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Lab Highlights
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# DETERMINING AFLATOXIN M IN MILK USING SEP-PAK® CARTRIDGES

When Aflatoxin B1 is consumed by animals it is metabolized to the hydroxylated form, Aflatoxin M1. One product which can be contaminated in this way is milk. This gives reason for concern because it is fed to infants and the young of most animals seem to be the most affected by aflatoxins. In the USA, the action level for M1 in milk has been set by the FDA at 0.5 µg/L (500 parts per trillion). The Netherlands and Switzerland recently adopted a tolerance limit of a ten times smaller amount (50 parts per trillion) in milk and Switzerland, a tolerance of 10 parts per trillion of M1 in milk intended for babies (1).

Chang and DeVries (2) state that when Aflatoxin M1 is present in milk at levels less than 0.5 µg/L it is difficult to detect by the AOAC method which uses TLC. These authors developed a rapid LC method.

In 1979, Winterlin et al. (3) published a method for extracting M1 by passing milk directly through a $C_{18}$ SEP-PAK® cartridge. The cartridge was eluted with 40% acetonitrile, made up to volume in a 5 ml flask and injected into an LC. The total time for analysis was about 20 minutes, including the LC analysis. They found that a sensitivity level of 0.1 µg/L could be attained with recoveries of 80 to 100% at this level. The results showed good agreement between this method and the AOAC method.

A more detailed method using $C_{18}$ SEP-PAK® cartridges has been published by Ferguson-Foos and Warren of the Florida Department of Agriculture and Consumer Services (4). They used a second cleanup on a short silica column. They confirmed that samples took only about 10 minutes to prepare and the LC was done in 20 minutes. They have used the method since 1980 for thousands of samples.

Consumers, and the authorities who protect them, are primarily interested in measuring market milk as supplied to the consumer. Such milk comes from a bulk supply used in the pasteurizing and packaging process. However, the milk processor risks financial loss if contaminated batches from individual farms are mixed into this bulk supply. Thus, if contamination is found to be occurring, they wish to know which farms are producing the contaminated milk. Qian et al. (1) carried out a study which demonstrated that $C_{18}$ SEP-PAK® cartridges could be used in the field. Milk at the farm gate could be sampled using a SEP-PAK® cartridge which could then be sent to a lab for analysis.

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They collected Aflatoxin M1 on SEP-PAK® cartridges and kept them for 11 and 24 days at ambient temperature before analysis. Recoveries were found to be 98.2 + 1.2% and 88.2 + 3.8% respectively. Even after 5 days at 40°C, average recoveries were found to be 82.0 + 3.5%. They used both LC and RIA for the determinations. These workers concluded, "Specimens can be collected and extracted at any location and the columns shipped unrefrigerated to any laboratory for subsequent analysis without fear of sample spoilage, decomposition and/or contamination."

Thus SEP-PAK® cartridges can be used for the rapid and easy sampling of milk from the farmer right through to the customer.

A useful technique indeed!

1. Qian, G-S., Yasei, P. and Yang, G. C., Anal. Chem. 56, 2079-2080 (1984).
2. Chang, H. L. and DeVries, J. W., JAOAC, 66 (4) 913-917 (1983).
3. Winterlin, W., Hall, G. and Hsieh, D. P. H., Anal. Chem. 51 (11) 1873-1874 (1979).
4. Ferguson-Foos, J. and Warren, J. D., JAOAC, 67 (6) 1111-1114 (1984).