Aflatoxin M1 in Europe between 1990-2018

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Aflatoxin M1 (AFM1) is a carcinogen metabolite that can be present in milk from lactating animals that consume aflatoxin B1 (AFB1) contaminated feed. AFM1, in addition to being hepatotoxic and causing carcinogenic effects, is relatively stable during milk pasteurization, storage and processing of various dairy products, which makes it a potential food contaminant. Consumption of dairy products has expanded rapidly over the past decade and, given the toxicity of this compound, its presence in milk and milk products poses a high risk to the health of the consumer.

The occurrence of AFM1 in milk has been reported in many studies and considering the impact of AFM1 on human health and the economy, it is extremely important to study and understand the occurrence of this toxin in different countries of Europe over the years (from 1990-2018). The objective of this work was to study the trend of the occurrence of AFM1 in dairy products, including milk, cheese, butter and yogurt. To achieve this objective, an extensive literature search was made, in the databases Science Direct, Web of Sciences, Scopus and B-on, on quantitative AFM1 data, to evaluate the possible correlation between AFM1 concentration and sampling year, different types of milk products, applied heat treatment, and animal species' influences. For the study of heat treatment and animal species, only milk samples were considered.

Data from 106 papers (representing 65,901 samples) were extracted and analyzed using IBM SPSS Statistics 27.0 statistical software. Data collected did not present homogeneity of variance nor followed a normal distribution. The discussion is based Welch and Brown-Forsythe's methods, followed by post hoc Games-Howell to evaluate differences betweens groups.

Regarding the AFM1 distribution over the years, three decades were analyzed, 1990's (1990-1999), 2000's (2000-2009), and 2010's (2010-2018), and no significant differences were observed between the two last decades. On the other hand, it was observed a significant difference between the two last decades and the 1990´s decade, presenting the last decades the highest AFM1 levels. In what regards dairy products, milk and yogurt were statistically similar and were the groups with the lowest levels of AFM1. Contrarily, butter and cheese samples were statistically different, with butter samples presenting the highest AFM1 concentration, probably due to a mass concentration effect.

Concerning animal species, significant differences were noticed between all species analyzed. Namely, cow milk samples were the samples presenting the highest AFM1 levels, while buffalo milk samples had the lowest AFM1 levels. Regarding heat treatment, no significant differences were observed between raw, pasteurized and UHT milk samples.

This study revealed that the levels of AFM1 in the last two decades are higher than the 1990´s decade, and the concentration in butter and cheese samples is higher than in milk samples. Therefore, considering the importance of dairy products, special measures should be taken to protect feed from contamination with AFB1, since the final levels of AFM1 will depend on the initial levels at the primary production.

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Short Analytics: Poster-style presentations on analytical developments
Chair: B. Cramer

14:30 - 16:00

Occurrence of mycotoxins in winter cereal varieties
Robert Kosicki, Magdalena Twarużek, Bartosz Rudzki, Paweł Dopierała, Jan Grajewski

Multi-mycotoxin occurrence in dairy cattle and poultry feeds from Machakos town, Kenya
David Chebutia Kemboi, Phillis Emelda Ochieng, Gunther Antonissen, Siska Croubels, Sheila Okoth, Johannes Faas, Barbara Doupovec, Erastus K. Kang'ethe, Marie-Loise Scippo, Johanna Lindahl, James K. Gathumbi

Mycotoxin survey in feed materials and feeding stuffs in Poland in years 2015-2020
Magdalena Twarużek, Paweł Skrzydlewski, Robert Kosicki, Jan Grajewski

Multiple mycotoxin contamination in rice and wheat samples collected from rural Pakistan
Lei Xia, Hifza Rasheed, Michael Routledge, U Ling Liew, Ka Lau, Yunyun Gong

Aflatoxin M1 in cheese marketed in Serbia
Sandra Jakšić, Nenad Popov, Milica Živkov Baloš, Dragana Ljubojević Pelić, Ljilja Torović

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Mycotoxins and bacterial pathogens in organic cereal-based infant foods
Christina Rehagel, Ömer Akineden, Ewald Usleber

Development of an LC-MS/MS method to monitor mycotoxin-mixtures in infant feces
Magdaléna Krausová, Dominik Braun, Lukas Wisgrill, Benedikt Warth

Screening determination of ochratoxin A in spices available on the Czech market using EIA method coupled with immunoaffinity columns
Darina Pickova, Jakub Toman, Veronika Frkova, Vladimir Ostry, Frantisek Malir

Prevalence of mycotoxigenic fungi and mycotoxins in figs
Jurgita Jovaišienė, Violeta Baliukonienė, Bronius Bakutis, Inesa Arvasaitė, Gediminas Gerulis, Gintarė Vaičiulienė, Rimvydas Falkauskas

Dietary supplements based on *Epilobium parviflorum* as a source of mycotoxins?
Iwona Ałtyn, Magdalena Twarużek

Prevalence of secondary metabolites from lichenized fungi in the indoor environment
Michael Sulyok, Gianni Rossini, David Lark, Rudolf Krska

Three Fit for Purpose Sample Preparation Methods for the Determination of Aflatoxin M1 in Milk and Infant Formula with the QSight® LC-MS/MS
Derek Joseph Mattern, Aristide Ganci, Phillipe Boniteau, Jingcun Wu, Tyrally Ordinario, Feng Qin

Determination of Twelve Mycotoxins in Foods by Stable Isotope Dilution LC-MS/MS
Aristide Ganci[1], Derek J. Mattern[2], Phillipe Boniteau[3], Jingcun Wu[4], Tyrally Ordinario[4], Feng Qin[4]