

DETECTION OF ARTIFICIALLY CONTAMINATED UHT SPRAY WHIPPED CREAM: A CHALLENGE TEST

Valík, L., Šípková, A., Kocková M.

Department of Nutrition and Food Quality Assessment, Faculty of Food and Chemical Technology STU, Radlinského 9, 812 37 Bratislava, lubomir.valik@stuba.sk

Keywords

Detection of unsterility, whipped cream, ATP, flow cytometry, microbial oxygen consumption

Abstract

Detection of microbial contamination of UHT products is an integral part of their production. It is influenced with various factors concerned mostly with type contamination, viability of the microbial cells present in a product, detection method and properties of the product.

In our study, the challenge test with whipped spray cream was performed. The UHT cream was artificially contaminated in cans with the raw milk just before the whipping. Pre-calculated levels of contamination, approx. 1 cells/mL and 10 cells/mL were confirmed by the cultivation.

The aim of our study was to consider the procedure of detection, including pre-incubation, time of incubation, and evaluate detection of microbial contamination by ATP methods (ATP I, ATP II), flow cytometry (FC) and by the rapid method detected microbial oxygen consumption (MOC).

Results

ATP I method was characterized with higher level of RLU representing the background of the sample. ATP II method showed more reliable and less variable RLU values of the background. Both, they were able to detect microbial contamination reliably at higher and lower inoculation level after 24 h and 30 h of incubation of the samples at 30 °C, respectively. However, significant correlation between the results determined by ATP I and ATP II was found ($r = 0.957$), we had to reject the null hypothesis at the 5% significance level. Both the databases were statistically different to each other. The lower RLU values by ATP I method were overestimated and higher RLU were underestimated in comparisons with RLUs by ATP II. FC and MOC provided highly correlated results to viable counts ($r = 0.953$; $r = 0.948$, respectively), but the values by MOC method were the closest to the results determined by cultivation methods. Thus the null hypothesis was not rejected only in this case by Student t method (Analyse-it, Leeds, UK).

Conclusion

Classical methods of detection of microbial contamination in whipped cream as measuring titratable acidity or pH were not suitable. Rapid indirect tests also required incubation of the samples (longer than 2 d) and provided less sensitive responses in comparison with cultivation methods. To evaluate the probability of detection of contaminated sample, the sampling plan and number of samples taken should be also considered.

Industry - University benefits

This work provided to producer information to revise control system of UHT production. The university had an opportunity to perform and evaluate the challenge test in real industrial condition. Involving the students and teachers in the project had a great impact on their experience and on improvement of teaching of the subjects such as Food Technology and Dairy Microbiology.