



Paper Summary

Comparison of the Anvajo Vet Fluidlab 1 urine sediment analyzer to manual microscopy and Idexx SediVue analysis for analysis of urine samples from cats and dogs (Seigner et al; September 14, 2022 - <https://journals.sagepub.com/doi/10.1177/10406387221124157>)

Study overview

Title	Comparison of the Anvajo Vet Fluidlab 1 urine sediment analyzer to manual microscopy and Idexx SediVue analysis for analysis of urine samples from cats and dogs
Authors	Sandra Seigner, Kirsten Bogedale, Roswitha Dorsch, Yury Zablotski, Karin Weber
Journal	Journal of Veterinary Diagnostic Investigation, Volume 34, Issue 6, Pages: 944 - 954 September 14, 2022
Duration of study	July 2020-June 2021
Aim	Evaluate the performance of anvajo's vet fluidlab 1 (software version 21.20.03.) against the SediVue Dx (IDEXX) and manual microscopy (considered as the gold standard in Europe).
Samples	624 urine samples (238 feline; 386 canine)

Despite being considered as the gold standard in routine urinalysis, the authors advance that *"preanalytical preparation steps can lead to significant variations in the results of the microscopic examination"* when using manual microscopy.

The authors state the following advantages of using an automated urine sediment analyzer instead:

- The analysis is *"less-time consuming and more cost-effective"* (chapter-section)
- *"The turnaround time for each sample is lower"* (chapter-section)
- *"Less laboratory stuff is needed"* (chapter-section)
- *"The preanalytical preparation steps are standardized"* (chapter-section)
- And Precision is higher than in manual microscopy

Results

Sensitivity/Specificity

The vet fluidlab 1 showed a good performance by detecting an active sediment on RBCs, WBCs and ECs. The study suggests to further improve the detection limit for STR, CRY and CST, whereas the classification of these elements was good to excellent. Especially for STR, the specificity was *"better than that reported for the SediVue"*.

	Sensitivity [%]	Specificity [%]
Red Blood Cells (RBC)	92.1	55.1
White Blood Cells (WBC)	90.1	78.4
Epithelial Cells (EC)	87.5	59.4
Struvites (STR)	67.6	97.9
All Crystals (CRY)	53.9	90.9
Casts (CST)	12.5	97.4

Table 1 – Sensitivity and Specificity of the vet fluidlab 1 in comparison to manual microscopy. Sensitivity and Specificity of the vet fluidlab 1 against manual microscopy were comparable to the results against the SediVue Dx.

Previous studies on the SediVue show an unsatisfactory performance on EC and also a low sensitivity for CST. *“In contrast, sensitivity of the Fluidlab for the detection of EC was good.”*

Similar to the SediVue, the specificity of RBCs and ECs of the vet fluidlab 1 was influenced by the presence of other elements such as sperm and cell detritus, but mainly lipid droplets (62.9% of false-positive results for RBCs). Therefore, the capability of the device to handle interferences needs improvement.

The vet fluidlab 1 uses uncentrifuged urine for the microscopic evaluation. Although a standardized protocol was used, unpredictable changes (increase and decrease) within the cell count of centrifuged urine were observed in manual microscopy. Therefore, only the results of the uncentrifuged samples were used for the comparison of the vet fluidlab 1 against manual microscopy

Struvite Formation

In-vitro struvite formation was frequently observed within a few minutes during the comparison study. Temperature, measuring time and most likely Specific Gravity and the pH have an influence on in-vitro crystal formation after urine collection. *“This observation demonstrates that the clinical relevance of struvite crystals in the urine sediment should not be overestimated, given that they may form so rapidly in vitro”.*

Repeatability

The measurements with the vet fluidlab 1 were performed in Triplicates. The vet fluidlab 1 showed acceptable CVs (6.36 – 17.1%) in comparison to the gold standard manual microscopy, where CVs can easily reach 20 to 30%.

	Sensitivity [%]	Specificity [%]
RBC	88.9	90.3
WBC	85.7	88.6
Squamous Epithelial Cells (sqEPI)	33.3	99.4
Non-Squamous Epithelial Cells (nsEPI)	71.4	87.3
Struvites (STR)	90.6	84.4
Calcium Oxalates Dihydrates (CaOx Di)	75.0	99.2

Table 2 – Sensitivities and specificities of the SediVue (SW1.0.1.3) in comparison to manual microscopy for the detection of formed elements in urine using thresholds of $\geq 5/hpf$ for RBC and WBC and $\geq 1/hpf$ for sqEPI, nsEPI, STR, and CaOx Di. [1]

Bacteria

The vet fluidlab 1 reports a suspected presence of bacteria depending on the number of WBCs inside the urine sample. This bacteria flag, together with the manual evaluation and the SediVue Dx measurement, was compared against bacterial culture.

	Mean [cells/ μ L]	CV [%]
RBCs	89.3 (n=235)	15.5
	1.130 (n=119)	11.8
WBCs	66.1 (n=180)	17.1
	1.070 (n=180)	6.36

Table 3 – Repeatability of Triplicate measurements of the vet fluidlab 1 at medium and high cell counts.

[1] Hernandez AM, et al. Comparison of the performance of the IDEXX SediVue Dx® with manual microscopy for the detection of cells and 2 crystal types in canine and feline urine. J Vet Intern Med 2019;33:170

The bacteria flag of the Vet fluidlab 1 shows higher sensitivity compared to manual microscopy. Using the bacteria flag of the vet fluidlab 1 therefore lowers the risk of missing positive samples.

	Sensitivity [%]	Specificity [%]
Manual microscopy	75.5	93.2
SediVue Dx	82.9	81.1
Vet fluidlab 1	89.8	72.3

Table 4 – Sensitivity and specificity for the detection of bacteria by manual microscopy, SediVue Dx and fluidlab analysis compared to bacterial culturing.

The chance for measuring false-positive results with the SediVue Dx and the vet fluidlab 1 is higher than by measuring with manual microscopy (lower specificity). All three methods have their limitations. To be confident with the results, bacterial culture should be performed.

Conclusion

The results of the study show, that the ***“Sensitivity for the detection of different cell types was good and exceeded those reported for the SediVue compared to manual microscopy”***, and thus show the advantage of the vet fluidlab 1 as a screening tool for small and mid-sizes vet practices. A NPV of > 90% was obtained for all elements, highlighting that the vet fluidlab is a reliable method to distinguish negative from positive samples.

Manual microscopy is observer dependent and therefore leads to high CVs, which can be reduced by implementing the vet fluidlab 1 into the routine urinalysis.

The vet fluidlab 1 was assessed as ***“simple to use, and operating errors are unlikely”***. It allows a ***“fast turnaround time, easy handling and maintenance”***, which makes it a very good tool that can be used by everyone in the vet practice to perform the first urinalysis screening steps.