

EXCRETION OF AFLATOXIN B₁ INTO MILK AS M₁ IN COWS AND BUFFALOES

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Dietary aflatoxins are excreted into milk at various levels. Mycotoxins causes decline in health of livestock and poultry and consequent economic loss to the farmers. In addition, aflatoxin M₁ in milk and milk products beyond a certain level poses health risk to human beings as it is carcinogenic, mutagenic and teratogenic (Veldman *et al.*, 1992). As limited information is available a study was undertaken to study the excretion of aflatoxin B₁ in milk as M₁.

Materials and Methods

Sixteen multiparous lactating animals, including eight of each buffaloes and crossbred cows were fed 5.0 kg compounded cattle feed, 0.5 kg groundnut cake, 4 kg paddy straw and 12 kg green maize fodder during the experimental period (3 weeks), to meet their nutritional requirement (NRC, 2001) for an average milk yield of 6.38±0.40 kg in buffaloes and 6.33±0.14 kg in cows. Compounded cattle feed, groundnut cake, paddy straw and green maize contained CP, 23.28, 36.60, 2.24, 13.06; EE, 2.36, 7.25, 1.19, 1.45; CF, 11.22, 18.21, 32.85, 32.62 and AIA, 3.57, 2.13, 13.20, 2.86 per cent, on DM basis. Animals were fed and milked twice a day and had free access to fresh drinking water.

All feeds and fodders were analysed for AFB₁ contents as per Bureau of Indian Standards IS: 13427, 1992. Compounded cattle feed, groundnut cake, paddy straw and green maize fodder, contained 20, 274, nil and nil ppb AFB₁, respectively. Total intake of aflatoxin B₁ for individual animal was 235 µg per day. After two weeks, milk samples were collected on three consecutive days. Milk samples were analysed for AFM₁ following the method suggested by the International Dairy Federation (Anon, 1990). The data were analysed statistically as per Snedecor and Cochran (1967).

Results and Discussion

In the present study, aflatoxin B₁ excretion in milk as aflatoxin M₁ was in the range of 2.06 to 4.65 per cent, with the overall mean of 2.61±0.14 per cent in case of cows (Table). Whereas, AFB₁ excretion in milk as AFM₁ in case of buffaloes was in the range of 0.95 to 2.27 per cent, with the overall mean of 1.56±0.14 per cent (Table). AFB₁ excretion in milk as AFM₁ in buffaloes was significantly (P<0.05) lower as compared to cows.

Chopra *et al.* (1999) fed 10 crossbred cows with 71.25, 150, 229.50 or 293 µg

Table - Level of excretion of aflatoxin M₁ in milk of cows and buffaloes

Total AFB ₁ intake (µg/day)		Total AFM ₁ excretion in milk (µg)		% Conversion	
Cows	Buffaloes	Cows	Buffaloes	Cows	Buffaloes
235	235	5.75	4.35	2.44	1.85
235	235	10.93	2.24	4.65	0.95
235	235	5.12	4.02	2.18	1.71
235	235	5.73	3.16	2.44	1.34
235	235	5.42	5.56	2.30	1.51
235	235	4.88	5.34	2.06	2.27
235	235	5.65	3.55	2.40	1.51
235	235	5.72	3.28	2.43	1.39
Mean ± SE		6.14±0.32	3.68±0.32	2.61 ^a ±0.14	1.56 ^b ±0.14

^{a, b} Means bearing different superscripts in a row differ significantly (P<0.05)

AFB₁ per day through contaminated concentrate mixture. Excretion rate of aflatoxin from feed to milk was 0.634, 0.391, 0.424 and 0.586 per cent, respectively. Choudhary *et al.* (1999) fed 10 lactating Kankrej cows, with AFB₁ 12.50, 25, 52.53, 77.90 or 108.45 µg per day through contaminated rations. Percentage conversion of AFB₁ from feed to AFM₁ in milk ranged from 0.15 to 1.31. The excretion of AFB₁ into milk as M₁ varies from animal to animal at similar level of intake, as reported by Chopra *et al.* (*loc. cit.*); Lynch *et al.* (1971) and Rodricks and Stoloff (1977). Pettersson *et al.* (1989) reported in Swedish Red and White breed cows consuming 108 µg AFB₁ per day, the carry over percentage vary on daily and individual basis. There was small variation amongst the different days, however, the individual variation was more pronounced which varied from 1.7 to 3.9 per cent, with the overall mean of 2.55 ± 0.76 per cent.

References

Anonymous, (1990)... IDF standards, Milk and dried milk. Determination of aflatoxin M₁ content. IDF Square, Vergote 41, B-1040, Brussels, Belgium.

Chopra, R.C., Chhabra, A., Prasad, K.S.N., Dudhe, A., Murthy, T.N. and Prasad, T. (1999)... *Indian J. Anim. Nutr.* **16**:103.

Choudhary, P.L., Sharma, R.S. and Borkhatriya, V.N. (1999)... *ibid.*, **16**:311.

Indian Standards (1992)... Animal Feeds and Feeding Stuffs. Determination of Aflatoxin B₁ Content. IS:13427-1992, New Delhi.

Lynch, G.P., Shalkop, W.T., Jacoby, M.A., Smith, D.F. and Miller, R.W. (1971)... *J. Dairy Sci.*, **54**:1688.

NRC (2001)... Nutrient Requirements of Dairy Cattle. 7th revised edn., NAS, Washington, DC.

Pettersson, H., Bertilsson, J. and Wennberg, O. (1989)... World Association of Veterinary Food Hygienists 10th (Jubilee) International Symposium in Stockholm, 2-7 July, 1989. p.97.

Rodricks, J.V. and Stoloff, L. (1977)... In *Mycotoxin in Human and Animal Health* (J. Roberts, C.Hasslitt and M. Mehliman Eds.), p.167.

Snedecor, G.W. and Cochran, W.G. (1967)... *Statistical Methods*. Oxford and IBH Publishing Co.

Veldman, A., Meijs, J.A.C., Borggreve, G.J. and Heeresvander, J.J.H. (1992)... *Anim. Prod.*, **55**:163.