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Control of milk on presence of aflatoxin residues, and the effects on public health

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Abstract

Aflatoxin is produced by *Aspergillus flavis* and *Aspergillusparasiticus*. The residue of this mycotoxin on food is dangerous for public health. So, routine control of food if they have toxic residues is very important. Especially, on milk products.Mycotoxins reproduce in favorable conditions like high temperature and humidity. The negative effects of food with mold, was discovered in China before 5000 years. Toxins formed from molfd, seriosly began to study fifty years ago. Methodology; A validated analytical methods are used for the analysis of aflatoxin in milk products. We used the Premi test and Elisa for detection of aflatoxin B1 and M1.Results; Totally 122 samples have been tested, for the presence of aflatoxin. Presence above of limits of aflatoxin on milk we found on 27 samples or 22,13% , while 95 samples or 77.87% we found no trace of aflatoxin. Conclusion; For health and consumer protection, it is essential to keepamount of residue of aflatoxin in food products as lower as possible,the normal values have been set by EU standards.

Keywords; aflatoxin, milk, food, public health

Introduction

Aflatoxins are toxic by-products produced by the mold fungus varieties *Aspergillus flavus* and *Aspergillus parasiticus* [6]. The parameters affecting levels of AFM_1 contamination in milk are the sources of animal feeds, ecologic and economic factors on the farm, and also farm management. It seems that the kind of animal feed and the harvesting time and temperature could be effective parameters in this regard [8]. Aflatoxin is metabolized by the hepatic microsomal mixed-function oxidase system, but it also can undergo several metabolic conversations depending upon species [10]. The amounts of aflatoxin M1 (AFM1) excreted in milk as a percentage of AFB1 averages 1-2%, varying from animal to an imal, from day to day and from one milking to the other. The AFM1 could be detected in milk 12-24 h after the first AFB1ingestion, reaching a high level after a few days. Then animals eat foodstuff containing AFB_1, it will be metabolized and excreted as AFM_1 in the urine and also in milk [1].

The aflatoxin concentration in the milk decreases to an undetectable level after 72 h [12]. It is observed that there was a linear relationship between AFB1 dose and excretion of AFM1into milk [2, 7]. Aflatoxins are one of the major etiological factors in the development of hepatocellular carcinoma [9], and more recently associations between childhood aflatoxin exposure and both growth faltering [5], have been reported. Moreover, as milk is the main nutrient for growing young, whose vulnerability is notable and potentially more sensitive than that of adults, the occurrence of AFM_1 in human breast milk, commercially available milk, and milk products is one of the most serious problems of food hygiene. To decrease aflatoxins risk nearly all developed countries are of the maximum permissible levels of AFB1in foods and feeds as well as the levels of AFM 1 in milk and milk products. Currently the limits of AFM1 are highly variable, depending upon the degree of development and economic standing of the countries. European Community and Codex Alimentarius prescribe that the maximum level of AFM1 in liquid milk and dried or processed milk products should not exceed 0.05 ug/kg [4]. Several studies have been conducted regarding the effect of yogurt manufacturing on AFM1 content. Some authors reported no influence on aflatoxin M1 content [3, 9]. The occurrence of AFM1 in cow milk and milk products is widespread. For this reason, milk and milk products have to be controlled continuously by accurate and reliable analytical techniques for presence of AFM1 contamination. It is also extremely important to maintain low levels of AFM1in the feeds of dairy animals. In order to achieve this, dairy cow feeds should be kept away from contamination as much as possible. Therefore, animal feds should be

checked regularly for aflatoxin and, particularly important, storage conditions of feeds must be strictly controlled.

Material and Methods

The milk samples were collected during the year 2013. We collected 100 samples from raw milk inside the country and imported products. The collection for imported products was done at the border. Samples of raw milk were taken with raw milk jar samplers from raw milk tankers, arriving directly from traditional dairy farm and after pasteurization process, samples of pasteurized milk were taken from pasteurized milk tankers. The samples were prepared for analysis of AFM1 with the competitive enzyme-linked immunosorbent assay (ELISA) method described by R-Biopharm AG, Darmstadt, Germany (Aflatoxin M130/15 Kit) by ELISA Reader. Milk samples were centrifuged for degreasing at 3500 G for 10 min at 10ºC. The upper cream layer was removed by aspirating through a Pasteur pipette. The skimmed milk was used directly in the test (100 µl per well).

Results and Discussion

After we got samples of milk we have analyzed them with Elisa test to detect the trace of aflatoxin. From our results we got high level of aflatoxin on domestic row milk. The level is over allowed (0.05µg/kg). In some cases we detect five to six time more aflatoxin on milk (Table 1). Especiaclly on region of Deqan we detecte 0.211 -0.250 µg/kg which is very high level, with possibelity to transmit to human. In the other region of Kosovo in Prizren, we detect slightly higher level of aflatoxin in milk, but not as in Deqani region. Are some exepction were we detect 0.250 µg/kg aflatoxin. In the other hand the pasteurized milk selling from domestic producers has very low amount of aflatoxin.

Table 1. Results of analysis for detection of aflatoxin on raw milk and milk after pasteurization in some region of Kosovo.

Nr.	*Samples*	*Date of sampling*	*Place*	*Level of aflatoxin*
1	Milk Vita 3.2%	21.03.2013	Peje	0.004 µg/kg
2	Milk Vita 3.2%	19.03.2013	Peje	0.003 µg/kg
3	Raw milk	08.05.2013	Pashtriku-N	**0.250 µg/kg**
4	Raw milk	08.05.2013	Pashtriku-N	**0.067 µg/kg**
5	Raw milk	08.05.2013	Pashtriku-N	**0.076 µg/kg**
6	Goat milk	13.05.2013	Pashtriku-N	0.006 µg/kg
7	Fresh milk	21.05.2013	Deqan	**0.250 µg/kg**
8	Fresh milk	27.05.2013	Deqan	**0.222 µg/kg**
9	Fresh milk	11.06.2013	Deqan	**0.243 µg/kg**
10	Fresh milk	20.06.2013	Deqan	**0.211 µg/kg**

In the imported samples of milk we got the results different from the milks of our farmers (Table 2). We detect slightly higher level of aflatoxin on some imported samples. Usually the level of aflatoxin was founded on samples imported from producers of Bosnia. The level is not so high is above the allowed amount. The reason why we found the aflatoxin on domestic row samples and in some cases from Bosnia is, the year 2012-2013 were detected a high level of aflatoxin on corn imported from Serbia. The corn and concentrate from Serbia is usally exported on neighbor countries such is Kosovo, Bosnia and Montenegro. The other imported milks has no or low trace of aflatoxin. The reason is because those countries have more strict rules and controls over all chain of food, for animal and human chain.

Table 2. Results of analysis for detection of aflatoxin in imported milk

Nr	*Samples*	*Date*	*Place*	*Level of aflatoxin*
1	Milk Meggle 3.2%	21.02. 2013	Border	**0.052 µg/kg**
2	Milk Meggle 1.5%	21.02. 2013	Border	0.008 µg/kg
3	Milk Dukat 3.8%	21.02. 2013	Border	**0.057 µg/kg**
4	Milk Dukat 3.8%	21.02. 2013	Border	0.032 µg/kg
5	Milk Primalat 3.5	21.02. 2013	Border	0.024 µg/kg
6	Milk Dukat 0.5%	21.02. 2013	Border	**0.059 µg/kg**
7	Milk Meggle 0.9%	21.02. 2013	Border	0.017 µg/kg
8	Milk Dukat 3.8%	21.02. 2013	Border	**0.059 µg/k**g
9	Milk ''Alpi'' 3.2%	21.03. 2013	Border	0.011 µg/kg

Nr	*Samples*	*Date*	*Place*	*Level of aflatoxin*
10	Milk ''Alpi'' 3.2%	21.02. 2013	Border	0.012 µg/kg
11	Milk «Bitosko''	21.02. 2013	Border	0.005 µg/kg
12	Milk Sole Drink	21.02. 2013	Border	0.014 µg/kg
13	Milk Sole Drink	21.02. 2013	Border	0.012 µg/kg
14	Milk Sole Drink	21.02. 2013	Border	0.012 µg/kg
15	Milk Sole Drink	21.02. 2013	Border	0.013 µg/kg
16	Milk Alpsko 3.5%	21.02. 2013	Border	0.005 µg/kg
17	Milk Alpsko 3.5%	21.02. 2013	Border	0.005 µg/kg
18	Milk Sole Ital	21.03. 2013	Border	0.009 µg/kg
19	Milk për kafe 3.8%	21.03. 2013	Border	0.014 µg/kg
20	Milk''Alpi'' 3.2%	21.02. 2013	Border	0.012 µg/kg
21	Milk Alpsko 3.5%	10.05. 2013	Border	0.005 µg/kg
22	Milk Zot Natura3.5%	13.05. 2013	Border	0.022 µg/kg
23	Milk Alpsko 3.5%	17.05. 2013	Border	0.005 µg/kg
24	Zott Natura Mleko 3.5%	18.05. 2013	Border	0.022 µg/kg
25	UHT Zott Natura Premium	17.05. 2013	Border	0.022 µg/kg
26	Milk Dukat 3.8%	21.05. 2013	Border	0.030 µg/kg
27	Milk Sole Italy	21.05. 2013	Border	0.008 µg/kg
28	Aptamil (Anti Regugitation)	21.05. 2013	Border	0.05 µg/kg
29	UHT Zott Natura 3.5%	21.05. 2013	Border	0.021 µg/kg

Conclusion

We found more residues of aflatoxin on domestic milk products as on imported milk products . Aflatoxins represent high health hazard for humans and animals. No method for total prevention of their presence in food and feed has been achieved. Nevertheless the presence of aflatoxins in food and feed in EU countries is under control. The presence of aflatoxin in food chain of livestock is mostly from environmental such temperature, humidity, which help to grow mycotoxins. Also harvesting of agriculture products not in proper condition is a factor for growing mold and other mycotoxic. The livestock food contaminated with molds can effect both the farm animals and human as a consumer of products of livestocks. Is very important to have regular monitoring from Agency of Food and Veterinary and Health Institution preventing the consumption of food contaminated with aflatoxin.

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