



# Proficiency testing program in milk and milk products microbiology: enumeration of *Staphylococcus aureus* and detection of staphylococcal enterotoxins

Jolanta G. Rola, Weronika Korpysa – Dzirba, Anna Czubkowska, Monika Ostrowska, Jacek Osek  
 Department of Hygiene of Food of Animal Origin  
 National Veterinary Research Institute, Pulawy, Poland  
 e-mail: jolarola@piwet.pulawy.pl

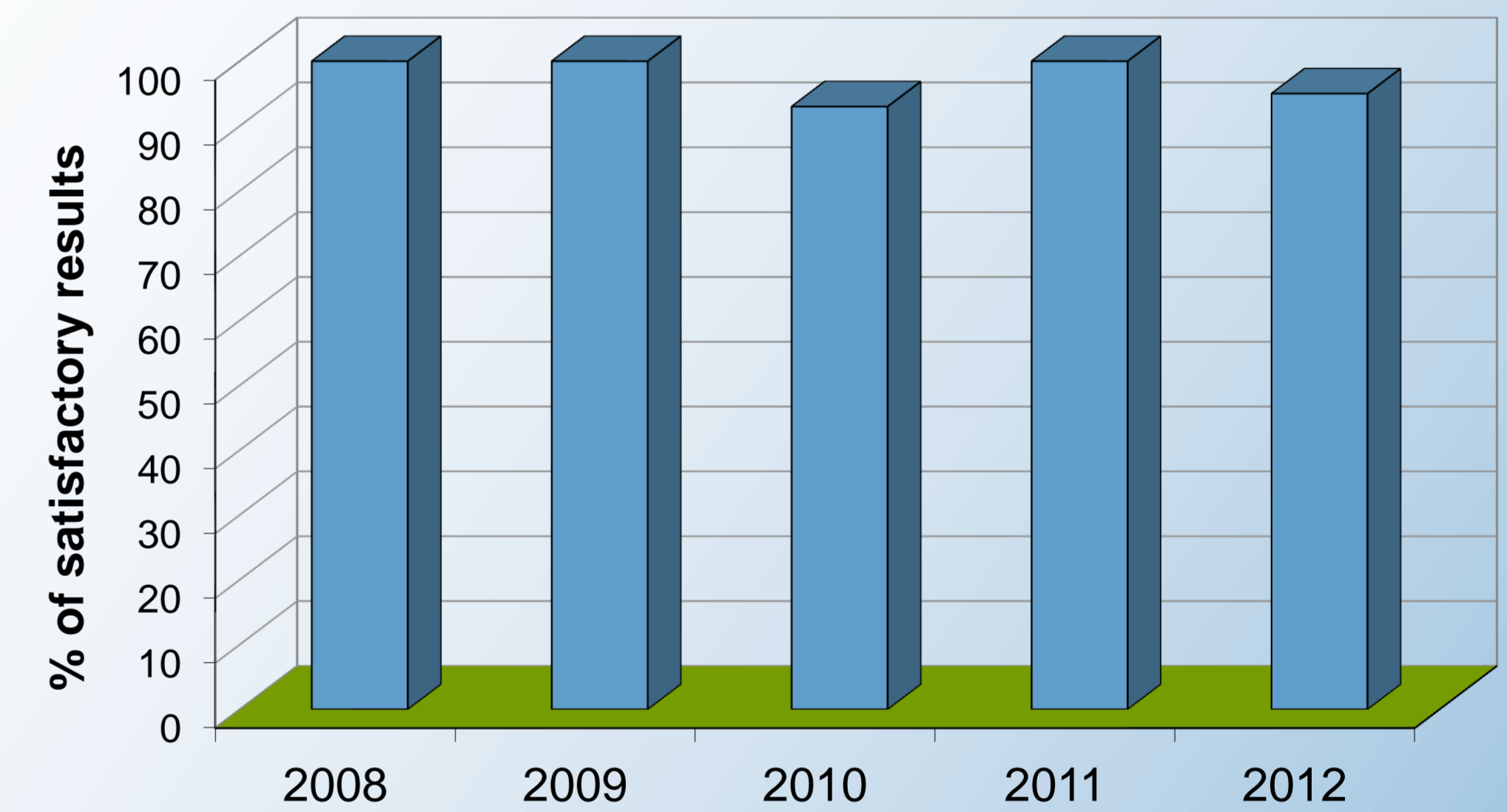
The National Veterinary Research Institute, Department of Hygiene of Food of Animal Origin as the National Reference Laboratory for staphylococci (NRL CPS) organized proficiency testing (PT) to evaluate the ability of official laboratories to perform enumeration of coagulase-positive staphylococci (CPS) as well as detection of staphylococcal enterotoxins (SEs) types SEA – SEE. The PT was organized and performed according to the ISO/IEC 17043 and ISO/TS 22117 standards.

The presented results concern the PT on enumeration of CPS and detection of SEs in milk and milk products organized in the years 2008 – 2013.



| ENUMERATION OF CPS     |                             |                             |   |   |   |
|------------------------|-----------------------------|-----------------------------|---|---|---|
| YEARS                  | 2008                        | 2010                        | 2011  | 2012  | 2013  |
| NUMBER OF PARTICIPANTS | 23                          | 21                          | 18  | 18  | 23  |
| NUMBER OF SAMPLES      | 3                           | 5                           | 4   | 4   | 1   |
| MATRIX                 | Soft cheese                 | Lyophilized soft cheese     | Milk powder + lyophilisate of the bacterial culture | Milk powder + lyophilisate of the bacterial culture | Soft cheese + lyophilisate of the bacterial culture |
| MICROORGANISM          | <i>S. aureus</i> ATCC 6538P | <i>S. aureus</i> ATCC 29213 | <i>S. aureus</i> ATCC 25923                         | <i>S. aureus</i> ATCC 25923                         | <i>S. aureus</i> ATCC 25923                         |

| DETECTION OF STAPHYLOCOCCAL ENTEROTOXINS |                              |                                    |                              |                              |  |
|--|------------------------------|------------------------------------|------------------------------|------------------------------|--|
| YEARS                                    | 2008                         | 2009                               | 2010                         | 2011                         | 2012                                     |
| NUMBER OF PARTICIPANTS                   | 5                            | 3                                  | 3                            | 5                            | 3  |
| NUMBER OF SAMPLES                        | 6                            | 8                                  | 5                            | 5                            | 8  |
| MATRIX                                   | Soft cheese                  | Soft cheese                        | Lyophilized soft cheese      | Lyophilized soft cheese      | Lyophilized soft cheese; Cooked pork ham |
| ANALYTE                                  | Staphylococcal enterotoxin B | Staphylococcal enterotoxin A and B | Staphylococcal enterotoxin A | Staphylococcal enterotoxin A | Staphylococcal enterotoxin A             |



## ENUMERATION OF CPS – HOMOGENEITY STUDY

## ENUMERATION OF CPS – STABILITY STUDY

## Z-SCORE

| Próbki | P1(10) | P2(10) | WZ    | WZ       | WZ       | WZ       | WZ       |
|--------|--------|--------|-------|----------|----------|----------|----------|
| 1      | 3,72   | 3,47   | 3,896 | 0,000000 | 0,000000 | 0,000000 | 0,000000 |
| 2      | 3,73   | 3,72   | 3,725 | 0,000100 | 0,000000 | 0,000000 | 0,000000 |
| 3      | 3,7    | 3,7    | 3,700 | 0,000000 | 0,000000 | 0,000000 | 0,000000 |
| 4      | 3,78   | 3,7    | 3,740 | 0,000400 | 0,000400 | 0,000400 | 0,000400 |
| 5      | 3,72   | 3,72   | 3,720 | 0,000000 | 0,000000 | 0,000000 | 0,000000 |
| 6      | 3,72   | 3,72   | 3,720 | 0,000000 | 0,000000 | 0,000000 | 0,000000 |
| 7      | 3,75   | 3,69   | 3,720 | 0,000000 | 0,000000 | 0,000000 | 0,000000 |
| 8      | 3,7    | 3,7    | 3,700 | 0,000000 | 0,000000 | 0,000000 | 0,000000 |
| 9      | 3,74   | 3,75   | 3,745 | 0,000100 | 0,000000 | 0,000000 | 0,000000 |
| 10     | 3,74   | 3,7    | 3,720 | 0,000100 | 0,000000 | 0,000000 | 0,000000 |

$s_x = 0,01$   
 $s_w = 0,02$   
 $s_b = 0,02$   
 $s = 0,02$   
 $s_{b \cdot w} = 0,02$   
 Criterion complied

| Próbki | P1(10) | P2(10) | WZ    | WZ       | WZ       | WZ       | WZ       |
|--------|--------|--------|-------|----------|----------|----------|----------|
| 1      | 3,81   | 3,85   | 3,83  | 0,000000 | 0,000000 | 0,000000 | 0,000000 |
| 2      | 3,79   | 3,78   | 3,79  | 0,000000 | 0,000000 | 0,000000 | 0,000000 |
| 3      | 3,78   | 3,81   | 3,79  | 0,000000 | 0,000000 | 0,000000 | 0,000000 |
| 4      | 3,72   | 3,80   | 3,76  | 0,000000 | 0,000000 | 0,000000 | 0,000000 |
| 5      | 3,77   | 3,79   | 3,78  | 0,000000 | 0,000000 | 0,000000 | 0,000000 |
| 6      | 3,72   | 3,72   | 3,720 | 0,000000 | 0,000000 | 0,000000 | 0,000000 |
| 7      | 3,72   | 3,72   | 3,720 | 0,000000 | 0,000000 | 0,000000 | 0,000000 |
| 8      | 3,72   | 3,72   | 3,720 | 0,000000 | 0,000000 | 0,000000 | 0,000000 |
| 9      | 3,72   | 3,72   | 3,720 | 0,000000 | 0,000000 | 0,000000 | 0,000000 |
| 10     | 3,72   | 3,72   | 3,720 | 0,000000 | 0,000000 | 0,000000 | 0,000000 |

$s_x = 0,01$   
 $s_w = 0,02$   
 $s_b = 0,02$   
 $s = 0,02$   
 $s_{b \cdot w} = 0,02$   
 Criterion complied

| Próbki | P1(10) | P2(10) | WZ    | WZ       | WZ       | WZ       | WZ       |
|--------|--------|--------|-------|----------|----------|----------|----------|
| 1      | 3,71   | 3,70   | 3,70  | 0,000000 | 0,000000 | 0,000000 | 0,000000 |
| 2      | 3,71   | 3,70   | 3,70  | 0,000000 | 0,000000 | 0,000000 | 0,000000 |
| 3      | 3,78   | 3,81   | 3,79  | 0,000000 | 0,000000 | 0,000000 | 0,000000 |
| 4      | 3,72   | 3,80   | 3,76  | 0,000000 | 0,000000 | 0,000000 | 0,000000 |
| 5      | 3,77   | 3,79   | 3,78  | 0,000000 | 0,000000 | 0,000000 | 0,000000 |
| 6      | 3,72   | 3,72   | 3,720 | 0,000000 | 0,000000 | 0,000000 | 0,000000 |
| 7      | 3,72   | 3,72   | 3,720 | 0,000000 | 0,000000 | 0,000000 | 0,000000 |
| 8      | 3,72   | 3,72   | 3,720 | 0,000000 | 0,000000 | 0,000000 | 0,000000 |
| 9      | 3,72   | 3,72   | 3,720 | 0,000000 | 0,000000 | 0,000000 | 0,000000 |
| 10     | 3,72   | 3,72   | 3,720 | 0,000000 | 0,000000 | 0,000000 | 0,000000 |

$s_x = 0,01$   
 $s_w = 0,02$   
 $s_b = 0,02$   
 $s = 0,02$   
 $s_{b \cdot w} = 0,02$   
 Criterion complied

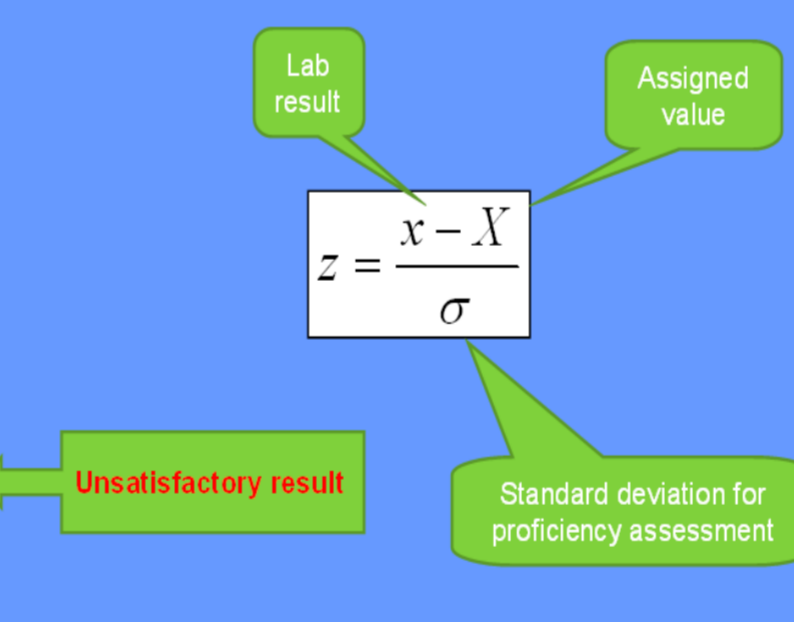


Figure 1. Qualitative test results

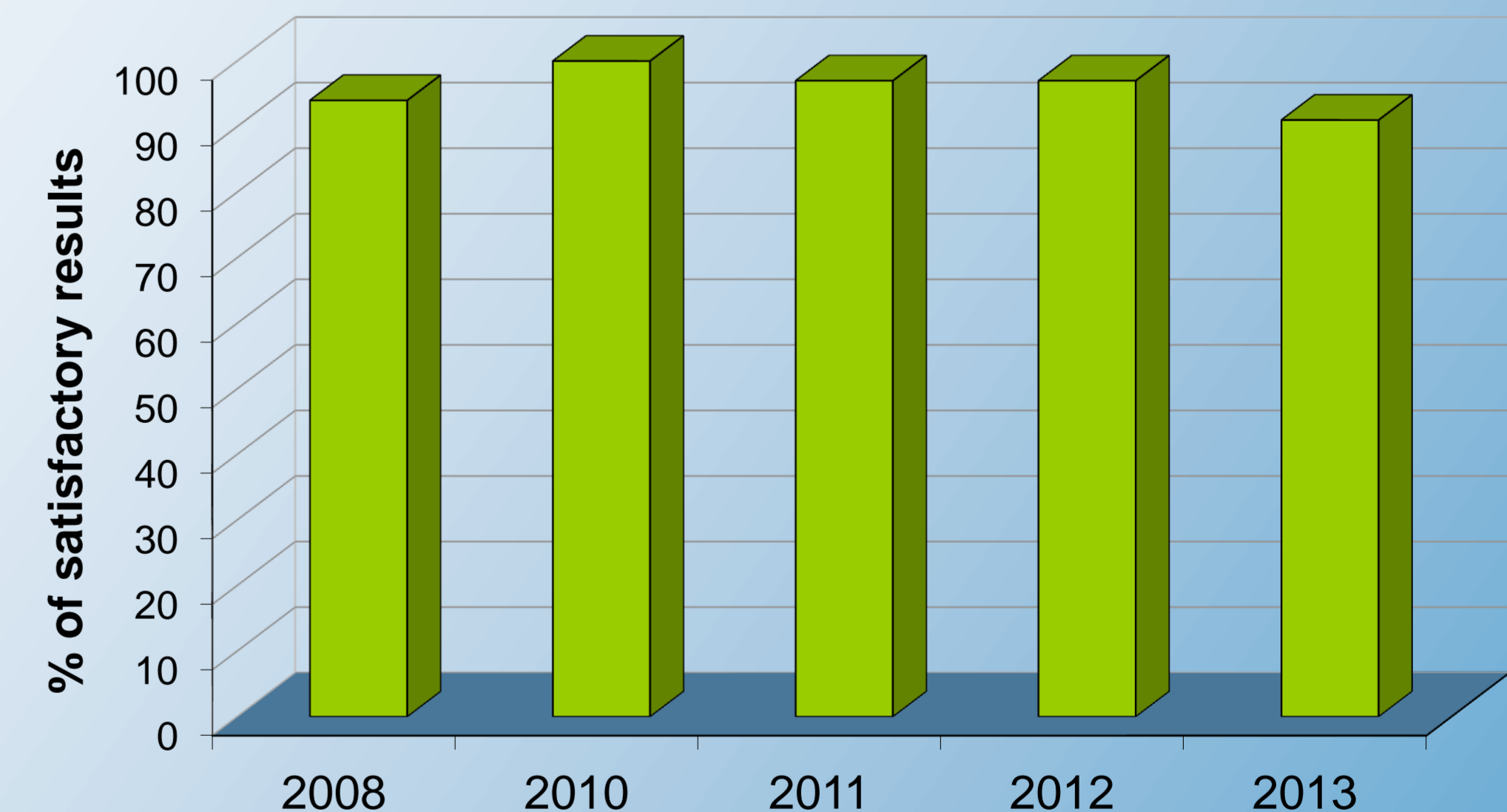


Figure 2. Quantitative test results

### DECLARATION OF ATTENDANCE

Name and address of the participant, Detection, Enumeration, Timetable, Payments, Range of analysis.

### INSTRUCTIONS

Package content, Temperature control, Description of samples labeling, Sample preparation and performing the analyses, Sending the results.



Figure 3. Stages of preparation of samples for PT for detection of staphylococcal enterotoxins