

Opposite direction for seasonal variation of aflatoxin M₁ in bulk-tank milk and aflatoxin B₁ in rations: results from a prospective study in selected dairy farms of Qazvin province, Iran

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Abstract

In the present study, aflatoxin M₁ (AFM₁) in bulk milk (n=72) and aflatoxin B₁ (AFB₁) in concurrent rations (TMRs; n=48) and feed ingredients (n=230) were assessed in 12 dairy farms in winter and summer. Bulk milk was sampled on days 1, 15 and 30 of the study. Feeds were sampled at days 1 and 30. Aflatoxin was measured using ELISA kits (detection ranges: 1-81 ngkg⁻¹ for milk, 1.25-101.25 ngkg⁻¹ for feeds). AFM₁ was identified in all milk samples (range: 2.03 to >81 ngkg⁻¹; median: 70 ngkg⁻¹). Overall, 76% of milk samples (n=55/72) had AFM₁ levels <81 ngkg⁻¹ (Iranian limit:100 ngkg⁻¹). Contaminations >81 ngkg⁻¹ (n=17/72; 24%) were more frequent in winter (n=15/36 vs. 2/36). Sixty-nine percent of winter (n=25/36) and 31% of summer samples (n=11/36) had contaminations above the median. The chance of contaminations above the median was higher in winter (OR=5.33, P=0.007). All TMRs and ingredients had higher contaminations in summer. Seventy percent of summer and 30% of winter TMRs had contaminations above median (716 ngkg⁻¹). The chance of TMR contamination above median was higher in summer (OR=5.57, P=0.002). The lower AFM₁ levels in summer could be due to reduced hepatic AFB₁ metabolism and lower dry matter intake induced by heat stress. Grain mix (r_s=0.90; P=0.001), corn silage (r_s=0.66; P=0.001) and wet beet pulp (r_s=0.68; P=0.005) were the most prominent contaminants of TMRs. Due to the limitations of the diagnostic kit and different year-round nutritional conditions, higher or lower AFM₁ contaminations are probable. With the current nutritional practices, higher summer contamination may happen if heat stress is efficiently controlled.

Key words: Aflatoxin, Bulk milk, Dairy cows, Ration

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