SHORT COMMUNICATION

BACTOSCAN FC – PROJECT FOR UNIFIED CONVERSION LINE IN ITALY

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Since January 2010 some Italian laboratories have adopted a new conversion system (linear regression line) for analytical results transformation of the total bacterial count from IBC/ul to U.F.C/ml using Bactoscan FC (Foss,DK)

The new conversion was the result of 12 month project, starting in 2008, elaborated and tested during 2009 and gradually applied in practice in 2010.

Out of 22 participating laboratories (13 from Institute Zooprofilattico Network, six from Nat. Breeders Ass. and two from private organizations), 15 applied the reference method for TBC on about 100 milk samples collected in their territorial area. The reference method was applied according to a work protocol derived from ISO 21187 : 2004 FIL 196 and ISO 8261: 2001 FIL 122 (the only relevant difference was the use of one dilution line, with double plate). The protocol included a previously determined distribution of the bacterial number along the linearity range of the instrument (from 5 to 50.000 Impulse/ul) with a maximum concentration of samples between 20 - 1.000 Impulse/ul.

The double analysis on Bactoscan FC was made simultaneously with the analysis on plates after dilution. The statistical evaluation of a single laboratory typical linear regression was performed. In addition , the 1.531 samples were assembled for the overall statistic evaluation. The results were selected for repeatability of Bactoscan, dilution factor, maximum and minimum number of colonies (15 -300 extended to 10-324 in particular situations). After this selection, three different statistical approach were considered:

- simply calculating the overall linear regression
- test-F to evaluate the different significances between the single regression lines
- Linear Mixed Effect Model to study the "lab-effect" considering the variability of the reference method.

Through these models we studied , for example, the regression residues OLS for a single lab, the distribution of the confidence limits for slope and intercept of each lab, or the Q-Q plot estimation of causal effect coefficients and many other consideration on the experimental work.

Information about the project , including the statistical evaluation and results are available at http://www.izsler.it/ (Section : National Reference Centre Bovine Milk Quality) .

The final result of the third statistical model is summarized below (Table and Picture) .

During this year each laboratory should choose between their own conversion line, representative of milk from local geographic area (ISO 21187:2004 - FIL 196) and the unified conversion line, representative of the national milk production .

Using the unified conversion line, the old problem of the very low TBC repeatability, observed in our country despite the high level of precision of the instruments, could be solved with a similar level of uncertainty. In fact, in the last 20 years, the majority of Italian laboratories have used a conversion line performed and tested by other laboratories, obviously based on milk of different geographic origin.

The unified conversion line is not the optimal solution to a problem that, from a scientific point of view, does not have a really complete solution. However, in our opinion, it is one of the best practical solutions.

UNIFIED CONVERSION LINE (LME Model)						
Number of observation			1.410			
Standard Error			0,279 (after a two-step selection of out-liers)			
	Coefficient	St. Err.	Stat t	Signif. Value	< 95 %	> 95 %
Intercept	2,599	0,05	51,7	0	2,501	2,698
Log IBC	0,911	0,009	100,9	0	0,893	0,929
$Log_{10}(UFC/mL) = log_{10}(IBC/\mu L) \times 0,911 + 2,599$						

log10(UFC/mL)=log10(IBC/µL) x 0.911 + 2.599   n° dati: 1410   Syx = 0.279