International Journal of Veterinary Sciences and Animal Husbandry 2024; SP-9(4): 23-25

ISSN: 2456-2912
VET 2024; SP-9(4): 23-25

www.veterinarypaper.com
Received: 18-06-2024
Accepted: 27-07-2024

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Management of aflatoxin contamination in feed by feed millers in Punjab

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Abstract
In Punjab, 30 feed millers were randomly chosen and subjected to questionnaire method to seek the information regarding aflatoxin contamination of their manufactured feed and methods applied to eradicate the problem. It was found that (40%) of the feed millers tested their feed on regular basis. Due to long duration of the feed, ingredients stored got spoiled and it was narrated by (63.33%) of the feed millers that feed ingredients were wasted (5-10 per cent) due to fungal spoilage. It was found that majority (40%) told that maize got more infested with aflatoxin Training of feed millers had significant ($P \leq 0.05$) positive impact on aflatoxin test conducted. Also level of education also showed a significant ($P \leq 0.05$) relation with awareness level of aflatoxin contamination in feed. This implies that regular monitoring for detection of aflatoxin in animal feed is necessary and long term solutions to control occurrence of aflatoxin in feed.

Keywords: Aflatoxin, management, feed millers, feed

Introduction
Aflatoxin contamination of animal feed threatens livestock production and can harm human health when aflatoxin B_1 (AFB_1) is carried over as aflatoxin M_1 (AFM_1) into milk for human consumption. High quality animal feed is essential for livestock productivity and profitability which eventually contributes to human food and nutrition security. Compared to forage, concentrate feeds provide more energy and nutrients such as protein, vitamins, minerals, amino acids, enzymes and organic acids, therefore feeding livestock on concentrates has been proposed among possible solutions to supplement the growing livestock feed demand and to provide the nutritional requirements for improved livestock productivity.

Aflatoxins are a group of secondary metabolites that are produced by several *Aspergillus* species with increased toxicity and carcinogenic potential. Pigs, poultry and cattle are the most important farm animals affected by aflatoxicosis. The most potent toxicant is AFB1 (Pleadin *et al.*, 2015) [7]. In this context, the reduction and prevention of the entry of hazardous substances in the early stages of the production chain, such as the primary production of feed and animal feeding, as well as the impact of animal feed on food safety, were identified as a public health priority (FAO, 2011) [5].

Feed contamination can occur before and after harvest (Smaoui S *et al.*, 2023) [8]. Mycotoxin-contaminated animal feed can occur worldwide, and this could be due to international trade. In the report recently published by EFSA in 2020 (EFSA CONTAM Panel, 2020) [3], it was highlighted that the monitoring of AFs should be continuous since climate change may increase their occurrence. Consumption of aflatoxin contaminated feed has been reported to predispose livestock to infectious diseases, increased mortality and lower productivity. Furthermore, the potential for carry-over of aflatoxins into milk and meat products threatens the quality and safety of human food.

Materials and methods
In this regard 30 feed millers were subjected to questionnaire method pertaining information regarding socio-economic characteristics of feed miller, production practices, perception regarding aflatoxin contamination of feed from districts included Amritsar, Hoshiarpur, Barnala, Sangrur, Fatehgarh Sahib, Ferozpur, Patiala, Ludhiana, Moga, Jalandhar.

Result and Discussion

Practices followed by feed millers regarding quality check for feed ingredients

The way the rural farmers makes their purchase of feed and have their buying priorities is quite different from those of their urban counterparts. Regarding purchase procedure of feed ingredients, it was found that (40%) of the feed millers purchased feed ingredients from commission agents. It may be due to feasibility of the price and ingredients according to their priorities.

Further for a concern feed ingredients kept for a long period of time and not stored properly, they got spoil due to fungus, insects etc. which would deteriorate the quality that had negative impact on the animals and found that majority (50%) of feed millers kept feed ingredients for a duration of 10-20 days. And due to long duration of the feed, ingredients stored got spoiled and it was narrated by (63.33%) of the feed millers that feed ingredients were wasted (5-10 per cent) due to fungal spoilage. Dunkel (1988) [2] found biological relationships between insects and fungi in the stored grain ingredients kept for long duration.

Table 1: Practices followed by feed millers regarding quality check for feed ingredients

S. No.	Particulars	Categories	Frequency	Percentage
1.	Purchase procedure of feed ingredients	Commission agents	12	40.00
		Directly from farmers	10	33.33
		Tenders	6	20.00
		Public auction	2	6.67
2.	Duration of storage of ingredients (in days)*	10-20	15	50.00
		20-30	7	23.33
		30-40	5	16.67
		Above 40	3	10.00
3.	How much percent of feed ingredients are wasted due to fungus	5-10	19	63.33
		10-15	7	23.34
		15-20	4	13.33
		Above 20	0	0.00

Practices followed by feed millers related to aflatoxin contamination

Developing feasible, sensitive and robust analytical methods is paramount for the identification and quantification of aflatoxin present in low concentrations in feed. By considering, a checklist was asked from the feed millers regarding aflatoxin practices which they are followed at their feed mill and it was found from Table 2, that (46.67%) of the feed millers used to conduct aflatoxin test regularly and only (6.67%) of the feed millers were had their own laboratory for testing. And it was also observed that if the prepared feed contained more aflatoxin, (66.67%) of the feed millers increased the dose of the toxin binder, (13.33%) withdrew from market followed by dilution with freshly prepared feed so as to compensate the level of aflatoxin. Complete rejected was opted by only (6.67%) of the feed millers.

Also a series of checklist of various ingredients which are more prone to aflatoxin was asked from the feed millers and it was found that majority (40%) told that maize got more infested with aflatoxin followed by cotton seed cake and the least prone to aflatoxin in this study was bajra, it may be due to several reasons from pre harvest to post harvest stage of the ingredients. The reasons behind maize being the most infested one, may be enhanced due to favorable conditions such as high moisture content and temperature, extent of contamination by aflatoxin also varied with different geographic location, agricultural and agronomic practices, storage condition of crops and more importantly processing of food materials under favorable temperature and humidity conditions**.** Aflatoxin contamination of maize exhibits a serious threat to human and animal health over the past few decades reported by Chohan *et al.* (2016) [1].

Table 2: Distribution of respondents regarding practices related to aflatoxin contamination

S. No.	Particulars	Categories	Frequency	Percentage
1.	Conduct aflatoxin test regularly for feed	Yes	14	46.67
		No	16	43.33
2.	Have own laboratory	Yes	2	6.67
		No	28	93.33
3.	If the prepared feed contains more toxin, then	Reject the lot	2	6.67
		Withdraw from market	4	13.33
		Dilute with freshly prepared feed	3	10.00
		Re direct the feed in another market	1	3.33
		Increase the dose of toxin binders	20	66.67

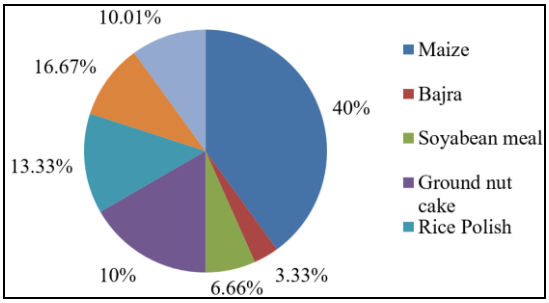

Fig 1: Highest level of aflatoxin coming in feed ingredients

Education level of Feed Millers

The results showed that majority (40%) of the feed millers belonged to high school education level. This implies that the literacy of owners will reveal the positive impact about the practices and production with regard to aflatoxin in their branded feed. As reported by Kang'ethe and Lang'a (2009) [6] that feed millers who had good education level were aware about aflatoxin B_1 in grains and excretion of aflatoxin M_1 in milk.

Training of Feed Millers regarding practices followed in Feed Industry

For greater efficacy and output, training helps developing skills and knowledge regarding practices followed at their feed plant. So same was asked from the feed miller whether they seeked any kind of training. The results revealed that (80%) of the feed millers had attained training related to feed industry. Also reported by FAO and IFIF (2010) [4] that feed millers should be trained for good practices for the feed industry and implementing systems that redefine the respective roles of industry and government in delivering safe feed.

Conclusions

Precise, accurate, affordable, and simple AFs detection means are requisite to apply regulations and measure the effectiveness of AFs control measures. Prevention of pre- and postharvest AF contamination of agricultural products, or their decrease to tolerable levels in contaminated products through removal, degradation, or decontamination, and regularity limits. In this line, good postharvest handling practices, good agricultural practices, and good manufacturing practices of AFs preventive procedures should be well developed.

In order to avoid undesirable effects related to exposure, concentrate feed manufacturers, sellers and all other value chain actors need to be sensitized on good management practices

References

1. Chohan KA, Awan F, Ali MM, Iqbal U, Ijaz M. Assessment of aflatoxin in dairy concentrate feeds, total mixed rations, silage and various feed ingredients in Pakistan. Pakistan Journal of Zoology. 2016;48(1):277-80.
2. Dunkel FV. The relationship of insects to the deterioration of stored grain by fungi. International Journal of Food Microbiology. 1988;7:227-44.
3. European Food Safety Authority EFSA CONTAM Panel, 2020. Scientific opinion—Risk assessment of aflatoxins in food. EFSA J. 2020;18:6040. [PMC free article] [PubMed] [Google Scholar] [Ref list]
4. FAO and IFIF. Good practices for the feed industry – Implementing the Codex Alimentarius Code of Practice on Good Animal Feeding. FAO Animal Production and Health Manual No. 9. Rome, c2010.
5. FAO. Quality Assurance for Animal Feed Analysis Laboratories. FAO; Rome, Italy. FAO Animal Production and Health Manual No. 14. c2011. [Google Scholar] [Ref list]
6. Kang'ethe EK, Lang'a KA. Aflatoxin B1 and M1 contamination of animal feeds and milk from urban centres in Kenya. African Health Sciences. 2009;**9**(4):218-26.
7. Pleadin J, Kovacevic D, Perkovic I. Impact of casing damaging on aflatoxin B 1 concentration during the ripening of dry-fermented meat sausages. J. Immunoass. Immunochem. 2015;36:655-666. doi: 10.1080/15321819.2015.1032306. [PubMed] [CrossRef] [Google Scholar] [Ref list]
8. Smaoui S, D'Amore T, Agriopoulou S, Mousavi Khaneghah A. Mycotoxins in Seafood: Occurrence, Recent Development of Analytical Techniques and Future Challenges. Separations. 2023;10:217. doi: 10.3390/separations10030217. [CrossRef] [Google Scholar] [Ref list]
9. Zentai A, Jozwiak A, Suth M, Farkas Z. Carry-over of aflatoxin B1 from feed to cow milk—a review. Toxins (Basel). 2023;15(3):195. https://doi.org/10.3390/toxins15030195

How to Cite This Article
Mir I, Singh P and Bedi JS. Management of aflatoxin contamination in feed by feed millers in Punjab. International Journal of Veterinary Sciences and Animal Husbandry. 2024; SP-9(4): 23-25.