

Comparison of the SQA-Vp, Pig Sperm Quality Analyzer to CASA

Item	SQA-Vp	CASA
General view		
Technology	Signal processing: Analog electronic signals detected in two independent channels are digitized and analyzed by the internal processor and proprietary algorithms are applied.	Image analysis. Video images of sperm cells are captured and analyzed by the software.
Automation	Full	Partial: <ul style="list-style-type: none"> • Morphology assessment is semi-automated in most of the systems • Extensive settings and adjustments
Sample type	Fresh and extended	Fresh and extended
Sample size	Hundreds of μ l	Tens of μ l
Sample preparation	Fresh samples: Dilution according on-screen instructions. Extended samples: No dilution.	The user must decide how to prepare/dilute the sample based on the sample quality. Overly diluted or insufficiently diluted samples are rejected by the system and have to be re-run.

Sample loading	Simple process of filling of a multi-use capillary equipped with a syringe.	The sample is loaded into a counting chamber.
Navigation through the screens	Friendly and easy man-machine interface	Navigation can be cumbersome
Number of cells analyzed	Thousands in motility channel and millions in concentration channel.	200 or more. Measurements of single spermatozoa tracks.
Statistical representation	Representative due to the large sample size.	Poor due to the small sample size.
Starting test	Insert a testing capillary into the measurement slot – testing begins automatically.	Place the sample chamber on the stage, focus the image, select the fields, and begin analysis.
Testing time	~ 40 seconds	Not specified, varying. The time required to track spermatozoa to achieve accurate results is controversial. Settings and adjustments take extra time. Testing time for 1 sample along with a semi-automated morphology assessment is ~20 minutes.
Parameters	Sperm Concentration Motility Motility Grading Motile Sperm Concentration Morphology	Sperm Concentration Motility Morphology (semi-automated) Velocity
Results	Fully objective standardized automated test results generated by a device pre-calibrated by the manufacturer.	Automated cell image counts vary due to different user settings.
Dosing	Complete dosing instructions	Calculation of dilution ratios
Accuracy (correlation to manual results)	Concentration: 0.99 Motility: 0.83 Morphology: 0.71	Inconsistent
Precision	Concentration: CV = 2.1 % Motility: CV = 4.0 % Morphology: 3.6 %	
Repeatability using Control material	<ul style="list-style-type: none"> Intra-device CV \leq 0.01 % Inter-device CV \leq 2.5 % (SQA-Vp User Guide, Appendix IX: Product Performance Data).	Statistical counting errors are the same as for manual counts and are consistently about 10%. The subjective nature of instrument calibration and the requirement to adjust the settings leads to high inter- and intra-device discrepancies.

Consumables	SQA-Vp multi-use capillaries, control and cleaning materials.	Disposable counting chambers (Microcell, Leja, etc.), morphology stained slides, control and cleaning materials.
Limitations	Disposable re-use requires washing.	<ul style="list-style-type: none"> • Instrument settings are subjective. • Different CASA instruments use different mathematical algorithms. The degree of comparability of measurements across all CASA systems is not yet known. • Problems with accuracy reporting high and low sperm concentration. • Statistical counting errors impact the accuracy of system measurements. • CASA requires extensive training and cross validation to ensure technician competency. • The clinical significance of kinematical test results is limited. • The analysis is not standardized due to the different instrument settings and algorithms.

References:

1. SQA-Vp User Guide, 2007.
2. Hamilton Thorn Biosciences web site.
3. Spiropoulos J. Computerized semen analysis (CASA): effect of semen concentration and chamber depth on measurements. Arch Androl 2001 Jan-Feb;46(1):37-42.
4. P Vyt, D Maes, T Rijsselaere, E Dejonckheere, F Castryck, A Van Soom (2004) Motility Assessment of Porcine Spermatozoa: a Comparison of Methods Reproduction in Domestic Animals 39 (6), 447–453.
5. Donald G. Levis, Ph.D. Emerging Technologies to Enhance Reproductive Performance. Ohio Pork Industry Center. <http://porkinfo.osu.edu/Word%20Documents/emergtech.doc>
6. SpermVision Minitube web site: http://www.minitube.de/DE_eng/Products-Services/Microscopes-and-Heating-Systems/Sperm-Vision-CASA-System