

Effect of feeding type on the occurrence of Aflatoxin M1 in cow milk of high producing cattle.

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Introduction

The dairy sector will be one of the priority sectors for development among other livestock sub sectors in Sri Lanka as the country is currently in the process of achieving 100% self sufficiency in milk production by year 2016. The demand for ruminant feeds, mainly roughages and concentrates is always increasing with the increase of milk production. Since there is lack of suitable lands for enough roughage production and due to their poor quality, dairy producers tend to use higher amounts of concentrate feeds, such as rice by products, maize, coconut poonac, compound animal feeds, etc. The major problem associated with concentrate feeds is declining quality by contamination with a fungal toxin called Aflatoxins.

Aflatoxins (AF) are a group of mycotoxins mainly produced by common fungi *Aspergillus flavus*, *A. parasiticus* and *A. nominus* that present in cereals, nuts, etc. like foods and feedstuffs (Zinedine *et al.*, 2007)). Aflatoxin M1 (AFM1), a hydroxylated metabolite of Aflatoxin B₁ formed in liver subsequently occurs in milk from lactating animals consuming AFB₁ contaminated feed. (Lin *et al.*, 2004). Aflatoxins are associated with various health and production problems in lactating animals. International Agency for Research on Cancer (IARC) AFM1 as a possible human carcinogen that has comparable liver toxicity, can reduce the immunity of infants. Humans get those toxins through AFM1 contaminated milk and milk products. Several countries have established legislation to regulate the levels of AFB₁ in feeds and AFM1 in milk because of their carcinogenicity (Lin *et al.*, 2004).

Though considerable studies have been conducted internationally, research performed locally on this subject is very limited. Hence, Sri Lanka does not have standards for maximum aflatoxin levels to be allowed in animal feeds and milk. It is very important to know the amount of AFM₁ in locally produced milk. Therefore the presence of AFM₁ under various feeding practices under Sri Lankan conditions should be investigated to understand the effect of feeding and the incidence of AFM1 in the milk.

Objectives

Objectives are to detect presence of Aflatoxin M1 in milk of high yielding dairy cattle in Sri Lanka and to assess the risk of Aflatoxin M1 in milk to human health considering the levels in the milk.

Methodology

Study setting : Ambagamuwa veterinary Range, Nuwara Eliya District in Central province

Study Population: High yielding dairy cattle fed with concentrates

Sample Size: 132 dairy cattle with age group of 3-5 years

Sampling: Simple random sampling was used

Study Instrument: A self administered questionnaire and data collection form was used

Data Collection:

Data collection was done by myself and 2 assistants

During Oct-Dec 2013

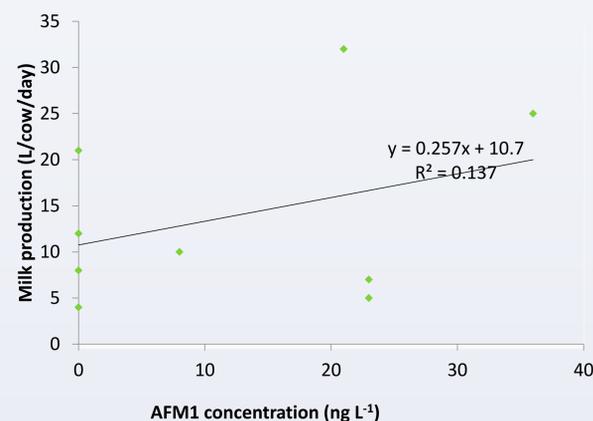
Analysis: Analysis of milk samples for Aflatoxin M₁ were carried out using Official Methods of Analysis of Association of Official Analytical Chemists (AOAC) Official Liquid Chromatographic Method 986.16

Statistical test: chi squared test. Significance level: $p < 0.05$

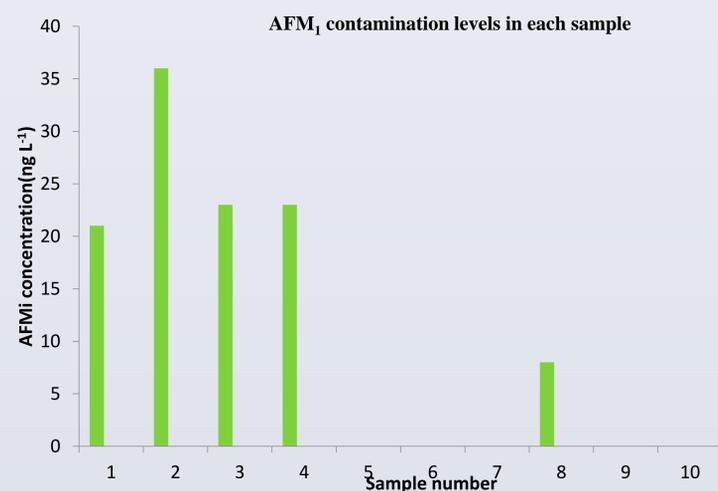
Results

In this study, results indicated no evidence of association between decreased milk production and AFM1 contamination. When compared individual feed types, coconut poonac was considered to have the most significant relationship with the AFM1 occurrence having a correlation of 0.65. Among the feed type combinations, coconut poonac and beer pulp combination had shown the highest correlation of 0.77. Grasses had shown a very poor relationship with the AFM1 occurrence in milk. However, when considering the relationship between overall concentrate feeds present in the study and AFM1 contamination in milk, it was clear that they had a significant relationship having 0.65 of correlation. Therefore, concentrated feeds should be stored properly to minimize contamination by aflatoxin like fungi. However, these findings were preliminary and further investigations would be essential to conclude on AFM1 contamination in milk and relationship of feeding types with the incidence in Sri Lanka.

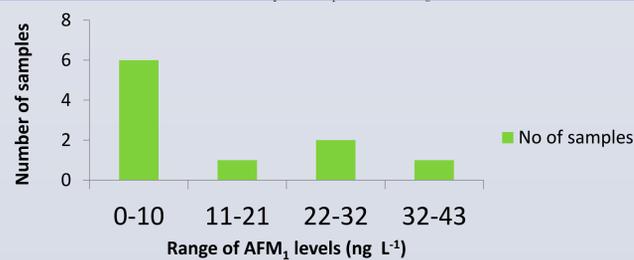
Relationship between milk production (L/cow/day) and AFM1 concentration (ng L⁻¹)



Contamination levels of AFM₁ in milk samples



Number of AFM1 contaminated samples in relation to contaminated ranges



Conclusions and Recommendations

Based on results obtained, it can be concluded that concentrate feeds have a significant relationship on the AFM1 contamination in cow milk, while grasses have no effect on the incidence. These kinds of studies would be beneficial for local dairy producers to understand the nature of aflatoxin contamination in feed and relevant authorities to take necessary precautions to protect the dairy product consumers in Sri Lanka. The presence of AFM1 in milk under various management and feeding conditions is yet to be investigated in Sri Lanka.

Acknowledgment

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