FONDAZIONE BRUNO KESSLER
MAGAZINE

Better, Faster Detection of AFM1 Contamination in Milk

July 11, 2017

A breakthrough in the dairy industry has been achieved with the development of new high-tech devices for improving quality control, particularly regarding contamination by the fungal toxicant aflatoxin M1 (AFM1)

One of the greatest concerns facing the dairy industry is the timely detection of aflatoxin M1 (AFM1). This potent carcinogen originates in feed contaminated by a mould (Aspergillus Flavus) and may be transferred into the milk of the infected animal. As it is not deactivated by pasteurization or UHT treatment it can be found in dairy products and concentrated in cheese.

AFM1 thus represents a threat to both human health and the economic success of the dairy industry. The technology currently available for its detection is laboratory based and often requires time-consuming sample preparation. By failing to provide rapid identification of the carcinogen, the industry is unable to deliver cost-effective management of milk quality.

Launched in 2013, the project SYMPHONY (Integrated system based on photonic microresonators and microfluidic components for rapid detection of toxins in milk and dairy products) set out to develop a faster, more efficient approach for detecting AFM1 in milk.

A fresh approach

‘The aim is to provide a new method for milk analysis, enabling precise quality control and production management,’ explains Dr Leandro Lorenzelli, the coordinator of SYMPHONY. ‘The system allows contamination to be detected at an early stage of the milk processing chain, thereby simplifying milk control logistics, minimising hands-on labour and improving product quality,’ he adds.

Project partners used biochemistry and novel microfluidic technologies to create a miniaturised device capable of sample purification and pre-concentration by using the selectivity of aptamers and antibodies. Photonic resonators based on a low-cost silicon-based optical sensor were integrated into a smart system in order to achieve the high sensitivity required for detection of the toxicant.

‘The main purpose of the sample preparation stage is to clean the milk sample from unwanted components like fats,’ states Dr Andrea Adami, project technical manager. ‘These may interfere with the following stages and cause clogging of the system; it also concentrates the toxin to allow detection,’ he continues.

Improved quality control and food safety

Using the SYMPHONY device as an automated sampling and analysis unit for the Hazard Analysis and Critical Control Points (HACCP) food safety management system will result in better quality control and management of specific risk factors, leading to improved public health safety.

This preventative approach enables contamination to be detected at an early stage by testing each batch entering the production chain more quickly and in larger samples. In addition, farmers are provided with effective feedback, ensuring timely on-farm management of the contamination by taking rapid action on herds and feed.

‘The result will be a considerable reduction in the economic loss to farmers and dairies and an improvement in the quality of the finished product,’ claims Dr Adami.

A growing market

Many factors determine the occurrence of AFM1 in milk, such as climate, farm and cow health management, quality of sampling and frequency of sampling. Recently, the effects of climate change such as warmer temperatures and drought-damaged plants are potential candidates for AFM1 outbreaks in temperate regions that are normally toxin free.

Hence, there is a growing need for the SYMPHONY automated system, the production of which will help to make the EU the market leader for AFM1 testing. In addition, the technology can be easily transferred to other sectors of the agro-food industry as well as the environmental sector. (via)

PERMALINK

https://magazine.fbk.eu/en/news/better-faster-detection-of-afm1-contamination-in-milk/

TAGS

- #BioMEMS
- #cmm
- #research

RELATED MEDIA

- Symphony Project website: http://symphony-project.eu/
- BioMEMS: https://biomems.fbk.eu/