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

Item	SQA-Vp	Microptic 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: • Operation of the microscope (fields of view, focus, etc.) is not automated • 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 µl	Tens of µl
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)**
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	• **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.**	• **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:

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