MES Ltd.

Clinical Comparison Trial, November 2007: SQA-Vp PORCINE vs. IVOS

Trial Summary

The SQA-Vp (porcine) sperm quality analyzer, nucleocounter, two photometers and manual semen analysis were compared to the IVOS (CASA) system. Two independent trials were conducted. The results of the trials are summarized in the text, tables and graphs below. All values related to sperm concentration measurements are expressed in $x10^6$ sperm cells per milliliter (M/ml). Motility and Morphology values are expressed in percentages (%). All tests were performed using fresh and extended boar semen samples.

SQA-Vp Precision, Correlation and Accuracy

Materials and Methods:

Two independent trials were performed. The SQA-Vp, nucleocounter, two photometers and manual semen analysis were compared to the IVOS (CASA) system. Nucleocounters and photometers can measure sperm concentration only. Each device was operated according to the manufacturer instructions. Manual semen concentration was assessed under the microscope using a Thoma hemacytometer. Fully automated reports including Morphology were generated using the SQA-Vp in less than 1 minute. The IVOS system reported semen parameters automatically except for Morphology. This was assessed semi-automatically. Due to this fact, the IVOS average measurement time per sample varied between 20 to 30 minutes. Sperm concentration, motility, motile sperm concentration and morphology were compared by regression graphs, correlation coefficients and precision (coefficients of variation – CV).

The clinical trials were conducted at the IMV laboratory in France. The protocols were based on WHO'99 manual and MES guidelines. All samples were assessed in triplicate. A total of 38 fresh and extended semen samples were analyzed.

Limitations of the methods:

- Statistical counting errors and dilution may have affected the manual results of the study.
- Sample dilution may have affected the automated results.

Statistical Parameters:

- Precision was estimated by calculation of coefficients of variation (CV, %) of the triplicate measurements (Table 1). CV is calculated according to the formula:

  CV = SD / MEAN x 100

  The lower the CV, the higher the precision of the method.
- Correlation between methods and accuracy were established by calculation of correlation coefficients and regression graphs (Table 2, Fig. 1-5).

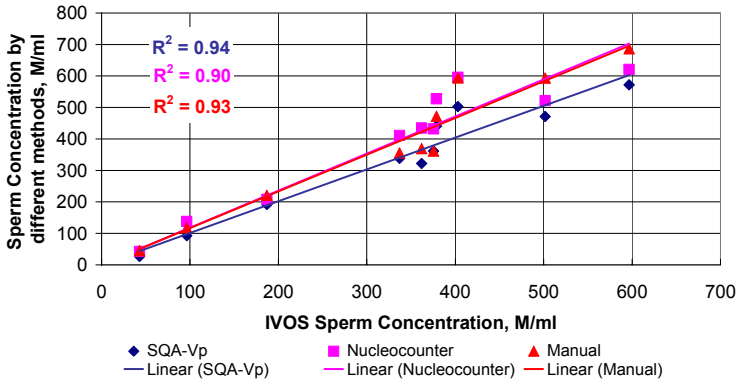
Table 1. Precision: Coefficients of Variation (CV, %)

Semen Variable	CV, %			
	SQA-Vp	IVOS	Nucleo-counter	Manual
Sperm Concentration, M/ml	2.0	5.8	4.6	6.7
Motility, %	2.4	5.1	-	-
Morphology, %	0.3	4.8	-	-

Table 2. Correlation to IVOS (CASA)

Parameters	Correlation coefficients, r			
	SQA-Vp	Nucleo-counter	Photometer	Manual
Sperm Concentration, M/ml	0.98	0.98	0.98	0.98
Motility, %	0.80	-	-	-
Motile Sperm Concentration, M/ml	0.95	-	-	-

Figure 1. SQA-Vp TRIAL @ IMV, November 2007



Results:

As it is seen from Table 1, the SQA-Vp precision was the best among all the methods compared (lowest CVs). Correlation of the SQA-Vp to the IVOS assessed in two independent trials was very high (Table 2, Fig. 1, 2 and 5). Sperm concentration results reported by the nucleocounter, photometers and manual method were also highly correlated to the IVOS system, but they were less accurate than SQA-Vp: their trendlines deviated from the SQA-Vp trendline showed the best fit to the IVOS data points.

The Motility and Morphology results of pre-selected boars were at the top of the range, therefore, they were analyzed for accuracy using the column graphs with 95% Confidence Interval bars (Fig. 3-4). The graphs show quite similar Motility and Morphology results of the SQA-Vp and IVOS, their 95% Confidence Interval bars overlap in most of the samples.

A Dead/Live experiment was conducted for comparison of Motility results in a wider dynamic range. The pooled semen sample was divided in two aliquots, one aliquot was intact and another one was treated with liquid nitrogen. Then, the semen samples from the different aliquots were mixed in different proportions and analyzed. The results plotted in a graph (Fig. 5) show that the SQA-Vp vs. IVOS trendline is quite close to the expected one with regression coefficient of 0.96.

Conclusions:

- The SQA-Vp provides highly precise results with low coefficients of variation for the boar semen parameters tested: 0.3-2.4% as compared to 4.8-5.8% for IVOS.
- The SQA-Vp and the IVOS system demonstrated high levels of correlation.
- The SQA-Vp vs. the IVOS system demonstrated the best accuracy of any of the other methods assessed.
- The SQA-Vp automated results including Morphology are generated in just 45 seconds – more rapidly than other methods.
- The SQA-Vp excels as an analyzer that can be used for rapid, precise and accurate boar semen assessment, dose preparation and QC for extended semen.

Figure 2. SQA-Vp TRIAL @ IMV, November 2007

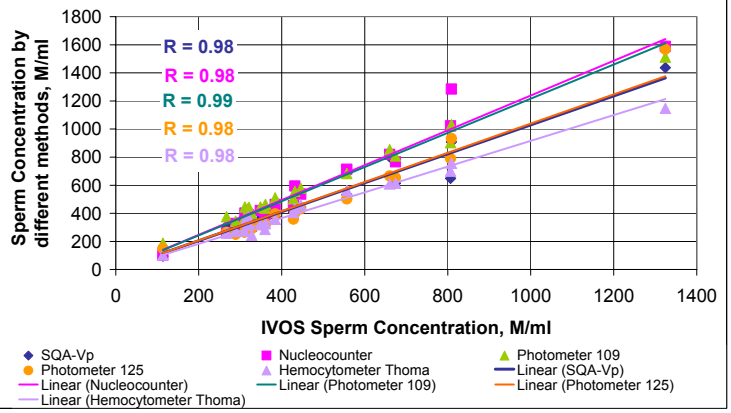


Figure 3. SQA-Vp TRIAL @ IMV, November 2007

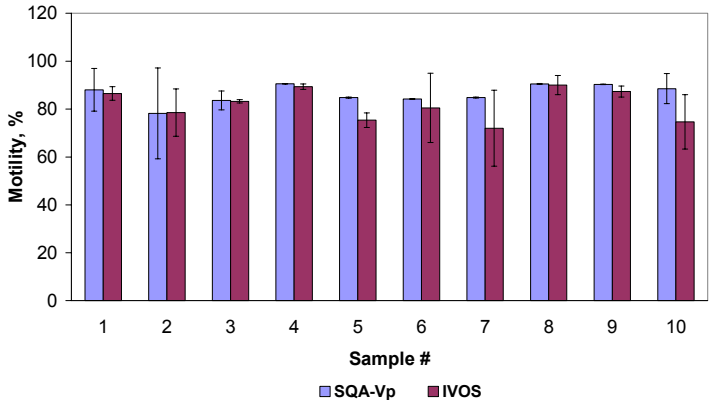


Figure 4. SQA-Vp TRIAL @ IMV, November 2007

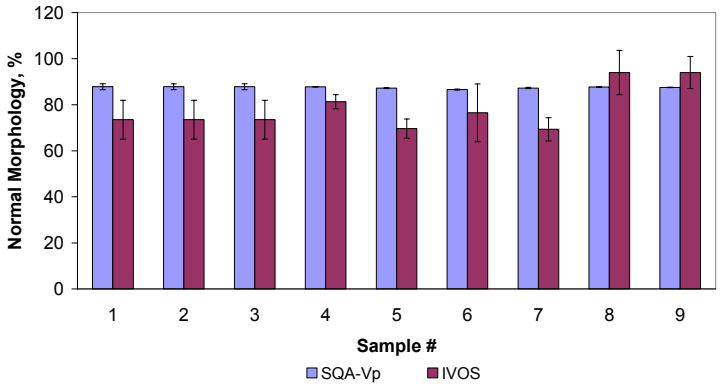


Figure 5. SQA-Vp TRIAL @ IMV, November 2007
"Dead/Live" experiment