Training Exercise: "Microbiological Bingo"

Notes for Trainers

Two possible classroom-based exercises are outlined below in order for the trainer to demonstrate the limitations of microbiological sampling.

The exercises take the form of a game called "Microbiological Bingo". It can be linked to training on HACCP (especially verification methods), self-monitoring and non-conformity management.

It is important for the trainer to convey the message that effective HACCP-based plans are a more reliable way of ensuring consumer safety than through increased sampling alone.

Exercise 1

The trainer should ask their trainees to pick one number between 1 and 200 and write it on a piece of paper.

The trainer should pick ten numbers between 1 and 200 and write them on a piece of paper without disclosing them to the trainees.

The trainer should tell the trainees that the numbers represent the number of 25g samples in a batch of cheese made by a small producer. The batch consists of 10 x 500g cheeses; 5kg in total. The trainer should state that, unknown to the cheesemaker, the batch is contaminated with *Salmonella* with a prevalence of 5% (i.e. 5% of the samples will show the contaminant).

The trainer should begin reading out the numbers and the trainees shout call "bingo" if their number is called.

The trainer should ask the students to consider the proportion of the students who successfully identified the contaminant and the proportion who missed it.

Exercise 2

The trainer should ask their trainees to pick five numbers between 1 and 400 and write them on a piece of paper.

The trainer should pick twenty numbers between 1 and 400 and write them on a piece of paper without disclosing them to the trainees.

The trainer should tell the trainees that the numbers represent the number of 25g samples in a batch of cheese made by a small producer. The batch consists of 5 x 2kg cheeses; 10kg in total. The trainer should state that, unknown to the cheesemaker, the batch is contaminated with *Listeria monocytogenes* with a prevalence of 5% (i.e. 5% of the samples will show the contaminant).

The trainer should begin reading out the numbers and the trainees shout call "bingo" if any of their numbers is called. The game continues until all twenty numbers have been read out.

The trainer should ask the students to consider the proportion of the students who successfully identified the contaminant and the proportion who missed it. The trainer should then ask to consider how many students identified the contaminant in:

i.   Two or more samples.
ii.   All five of their samples.

Suggestions for further discussion:

The trainer may wish to initiate group discussion on any of the following topics:

- The 'clustering' of microorganisms within a food.
- Sharing experiences of microbiological non-conformity.
- Explaining the microbiological criteria applicable to dairy products and the meaning of sample number (*n*), "big-M" and "small-m" as outlined in Regulation (EC) 2073/2005.
- Reduction of sample number based on historical results and the requirement to test with *n=5* in the event that contamination is suspected or a new process is developed.

Suggested questions for discussion:

- *Listeria monocytogenes* is identified in a batch of ripened blue cheese. The physicochemical parameters of cheese suggests that it is able to support the growth of *Listeria.* After holding the cheese for a period of two weeks, a single sample is analysed for presence of *Listeria monocytogenes.* Listeria is not detected in the 25g sample. Can the cheese be placed on the market?
- Coagulase-positive Staphylococci are identified in a hard cheese at 48 hours after production. The count exceeds 100,000cfu/g. A 25g sample is sent for toxin testing but staphylococcal enterotoxin is not detected. Can the product be placed on the market?