

GEOGRAPHICAL AND SEASONAL OCCURRENCE OF AFLATOXINS M1 AND M2 IN DAIRY PRODUCTS

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Aflatoxins M1 (AFM1) and M2 (AFM2) constitute a significant public health concern and therefore require systematic monitoring throughout the dairy product supply chain. Progressive climate change increases the risk of aflatoxin contamination in feed, particularly maize silage, which may in turn lead to the transfer of these toxins into milk. In the present study, the occurrence of AFM1 and AFM2 was assessed in liquid milk obtained from conventional dairy farms in Poland across different seasons of the year, as well as in 70 milk powder samples available on the retail market and purchased in the Visegrad Group countries and Iran. Among the 228 liquid milk samples analyzed, AFM1 was detected above the limit of quantification (LOQ = 0.002 µg/kg) in 4 samples, whereas AFM2 was detected above the limit of quantification (LOQ = 0.001 µg/kg) in 3 samples; in the positive samples, AFM1 concentrations ranged from 0.004 to 0.019 µg/kg, while AFM2 concentrations ranged from 0.002 to 0.078 µg/kg. Polish raw milk was generally characterized by a high level of purity, although isolated seasonal outliers were observed, mainly during the winter–spring and summer periods. In an additional study model comprising 56 raw milk samples collected in winter and summer from farms located in three provinces of Poland, both AFM1 and AFM2 remained below the LOQ in all analyzed samples. Monitoring of milk powder demonstrated a very high safety profile for products originating from the Visegrad Group countries, while samples from Czechia, Slovakia, and Hungary consistently remained below the LOQ. At the same time, a higher frequency of aflatoxin occurrence was found in samples originating from Iran, indicating clear regional variation in the contamination profile. The obtained results confirm the high safety level of Polish raw milk and at the same time highlight the importance of continued, regionally targeted monitoring that takes into account the influence of climatic conditions, feed quality, and production practices on the risk of aflatoxin occurrence.

Keywords: aflatoxin M1, aflatoxin M2, milk, milk powder, seasonal variation, geographical occurrence

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