

Comparison of the Sperm Quality Analyzer SQA-Vb and CASA for bull semen evaluation

Item	SQA-V	CASA
Technology	Signal processing: Analog electronic signals detected in two independent channels are digitized and analyzed by the internal processor applying proprietary algorithms.	Image analysis. Video images of the sperm cells are captured and analyzed by the software.
Automation	Full	Partial (a lot of settings and adjustments)
Sample type	Fresh and frozen	Fresh and frozen
Sample size	Fresh semen: 100 μ l Frozen semen: 20 μ l	10 μ l
Sample preparation	Fresh samples: Constant dilution. Extended samples: No dilution.	Variable dilution depending on sample quality. The user must decide how to prepare the sample. In cases of high concentrations (fresh semen samples), sample dilution must be undertaken to avoid measurement error. In order to standardize results, the same dilution medium should be used throughout.
Additional sample preparation steps	No	Using a fluorescent dye for detection of spermatozoa in the samples extended in the Egg Yolk media.
Sample loading	Filling a multi-use capillary equipped with a syringe.	Loading the sample into a counting chamber.
Entering sample information	From the keypad of the instrument	From the keyboard
Number of cells analyzed	Thousands in motility channel and millions in concentration channel.	200 or more. Measurements of single spermatozoa tracks.

Statistical representation	Adequate due to the large sample size.	Poor due to the small sample size.
Starting test	Insert a capillary into the measurement slot, testing will be started 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 necessary to follow the spermatozoa to achieve accurate results is controversial. Settings and adjustments take extra time.
Parameters	Sperm Concentration Motility Progressive Motility Velocity	Sperm Concentration Motility Progressive Motility Velocity
Results	Fully objective standardized automated test results generated by a device pre-calibrated by the manufacturer.	Automated cell image counts varying due to the different user settings.
Dosing	Complete dosing instructions	Calculation of dilution ratios
Accuracy	Concentration: 0.9 Motility: 0.8	Inconsistent
Precision	Concentration: 3% Motility: 5%	
Repeatability using Control material	<ul style="list-style-type: none"> • Intra-device CV \leq 0.01% • Inter-device CV \leq 2.5% (SQA-V User Guide, Appendix 6: Product Performance Data, p. 41-43).	The statistical counting error is the same as in the manual method and varying around 10%. Subjective nature of instrument calibration and settings leads to high inter- and intra-instrument discrepancies.
Consumables	SQA-V multi-use capillaries, control and cleaning materials.	Disposable counting chambers (Microcell, etc.), morphology stained slides, control and cleaning materials.

<p style="text-align: center;">Limitations</p>	<p>Measurement errors are the subject of the technology used: electro-optical detection and spectrophotometry.</p>	<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 instruments is not yet known. • Problem of accurate counting the high and low sperm concentrations. • The measurements obtained by counting include the statistical counting error. • CASA requires extensive training and cross validation for technician competencies. • Clinical significance of kinematical variables is severely limited. • The analysis is not standardized due to the different instrument settings and algorithms. • Poor technical and field support.
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References:

1. SQA-Vb User Guide, 2006.
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3. Farrell PB, Presicce GA, Brockett CC, Foote RH. Quantification of bull sperm characteristics measured by computer-assisted sperm analysis (CASA) and the relationship to fertility. *Theriogenology* 1998 Mar;49(4):871-9.
4. Atkins EL, Hupp HD, Grimes LW, Thompson CE, Higdon HL. Evaluating Bovine Spermatozoa Using the Hamilton-Thorne Integrated Visual Optical System (IVOS). *Journal of Animal and Veterinary Advances* 2003;2(7):385-391.
5. Spiropoulos J. Computerized semen analysis (CASA): effect of semen concentration and chamber depth on measurements. *Arch Androl* 2001 Jan-Feb;46(1):37-42.