INŠTITUT ZA MLEKARSTVO IN PROBIOTIKE
INSTITUTE OF DAIRY SCIENCE & PROBIOTICS

PROFICIENCY TESTING

Total bacterial count – Instrumental method IBC/ml

MARCH

2025

Dear Sir/Madam!

Thank you for participating in the proficiency testing MARCH 2025. Participating in the proficiency testing will allow you to evaluate the performance of your work and obtain data for maintaining the quality system in your laboratory. Based on the independent results in this report, you can monitor, evaluate and ultimately improve your processes.

This report includes results of samples with serial number: 1166-0325 for parameter TOTAL BACTERIAL COUNT in milk with instrumental method (IBC/ml) and they are presented in the form of tables and graphs.

Table 1: Used statistics

$\boldsymbol{mean = \frac{\sum x_n}{N}}$	$mean$ = average sample value x_n = value of sample n N = number of samples
$\boldsymbol{diff = \bar{x}_n - REF}$	$diff$ = deviation of sample value from reference value $\bar{x}_n$ = avrage sample value REF = robust average sample value
$\boldsymbol{Z - value = \frac{\bar{x}_n - REF}{S}}$	$\bar{x}_n$ = average sample value REF = robust average sample value S = standard deviation of robust average sample value (*ref*)
	green: |Z| ≤ 2,00 satisfactory
	yellow: 2,00 < |Z| < 3,00 questionable
	red: |Z| ≥ 3,00 unsatisfactory
$\boldsymbol{d = \frac{\sum(\bar{x}_n - REF)}{N}}$	d = average of deviations x_n = value of sample n N = number of samples REF = robust average sample value
$\boldsymbol{Sd = \sqrt{\frac{\sum(\bar{x}_n - REF)^2}{N}}}$	Sd = standard deviation of deviations x_n = value of sample n N = number of samples REF = robust average sample value
$\boldsymbol{REF}$	Value REF represents robust average of each sample and it is calculated according ISO 13528 (Algorithm A) from results of all participating laboratories after excluding outliers according to Grubbs method (a=0,05)

Responsible for sample preparation and statistical analysis of results:
Borut Kolenc, Msc anim. sci.

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Head of the laboratory:
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Table 2: Outliers detection according to Grubbs method (a = 0,05)

	Sample					
Laboratory	1	2	3	4	5	n
1						50
2						0
3						0
4						0
5						0
6						0
7						30
8						0
9						0
n	10	10	10	0	0	

Legend:
n = number of outliers

Table 3: Repeatability (log IBC/ml)

	Sample (Sr)						
Laboratory	1	2	3	4	5	A	B
1	0,06	0,01	0,01	0,02	0,01	0,02	0,02
2	0,03	0,01	0,01	0,02	0,02	0,02	0,01
3	0,05	0,03	0,02	0,02	0,03	0,01	0,01
4	0,03	0,02	0,01	0,01	0,02	0,01	0,02
5	0,03	0,01	0,01	0,02	0,02	0,02	0,02
6	0,05	0,03	0,02	0,02	0,01	0,02	0,01
7	0,00	0,01	0,02	0,01	0,00	0,01	0,01
8	0,07	0,02	0,02	0,04	0,01	0,04	0,04
9	0,03	0,01	0,01	0,02	0,01	0,02	0,02

Legend:
Sr = Standard deviation of repetability (log IBC/ml)

Note:
Repeatability values for Bactocount instruments were calculated after recalculation of the returned results using a factor of 1,230654172 (IBC Bactocount / Bactoscan FC ratio).

Limits: according to the instructions of the instrument manufacturer

FOSS BactoScan FC+

Range (x1000 IBC/ml)	Sr (log IBC/ml)	Sample
10 – 50	0,07	1
51 – 200	0,05	2,A
> 200	0,04	3,4,5,B
Total range	0,05	

Bentley Bactocount IBC

Range (x 1000 IBC/ml)	Sr (log IBC/ml)	Sample
10 – 50	0,07	1
51 – 100	0,06	
101 – 300	0,05	2,4,A
> 300	0,03	3,5,B

Table 4: Accuracy (log IBC/ml)

LAB 1	1	2	3	4	5	STD A	STD B
Mean	4,725	5,264	6,194	5,472	5,889	179	474
REF	4,656	5,257	6,173	5,453	5,854		
diff (mean-REF)	0,069	0,007	0,020	0,019	0,035		
S	0,052	0,044	0,059	0,046	0,043		
Z-value	1,33	0,15	0,34	0,41	0,81		
REFCert						189 ± 10 %	517 ± 10 %
Mean×100/REFCert (%)						95	92

LAB 2	1	2	3	4	5	STD A	STD B
Mean	4,679	5,266	6,199	5,486	5,889	176	460
REF	4,656	5,257	6,173	5,453	5,854		
diff (mean-REF)	0,024	0,009	0,026	0,032	0,035		
S	0,052	0,044	0,059	0,046	0,043		
Z-value	0,46	0,21	0,44	0,70	0,80		
REFCert						179 ± 10 %	465 ± 10 %
Mean×100/REFCert (%)						98	99

LAB 3	1	2	3	4	5	STD A	STD B
Mean	4,190	5,379	6,266	5,594	6,001	216	521
REF	4,656	5,257	6,173	5,453	5,854		
diff (mean-REF)	-0,466	0,122	0,093	0,141	0,147		
S	0,052	0,044	0,059	0,046	0,043		
Z-value	-8,98	2,76	1,57	3,06	3,39		
REFCert						220 ± 10 %	573 ± 10 %
Mean×100/REFCert (%)						98	91

LAB 4	1	2	3	4	5	STD A	STD B
Mean	4,712	5,271	6,202	5,463	5,857	169	470
REF	4,656	5,257	6,173	5,453	5,854		
diff (mean-REF)	0,056	0,014	0,029	0,010	0,003		
S	0,052	0,044	0,059	0,046	0,043		
Z-value	1,08	0,31	0,49	0,22	0,07		
REFCert						179 ± 10 %	465 ± 10 %
Mean×100/REFCert (%)						95	101

LAB 5	1	2	3	4	5	STD A	STD B
Mean	4,666	5,217	6,117	5,404	5,813	144	353
REF	4,656	5,257	6,173	5,453	5,854		
diff (mean-REF)	0,010	-0,040	-0,056	-0,049	-0,041		
S	0,052	0,044	0,059	0,046	0,043		
Z-value	0,19	-0,91	-0,95	-1,07	-0,95		
REFCert						179 ± 10 %	465 ± 10 %
Mean×100/REFCert (%)						81	76

LAB 6	1	2	3	4	5	STD A	STD B
Mean	4,646	5,168	6,088	5,385	5,789	164	434
REF	4,656	5,257	6,173	5,453	5,854		
diff (mean-REF)	-0,009	-0,089	-0,085	-0,069	-0,065		
S	0,052	0,044	0,059	0,046	0,043		
Z-value	-0,18	-2,00	-1,44	-1,50	-1,50		
REFCert						179 ± 10 %	465 ± 10 %
Mean×100/REFCert (%)						92	93

To be continued…

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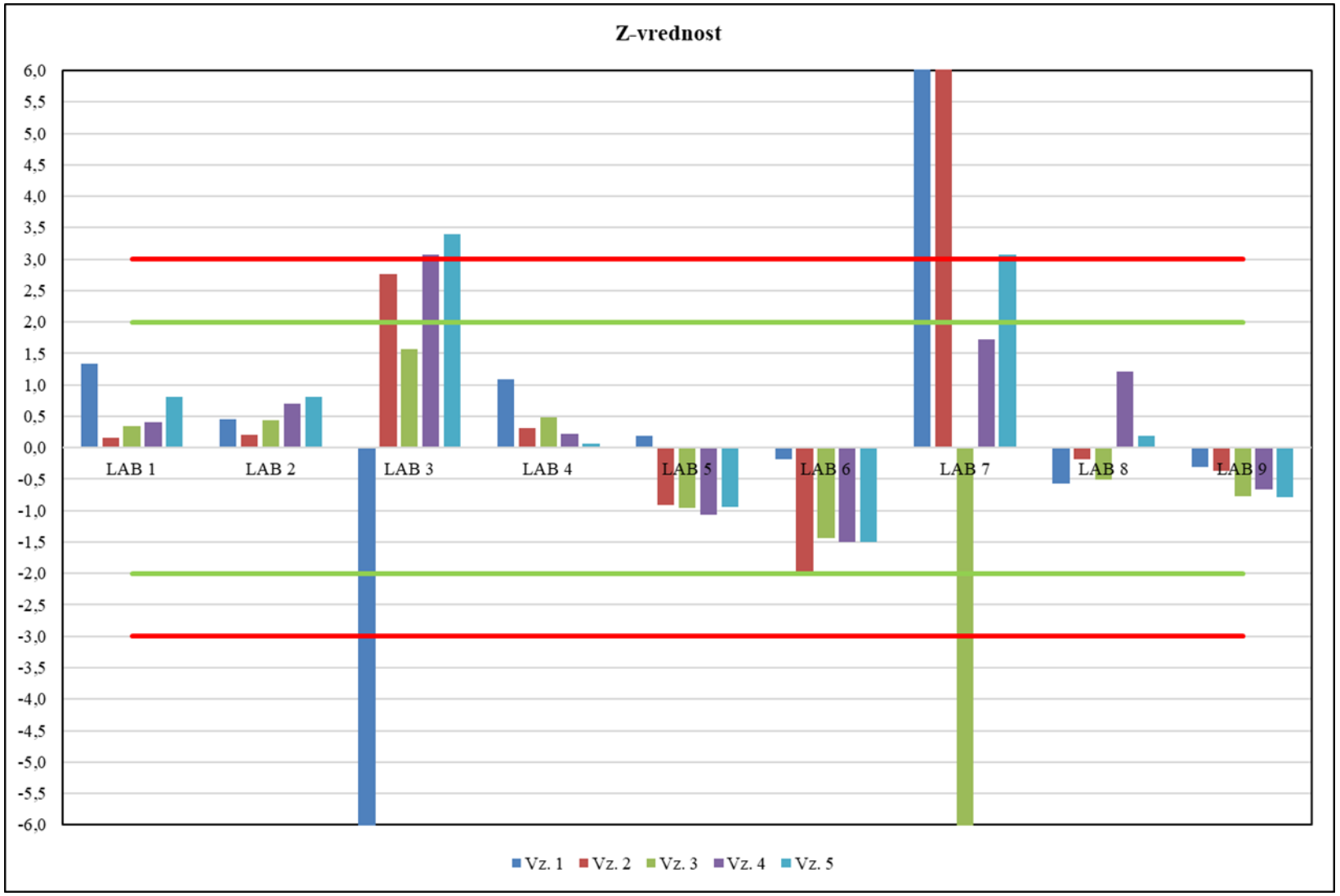
LAB 7	1	2	3	4	5	STD A	STD B
POVP	6,510	5,719	5,439	5,532	5,987	22	33
REF	4,656	5,257	6,173	5,453	5,854		
d (POVP-REF)	1,855	0,462	-0,734	0,079	0,133		
S	0,052	0,044	0,059	0,046	0,043		
Z-vrednost	35,79	10,43	-12,43	1,72	3,07		
REFCert						179 ± 10 %	465 ± 10 %
POVP×100/REFCert (%)						12	7

LAB 8	1	2	3	4	5	STD A	STD B
POVP	4,626	5,249	6,143	5,509	5,862	153	385
REF	4,656	5,257	6,173	5,453	5,854		
d (POVP-REF)	-0,030	-0,008	-0,030	0,056	0,008		
S	0,052	0,044	0,059	0,046	0,043		
Z-vrednost	-0,57	-0,19	-0,51	1,22	0,19		
REFCert						179 ± 10 %	465 ± 10 %
POVP×100/REFCert (%)						85	83

LAB 9	1	2	3	4	5	STD A	STD B
POVP	4,640	5,241	6,128	5,423	5,820	154	355
REF	4,656	5,257	6,173	5,453	5,854		
d (POVP-REF)	-0,016	-0,016	-0,046	-0,031	-0,034		
S	0,052	0,044	0,059	0,046	0,043		
Z-vrednost	-0,30	-0,37	-0,78	-0,67	-0,79		
REFCert						179 ± 10 %	465 ± 10 %
POVP×100/REFCert (%)						86	76

Graph 1: Z-value (see Table 4)



Limits: $|Z| \leq 2{,}00$ satisfactoy $2{,}00 < |Z| < 3{,}00$ questionable $|Z| \geq 3{,}00$ unsatisfactory