INŠTITUT ZA MLEKARSTVO IN PROBIOTIKE
INSTITUTE OF DAIRY SCIENCE & PROBIOTICS

PROFICIENCY TESTING

Somatic cell count

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: 1168-0325 for parameter SOMATIC CELL COUNT in milk and they are presented in the form of tables and graphs.

Table 1: Used statistics

$\boldsymbol{mean = \frac{\sum x_n}{N}}$	$povp$ = 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*)
	|Z| ≤ 2,00 satisfactory
	2,00 < |Z| < 3,00 questionable
	|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:

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

	Vzorec					
Laboratorij	1	2	3	4	5	n
1						0
2						0
3						0
4						0
5						0
6						0
7						0
8						0
9						0
10						8
n	2	2	2	0	2	

Legend:
n = number of outliers

Table 3: Repeatability (somatic cells×1000/ml

	Sample (r)						
Laboratory	**1**	**2**	**3**	**4**	**5**	N	Sr
1	4	22	63	13	8	5	21
2	0	6	39	10	1	5	14
3	2	1	3	1	2	5	1
4	6	10	7	3	4	5	2
5	8	3	10	3	7	5	3
6	13	0	5	2	4	5	4
7	6	1	7	1	4	5	2
8	8	7	27	9	4	5	8
9	2	1	4	0	1	5	1
10	3	3	4	3	3	5	0
N	10	10	10	10	10		
Sr	4	7	20	4	2		

Legend:
r = repetability; absolute diffrerence between two measurments of the same sample
N = number of measurments
Sr = standard deviation of repeatability

Limits (ISO 13366-2/IDF148-2:2006):

Range (SCC×1000/ml)	150	300	450	750	1.500
r (SCC×1000/ml):	25	42	50	63	126

Table 4: Accuracy (SCC×1000/ml)

Laboratory 1	Sample	1	2	3	4	5	d %	Sd %
	Mean	634,0	239,0	1130,5	143,5	237,0		
	REF	597,6	220,5	1085,2	119,8	230,5		
	S	53,2	10,3	80,5	10,2	13,8		
	d (mean - REF)	36,4	18,5	45,3	23,7	6,5		
	d %	6,1	8,4	4,2	19,8	2,8	8,2	6,8
	Z-value	0,68	1,80	0,56	2,32	0,47		

Laboratory 2	Sample	1	2	3	4	5	d	Sd
	Mean	638,0	221,0	1167,5	112,0	241,5		
	REF	597,6	220,5	1085,2	119,8	230,5		
	S	53,2	10,3	80,5	10,2	13,8		
	d (mean - REF)	40,4	0,5	82,3	-7,8	11,0		
	d %	6,8	0,2	7,6	-6,5	4,8	2,6	5,8
	Z-value	0,76	0,05	1,02	-0,76	0,79		

Laboratory 3	Sample	1	2	3	4	5	d	Sd
	Mean	602,0	222,5	1098,5	126,5	227,0		
	REF	597,6	220,5	1085,2	119,8	230,5		
	S	53,2	10,3	80,5	10,2	13,8		
	d (mean - REF)	4,4	2,0	13,3	6,7	-3,5		
	d %	0,7	0,9	1,2	5,6	-1,5	1,4	2,6
	Z-value	0,08	0,19	0,17	0,66	-0,26		

Laboratory 4	Sample	1	2	3	4	5	d	Sd
	Mean	593,0	224,0	1120,5	116,5	228,0		
	REF	597,6	220,5	1085,2	119,8	230,5		
	S	53,2	10,3	80,5	10,2	13,8		
	d (mean - REF)	-4,6	3,5	35,3	-3,3	-2,5		
	d %	-0,8	1,6	3,3	-2,8	-1,1	0,0	2,4
	Z-value	-0,09	0,34	0,44	-0,32	-0,18		

Laboratory 5	Sample	1	2	3	4	5	d	Sd
	Mean	565,0	219,5	1004,0	128,5	228,5		
	REF	597,6	220,5	1085,2	119,8	230,5		
	S	53,2	10,3	80,5	10,2	13,8		
	d (mean - REF)	-32,6	-1,0	-81,2	8,7	-2,0		
	d %	-5,5	-0,5	-7,5	7,3	-0,9	-1,4	5,7
	Z-value	-0,61	-0,10	-1,01	0,85	-0,15		

Laboratory 6	Sample	1	2	3	4	5	d	Sd
	Mean	687,5	228,0	1171,5	116,0	248,0		
	REF	597,6	220,5	1085,2	119,8	230,5		
	S	53,2	10,3	80,5	10,2	13,8		
	d (mean - REF)	89,9	7,5	86,3	-3,8	17,5		
	d %	15,0	3,4	8,0	-3,2	7,6	6,2	6,7
	Z-value	1,69	0,73	1,07	-0,37	1,26		

To be continued…

…continued

Laboratory	Sample	1	2	3	4	5	d	Sd
7	Mean	599,0	220,5	1077,5	116,5	221,0		
	REF	597,6	220,5	1085,2	119,8	230,5		
	S	53,2	10,3	80,5	10,2	13,8		
	d (mean - REF)	1,4	0,0	-7,7	-3,3	-9,5		
	d %	0,2	0,0	-0,7	-2,8	-4,1	-1,5	1,9
	Z-value	0,03	0,00	-0,10	-0,32	-0,69		

Laboratory	Sample	1	2	3	4	5	d	Sd
8	Mean	536,0	201,5	1004,5	117,5	219,0		
	REF	597,6	220,5	1085,2	119,8	230,5		
	S	53,2	10,3	80,5	10,2	13,8		
	d (mean - REF)	-61,6	-19,0	-80,7	-2,3	-11,5		
	d %	-10,3	-8,6	-7,4	-1,9	-5,0	-6,7	3,3
	Z-value	-1,16	-1,85	-1,00	-0,23	-0,83		

Laboratory	Sample	1	2	3	4	5	d	Sd
9	Mean	614,0	227,5	1113,0	125,0	245,5		
	REF	597,6	220,5	1085,2	119,8	230,5		
	S	53,2	10,3	80,5	10,2	13,8		
	d (mean - REF)	16,4	7,0	27,8	5,2	15,0		
	d %	2,7	3,2	2,6	4,3	6,5	3,9	1,6
	Z-value	0,31	0,68	0,35	0,51	1,08		

Laboratory	Sample	1	2	3	4	5	d	Sd
10	Mean	268,5	122,5	306,0	83,5	116,5		
	REF	597,6	220,5	1085,2	119,8	230,5		
	S	53,2	10,3	80,5	10,2	13,8		
	d (mean - REF)	-329,1	-98,0	-779,2	-36,3	-114,0		
	d %	-55,1	-44,4	-71,8	-30,3	-49,5	-50,2	15,2
	Z-value	-6,18	-9,54	-9,69	-3,56	-8,24		

Limits: d = ± 10 % cells/ml Sd = 10 % cells/ml

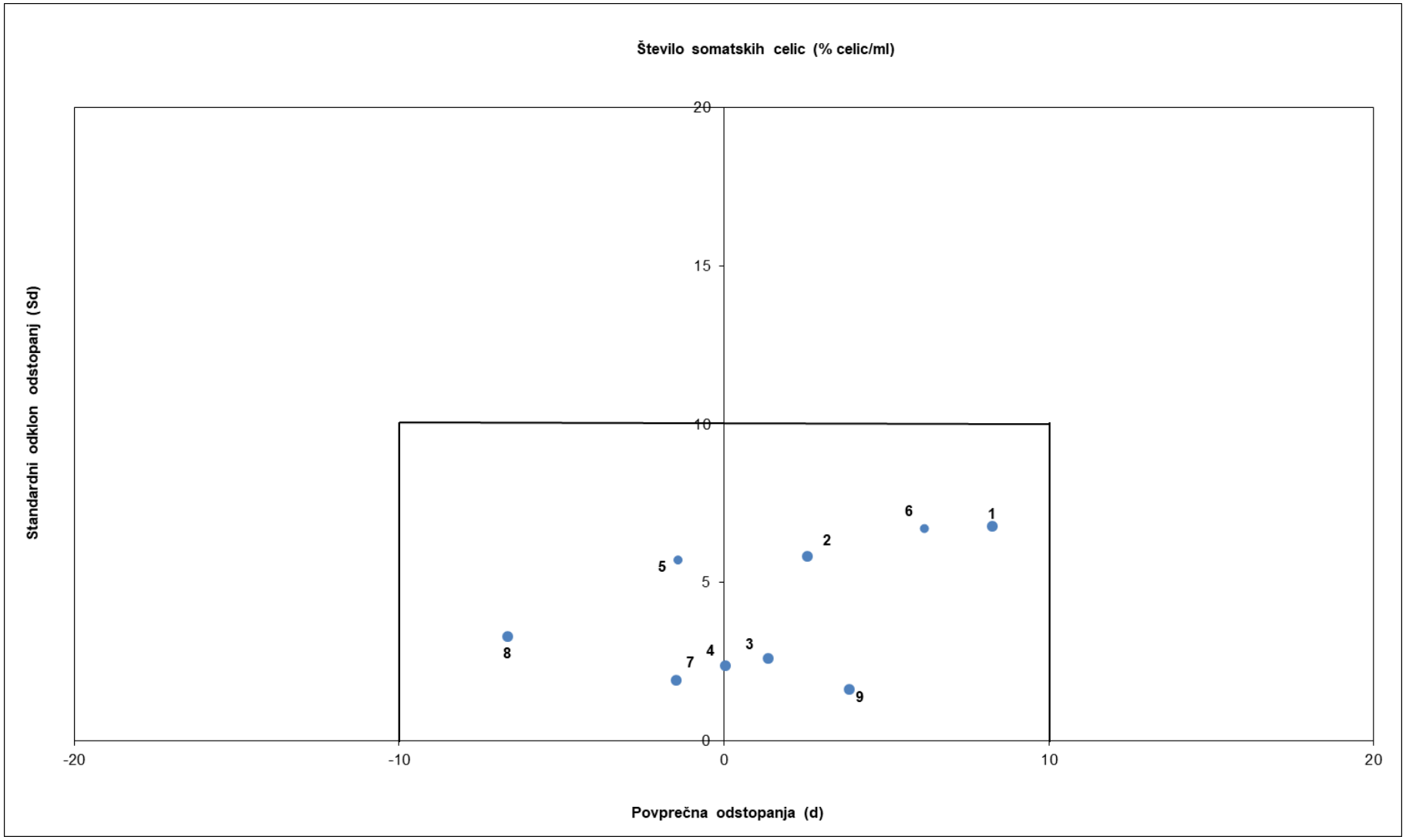
Tabela 5: Repeatability (S_r) and reproducibility (S_R) (ISO 5725-2:2003)

	Sample				
	1	2	3	4	5
Povprečje (ŠSCx1000/ml)	608	223	1099	122	233
S_r (ŠSCx1000/ml)	5	6	19	5	3
S_r, %	1	3	2	4	1
S_R (ŠSCx1000/ml)	44	11	63	10	11
S_R, %	7	5	6	8	5

Limits (ISO 13366-2/IDF148-2:2006)*:*

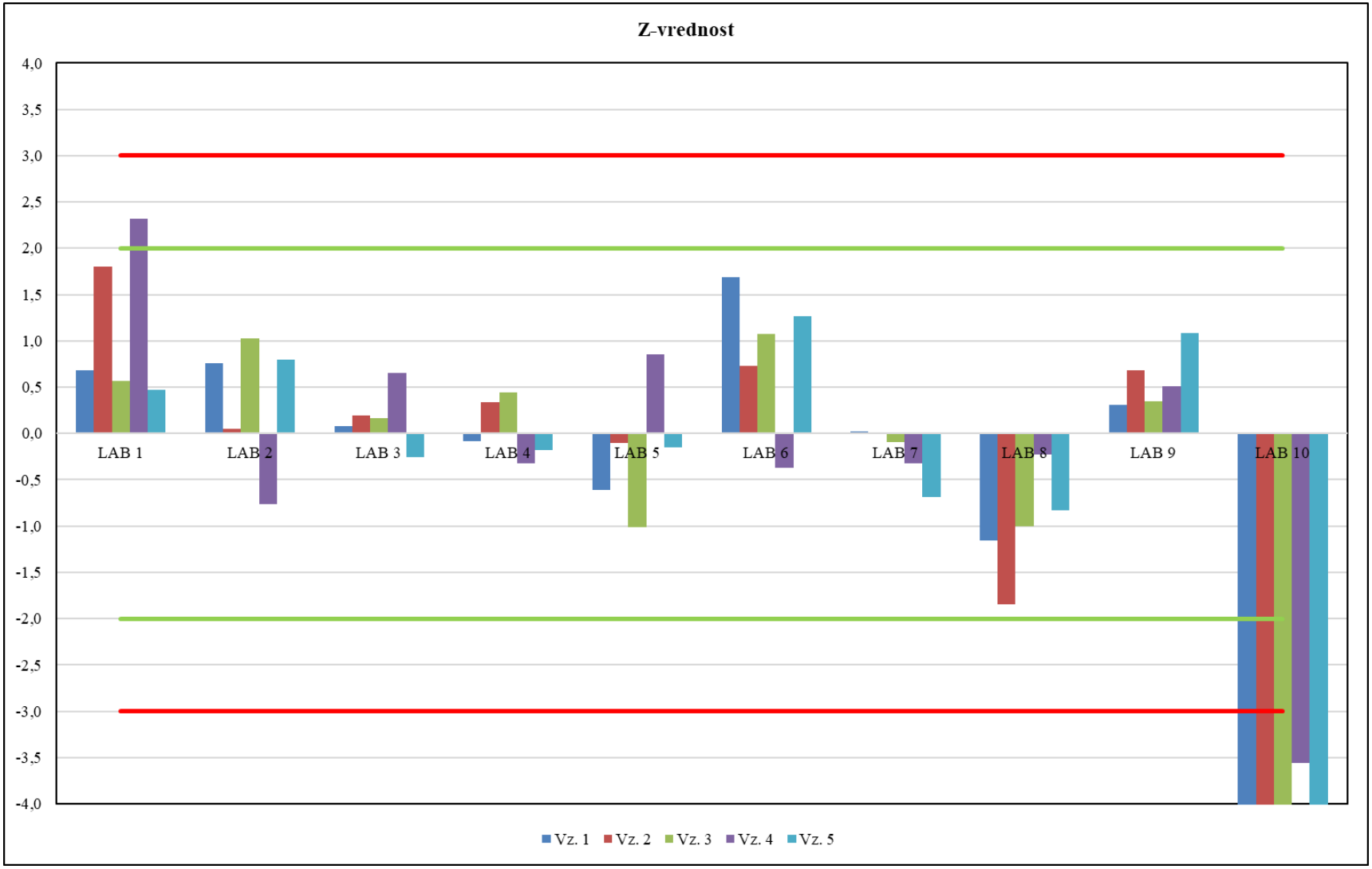
	Range (SSC×1000/ml)				
	150	**300**	**450**	**750**	**1.500**
S_r (ŠSC×1000/ml):	25	42	50	63	126
S_r, %	6	5	4	3	3
S_R (ŠSC×1000/ml):	38	67	88	126	252
S_R, %	9	8	7	6	6

Figure 1: Accuracy (see Table 4)



Limits d = ± 10 % cells/ml, Sd = 10 % cells/ml

Figure 2: Z-value (see Table 4)



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