



**A.I.A.**  
ASSOCIAZIONE ITALIANA ALLEVATORI

Ente Morale - D. P. R. n. 1051 del 27.10.1950

## **EVALUATION OF SOMASCOPE SMART**

### **DELTA INSTRUMENT**

**Evaluation performed in Laboratorio Standard Latte  
of Italian Breeder Association**

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## EVALUATION OF SOMASCOPE SMART DELTA INSTRUMENT

The Somascope Smart from Delta Instruments is a cell counter used in milk testing laboratories for determination of somatic cell in milk.

The instrument is a manual fluoro-opto-electronic counter.

The sample is mixed with a fluorescence staining solution and triton at 0,1 %. The resulting fluorescence is recorded by the electronic system.

This instrument was subjected to functioning and evaluation tests according the ISO 13366-2:2006 to verify repeatability, carry-over, accuracy and stability.

The tests were made in AIA-Laboratorio Standard Latte from September 2009 to June 2011.

The evaluation of the instrument was carried out using the raw cow's milk matrix on 820 samples in two or four replicates.

In this report are evaluated the data obtained in 2010 and 2011.

The different evaluation tests had to be applied to different concentration levels: low (0-300 \* 10<sup>3</sup> cell/ml) medium (301-450\*10<sup>3</sup> cell/ml and 451-750\*10<sup>3</sup> cell/ml) and high (751-1500\* 10<sup>3</sup> cell/ml).

A part of the samples were analyzed with Somascope 1 located in AIA-LSL and Somascope 2 located in Delta (NL).

In this report the results obtained in 2011 are considered.

### REPEATABILITY

The analyses were carried out on a total of 153 samples in two replicates on Somascope 1 and 42 of these were processed by Somascope 2.

From the data obtained, the relative standard deviation of repeatability (sr %) for each level was calculated and the results were always below the threshold established in ISO 13366-2:2006.

In the table below are reported: the number of samples analysed (n), the mean value of the cell scored (Mean); the standard deviation of repeatability (Sr), the relative standard deviation of repeatability (Sr %), and the repeatability (r)

*1000 (cell/ml)													
Repeatability ISO 13366-2				Somascope 1_ AIA_ LSL (IT)					Somascope 2_ Delta (NL)				
Cell count Level (cell/ml)	sr	sr (%)	r (cell/ml)	n	Mean	sr (%)	r (cell/ml)	sr	n	Mean	sr (%)	r (cell/ml)	sr
30-300	15,00	5	42	53	182	4	18	6,46	13	191	2	10	3,56
301-450	17,86	4	50	10	377	1	12	4,14	5	384	2	19	6,76
451-750	23,21	3	65	40	592	1	22	7,74	11	588	1	20	7,28
751-1500	45,00	3	126	52	1136	1	41	14,77	13	1073	1	23	8,29

### CARRY-OVER EFFECT

The possible presence of a carry-over effect denoting the influence of one analytical result on the next one was evaluated to exclude the possibility that instrument washing procedure is incomplete or insufficient.

The results obtained were always in the limit of CO < 2%

CO has been calculated as:

$$CO = \frac{(\Sigma B_1 - \Sigma B_2)}{(\Sigma M - \Sigma B_2)} \times 100$$

where

$B_1$  = is the score of the first blank;

$B_2$  = is the score of the second blank;

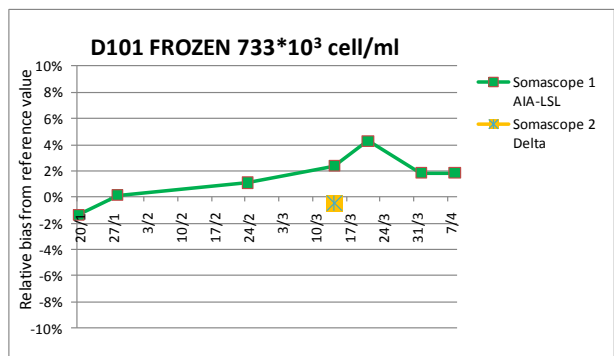
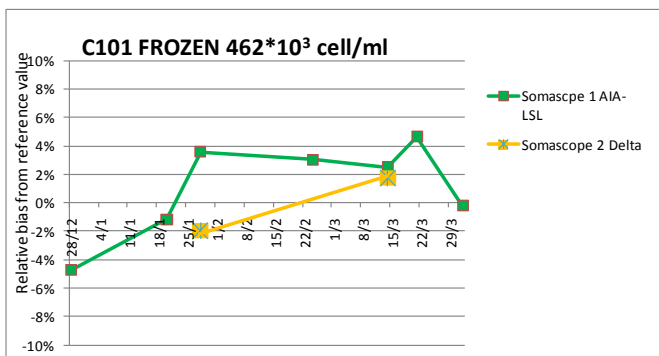
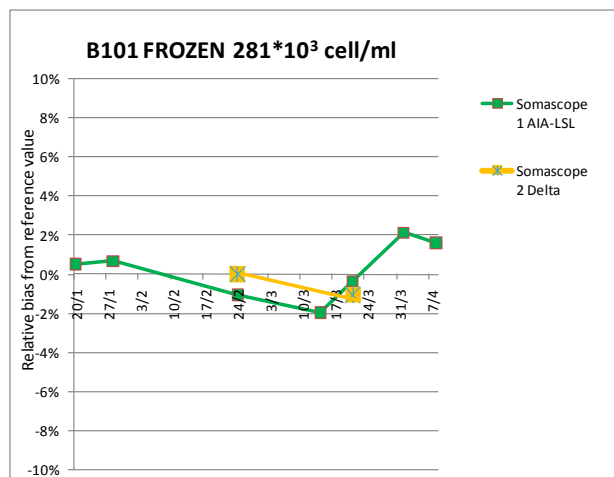
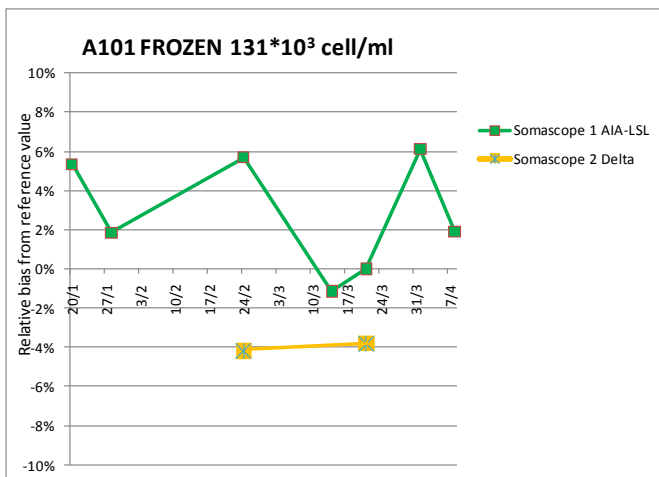
$M$  = is score of test sample.

## STABILITY AND ACCURACY

Instrumental stability and accuracy were evaluated using frozen reference materials prepared by AIA-LSL from December 2010 to March 2011.

The stability and accuracy were assessed calculating the relative difference from the reference value.

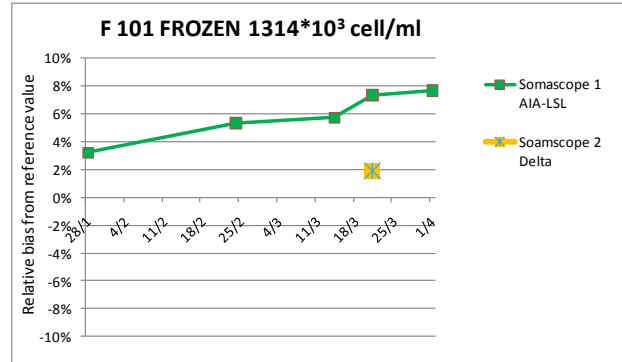
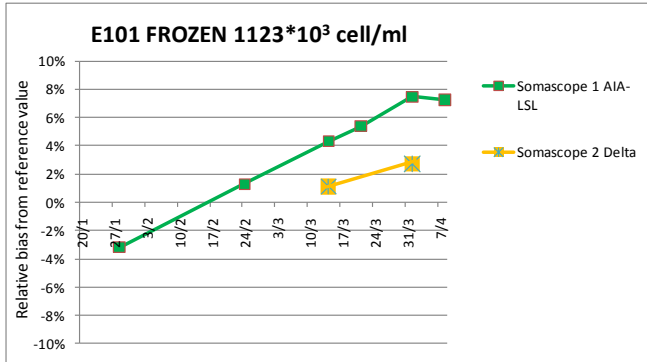
The line charts below represent, for each concentration level, the difference in percentage between the test samples and the reference sample (y axis). The tests were executed in different date (x-axis). The values were always within the range +/- 10%.





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## LINEARITY

The linearity was checked by preparing scalar somatic cell contents from suitable dilutions of a high and low content of somatic cell samples, covering a total range representative of the 0 - 1,000,000 cells/ml interval. One milk with low concentration of cell "L" and one milk with high concentration of cell "H" with the same density were prepared. "L" and "H" were then mixed in 5 proportions: 0%-25%-50%-75%-100% by weighting.

The expected values of the 5 samples were calculated respect to the mean values obtained for the sample "L" and for the sample "H". Four repetitions of the analysis were performed on the samples.

The ratio De/DC was calculated, where De represents the maximum differences between the residuals and DC the maximum difference between concentrations (within the range considered). The De/DC ratio (r) obtained were compared to the 2% limit specified in the corresponding reference document.

$$r = \frac{(e_{\max} - e_{\min})}{(M_{\max} - M_{\min})} \cdot 100$$

where

$e_{\max}$  is the maximum residual from the regression;

$e_{\min}$  is the minimum residual from the regression;

$M_{\max}$  is the upper measured value of samples;

$M_{\min}$  is the lower measured value of samples

Below is reported the results obtained in one among the several tests performed:

LINEARITY	
De/DC	ISO 13366-2 limit
0,44%	2%



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Linearity										
*1000 cell/ml										
Sample	Expected Value	rip1	rip2	rip3	rip4	Mean (y)	St.Dev.	Bias	e (residuals)	
1	65	68	65	63	65	65	1,79	0	0,35	
2	348	354	346	351	344	349	3,96	1	1,84	
3	630	632	628	627	619	626	4,72	-4	-2,93	
4	913	930	905	899	907	910	11,78	-3	-1,06	
5	1196	1197	1191	1194	1200	1196	3,35	0	1,80	
<b>Level N</b>		5	5	5	5					
<b>Mmin</b>		68	65	63	65	<b>65</b>	2		-3	
<b>Mmax</b>		1197	1191	1194	1200	<b>1196</b>	12		2	
<b>D= Max-Min</b>		1129	1126	1131	1135	1130				
<b>Sr</b>		13,82								
<b>slope</b>		1,00								
<b>bias</b>		-0,27								
<b>De=emax - emin</b>									5	
<b>DC=Mmax - Mmin</b>									1130	
<b>De/DC</b>	<b>2%</b>								0,44%	

## SOFTWARE IMPROVEMENT

The last software version delivered by Delta can analyse the UHT milk. This improvement is very useful because on the market is possible to find UHT reference material.

The same instrument calibration for raw milk was optimized to analyze raw and UHT milk.

## UHT MILK ANALYSES

To analyze UHT milk it is necessary to tune instrument setting according the manufacture's instructions.

The results obtained for the accuracy and stability evaluated on Somascope 1 and Somascope 2 were comparable to the results obtained with frozen milk: the mean relative difference is always around 5 % and never higher than 10 %.

## ACCURACY IN THE PROFICIENCY TEST

The table below shows the performance obtained in the Italian proficiency test during 2010 and 2011. The value of relative accuracy ( $S_{yx}$  %) was calculated considering as reference value the assigned value in the Proficiency test. A value of  $S_{yx}$  % lower than 10 % means that the instrument calibrated with the AIA-LSL reference material is aligned with the population of other fluoro opto electronic instruments.

Somascope Smart 1								
Sample	Type of milk	Instrument slope	n of samples	Slope RT	Difference cell*1000/ml	$S_{yx}$ cell*1000 /ml	$S_{yx}$ %	% differences
RT routine Jan 2010	Raw milk	0,99	5	0,96	15,52	13,63	3	-2
RT Jan 2010	Frozen milk	0,99	9	1,02	-44,36	26,29	4	4
RT routine Mar 2010	Raw milk	0,99	5	0,94	5,66	5,39	1	5
RT routine Sept 2010	Raw milk	0,99	5	0,83	23,01	9,86	2	12
RT Jan 2011	UHT milk	1,00	9	0,90	7,24	10,60	2	9
RT routine Mar 2011	Raw milk	0,95	5	0,91	13,39	6,49	1	5
RT Apr 2011	UHT milk	0,95	9	0,94	28,60	13,06	3	-1



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## **CONCLUSIONS**

According to the results of the tests performed at the Laboratorio Standard Latte, the instrument fulfils the precision and accuracy limits indicated in the ISO 13366-2:2006.

## **ADDITIONAL COMMENTS**

The results obtained indicate that the instrument is suitable for laboratories or protocols where highly precise measurements are required. The detailed instructions provided by the manufacturer and the minimal maintenance requirement reduce the intervention of specialized technical assistance. The execution of the analyses is simple and the software is user friendly. The information on the display indicates to the technician how to proceed step by step.

## **REFERENCE DOCUMENT**

ISO 13366-2 /IDF 148-2 Milk: Enumeration of somatic cell – Part 2: Guidance on the operation of fluoro-opto-electronic counters

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