preharvest crops are equally important in terms of feed contamination. Aflatoxin contamination in the field appears to be more common as a result of dryness, close planting, weed competition, less fertilizer, and other plant-stressing conditions. Cows consume



a significant amount of protein from cottonseed, which, like corn, is extremely prone to aflatoxin contamination. High ambient temperature, high relative humidity, and mechanical injury to the branches / plant prior to drying are all factors that contribute to aflatoxin contamination of cotton in the field. In addition, when crops are watered and there is a serious boll-worm infestation, there may be widespread aflatoxin contamination.

Responses of Dairy Cows to Ingested Aflatoxin

The production of milk and energy in cows depends on volatile fatty acids. Part of the reason why milk production decreased after dairy calves consumed aflatoxin could be attributed to an interference with rumen microbial activity that led to a reduction in the formation of volatile fatty acids.

Effect of aflatoxin in dairy cows

1. Unthriftiness, lethargy and anorexia.
2. Decreased milk production.
3. Normal or below normal body temperature.
4. Dry, peeling skin on muzzle.
5. Prolapse of the rectum.
6. Liver damage.
7. Elevated blood levels of cholesterol, bilirubin, glutamic oxaloacetic transaminase, lactic dehydrogenase and alkaline phosphatase.
8. Edema in the abdominal cavity.

Determination of Aflatoxins in Milk and Milk Products

Aflatoxins are one of the few dietary toxins whose levels are regularly measured at less than 20 parts per billion (ppb). Particularly at concentrations ranging from 0.1 to 5 ppb, aflatoxin M1 is observed.

Aflatoxin can be measured with primarily two different types of tests: biological and physicochemical. Bio-assays are semi-quantitative tests that are intended to demonstrate the effects of the test substance on an organism or tissue (such as mortality, lesions, etc.). It is uncommon to quantify aflatoxins in dairy products using biological techniques. Physical or chemical properties of the test compound that can be measured are used in physicochemical tests to determine the test compound's concentration. Fluorescence, ultraviolet light absorption, and colour changes brought on by chemical reactions are a few examples of these features. To measure aflatoxins, thin-layer chromatographic techniques use either a visual or an instrumental method of quantifying



fluorescence. High-performance liquid chromatography is used to analyze AFM and is based on either fluorescence or ultraviolet light absorption.

Treatment Or Stability of Aflatoxin In Milk

- A. Stability of aflatoxin M 1 in raw milk:** Approximately 40% of the AFM1 was gone after 4 days and about 80% after 6 days of storage at 0 °C. The amount of AFM1 was reduced by 11 to 25% after being stored at 5 °C for 1-3 days. Compared to artificially infected milk, the decline happened more quickly in naturally contaminated milk.
- B. Treating milk to inactivate aflatoxin:** Preventing the initial contamination of the food that dairy calves eat is the greatest strategy to get rid of AFM1 and AFM2 direct contamination of milk. Good farm management methods are the first line of defense, but storage needs to be done properly as well. Using suitable processing, shipping, and handling techniques as well as antifungal agents as needed.

The amount of AFM1 in milk was decreased by pasteurization. The amount of aflatoxin that was inactivated increased with temperature. A 32% reduction was produced via bulk pasteurization at 62°C for 30 minutes. AFM1 content was decreased by 45% and 64%, respectively, using high-temperature, short-time (HTST) procedures at 72 °C and 80 °C for 45 seconds.

References

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