

## AFLATOXINS ON MILK (ORGANIC AND BIODINAMIC) MARKETED IN FLORENCE AREA

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### Introduction

It is believed that risks linked to aflatoxins (AFM<sub>1</sub>) contamination are higher in organic milk production than in conventional.

In a past study (Lorenzini *et al.*, 2004) we demonstrated that the AFM<sub>1</sub> is not only a problem for organic agriculture, but also for conventional agriculture. Therefore, adopting preventive measures, it is possible to produce safe milk for human consumption also in Mediterranean areas where the warmer climate increases the risk of AFM<sub>1</sub> contamination in the maize.

The aim of this work has been to establish what is the actual risk linked to AFM<sub>1</sub> contamination of milk in the organic Italian market.

### Methodology

The study was initiated with a literature review, in order to evaluate the problem of the AFM<sub>1</sub> in the milk marketed in the Florence area.

Dairy Centre of Florence, Pistoia and Livorno (Mukki Latte) carried out the laboratory analyses on organic and biodynamic milk, using the official methodology (HPLC).

The analyses were carried out for three times, every ten days, on samples bought in the supermarkets of Florence throughout February 2005.

**Table 1** Organic milk samples.

	Organic				Biodynamic	
	Pasteurized		UHT		UHT	
	Entire	Partially skimmed	Entire	Partially skimmed	Entire	Partially skimmed
N° of samples	4	2	3	1	1	1

Amongst the methodologies used for the analysis of AFM<sub>1</sub>, the liquid chromatography was the most efficient. This methodology has a high sensitivity and specificity and with this it is possible to resolve 5 ppt (ng/kg) of AFM<sub>1</sub> in milk. In comparison to the HPLC method, the ELISA (Enzyme-Linked Immunosorbent Assay) methodology shows the following advantages: high specificity, relatively simple and short assay time (4 hours).

The data obtained from the analyses were reported on tables underlining the legal limits.

## Results

### *Literature review*

One study was carried out on 2002 to evaluate the occurrence of AFM<sub>1</sub> in milk and dairy products (Capei and Neri, 2002). A total of sixty samples of commercial milk were collected in supermarkets in Florence and checked for AFM<sub>1</sub> by using direct competitive enzyme-linked immunosorbent assay (ELISA). The incidence of AFM<sub>1</sub> contamination in samples analysed was very high (91-94% of positive samples). It was found, above detection limit (d.l.) of 3 ppt, in 55 (91.6%) of the milk samples in amounts ranging from 3 to 35 ppt with a mean concentration of 9.3 ppt. None of milk samples exceeded the European and Italian legal limit of 50 ppt. The results showed a diffuse microcontamination of AFM<sub>1</sub> in samples analysed, which does not appear to be a serious risk to public health.

**Table 2** Market trend of milk (Data referred 2001 and % variations on the previous year).

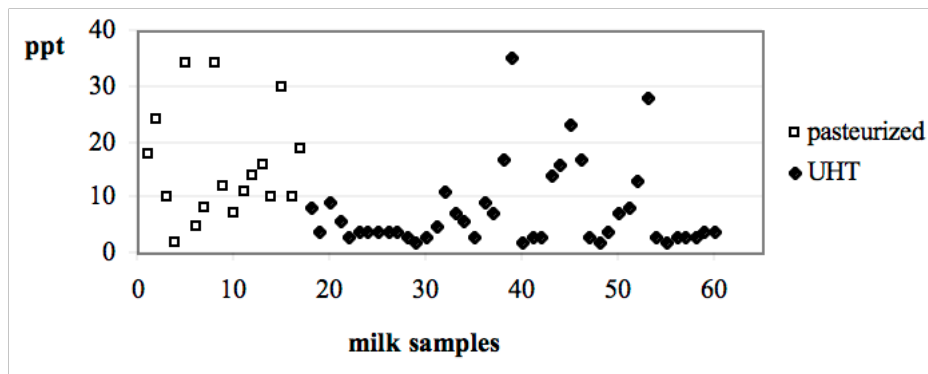
Product	Market in volume (tons)	Dynamics of consumptions (%)
Pasteurized milk	449.000	+ 5,7
UHT milk	896.000	+ 4,3

**Table 3** Occurrence and levels of AFM<sub>1</sub> in milk.

	Number of samples	
	Pasteurized milk	UHT milk
	N. (%)	N. (%)
< d.l.	1 (6)	4 (9)
> d.l.	16 (94)	39 (91)
Total	17	43
Range (ppt)	N. (%)	N. (%)
3 - 10	6 (38)	30 (77)
11 - 20	6 (38)	6 (15)
21 - 30	2 (13)	2 (5)
31 - 40	2 (13)	1 (3)
41 - 50	0	0
media ± S.D.	15,5 ± 9,8	7.5 ± 7,2

d.l. = detection limit (3 ppt)

**Figure 1** AFM1 dispersion in milk samples.



**Analyses made by Mukki Latte**

Mukki Latte commercializes organic milk under the label “Podere Centrale” from two dairy farms in Mugello and one from Lazio (pasteurized entire and partially skimmed, and UHT entire).

Mukki Latte carried out analyses on organic milk, using the official methodology HPLC.

We can evaluate that the organic milk marketed in Florence reach about the 5-6%, and the Podere Centrale label represents the 80% of this amount.

**Table 4** AFM<sub>1</sub> in organic milk. Number of samples analysed by Mukki Latte.

	Organic				Biodynamic	
	Pasteurized		UHT		UHT	
	Entire	Partially skimmed	Entire	Partially skimmed	Entire	Partially skimmed
<b>1<sup>st</sup> analysis</b>						
< d.l.	2	1	3	1	1	-
> d.l.	2 (7 and 24 ppt)	1 (13 ppt)	0	0	0	-
<b>2<sup>nd</sup> analysis</b>						
< d.l.	0	1	3	1	-	1
> d.l.	2 (7 ppt both)	1 (14 ppt)	1 (14 ppt)	0	-	0
<b>3<sup>rd</sup> analysis</b>						
< d.l.					-	-
> d.l.					-	-

d.l. = detection limit (5 ppt)

It was impossible to find all the kinds of milk for all the three analyses, because some milk labels were not available in the supermarkets.

## Conclusions

- 1) The Biodynamic milk seems always free for AFM<sub>1</sub>. But, for the biodynamic philosophy, a milk sold as UHT could be not so correct.
- 2) Few samples (pasteurized and UHT) showed positive results for AFM<sub>1</sub>, but all under the EU legal limits of 50 ppt.
- 3) Comparing these results with the bibliographic data about conventional milk market in Florence area in 2001, we can assert that the risk of AFM<sub>1</sub> in organic milk is at a very low level.
- 4) May be in the future, using the adopting preventive measures, it will be possible to produce organic milk without AFM<sub>1</sub>.
- 5) Possible solutions to realise this aim are the following:
  - a. Preventive analysis on milk and feed produced on the organic farms,
  - b. Adopting a good management of the maize crops,
  - c. Adopting a correct harvesting and keeping maize system.

## References

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- Capei, R., Neri, P., (2002) *Occurrence of aflatoxin M1 in milk and yoghurt offered for sale in Florence (Italy)*, Ann. Ig. 2002 Jul-Aug; 14 (4): 313-9.