

Understanding the Numbers: *Interpreting Hygiene Indicators and other Microbiological results*

Microbiological sampling and interpreting results could perhaps be reasonably compared to the search for extra-terrestrial life in a science fiction story. The milking machine, the bulk tank... these represent a vast universe that may, or may not, be home to creatures that threaten our very existence. Are we alone in this great, empty space, or are the inhabitants of planet Listeria waiting to attack?
by Paul Thomas



When the results of a single 25ml milk sample are returned showing “absence” of *Listeria monocytogenes*, is it really possible to say with great certainty that the milk is free from that organism... or is it comparable to surveying a few thousand miles of a distant planet and declaring the universe to be devoid of life?

The inherent uncertainty associated with microbiological sampling has the potential to alarm food producers, but I would argue that better understanding of these limitations can help us to draw more meaningful conclusions from the data and to manage safety in an effective way. The inability of end product microbiological testing to act as an effective basis for food safety management led to the development of HACCP – Hazard Analysis Critical Control Points – appropriately enough as a by-product of the space programme. HACCP is a systematic approach to identifying and controlling relevant hazards during manufacture that has become the basis of modern food safety culture.

In my lecture, at 6pm on the 7th of September, I will be discussing the various microbiological parameters that we can test for and what the results might mean.

- » *How does plate count relate to bactoscan?*
- » *What does a thermophilic count or psychrotrophic count tell us and how can they be used to evaluate the effectiveness of cleaning procedures?*
- » *Why might we look at indicator organisms, including Listeria species?*
- » *What are the relative merits of the various the faecal contamination indicators (Enterobacteriaceae, coliforms, and E.coli) and how might they be linked to possible presence of a pathogen?*
- » *How can we use trend analysis to identify emerging problems before a serious incident is encountered?*

We will explore the importance of the lab reporting sample temperature accurately and discuss the other possible sources of erroneous results. I will also explain the limitations of testing when looking for a pathogen that may be present with a low prevalence. What exactly are the chances of finding that needle in a haystack?

Several years ago, I developed a game called “Microbiological Bingo” for Teacheesy, an EU-funded programme set up to develop tools that could be

used to train small dairy processors on good hygiene practices and the application of HACCP-based procedures. In the game, participants try to match numbers to identify the presence of a contaminant in a food consignment. Sadly, very few people “win” when playing microbiological bingo. The needle usually remains unfound!

Microbiological analysis is a useful means of verifying the effectiveness of good hygiene practices, but these practices rather than the verification will ultimately determine the success of the food safety management system. Careful interpretation of the results though can focus attention on the areas where there is room for improvement.

About the writer

Based in Berlin, Paul Thomas is a freelance dairy technologist and hygiene advisor. He currently provides technical advice to members of the Raw Milk Producers Association, Specialist Cheesemakers Association, CAIS (the Irish cheesemakers association) and the Guild of Fine Food.

Paul was one of five co-authors of the *European Guide to Good Hygiene Practices in the Production of Artisanal Cheese and Dairy Products*, published by the European Commission and he has previously delivered training courses to food enforcement officers in the UK on behalf of the Food Standards Agency and Food Standards Scotland.