

# Reliability of Refractometers in Measurement of Urine Specific Gravity in Dogs

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## In the literature

du Preez K, Boustead K, Rautenbach Y, Goddard A, Hooijberg EH. Comparison of canine urine specific gravity measurements between various refractometers in a clinical setting. *Vet Clin Pathol.* 2020;49(3):407-416.

## FROM THE PAGE ...

Urinalysis is a valuable diagnostic tool that consists of a combination of diagnostic tests, including gross evaluation of urine, urine chemistry, sediment examination, and specific gravity. Urine specific gravity (USG) is a critical component of urinalysis and minimum database; it allows for assessment of the ability of renal tubules to dilute or concentrate glomerular filtrate.<sup>1</sup> USG is used in combination with physical examination findings and serum chemistry profile values in the diagnosis of renal disease.

Urine osmolality is considered the gold standard for determining the concentration of the urine. Urine concentration is measured by determining the freezing point of the urine, which decreases with increasing solute in the urine. However, it is impractical to measure urine osmolality in clinical practice, and use of a refractometer to measure USG has been shown to be comparable with measurement of osmolality.<sup>2</sup> All refractometers are not necessarily equal, and there have been studies to evaluate their reliability.<sup>2,3</sup> One study compared 5 different refractometers (including 1 digital and 2 feline-specific) and found proportional negative bias among them.<sup>3</sup> A second study compared USG measured on canine urine obtained via 4 refractometers with results of measured osmolality<sup>2</sup>; refractometers included 2 optical and 1 digital refractometer, and 3 of 4 were found to be comparable. These studies collectively suggest that comparing results among refractometers could present some clinical challenges.

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In this study, the authors evaluated results from 4 different refractometers and evaluated the variability among different users performing USG measurements. Similar to an earlier study,<sup>2</sup> this study showed excellent correlation among refractometers, although one showed constant and proportional biases. Minimal variation of the other refractometers was not clinically relevant. In addition, correlation among users was exceptional. In contrast to other studies, this study found that some refractometers could be used interchangeably and do not appear to have clinically relevant variation and users of variable clinical training could accurately interpret refractometer results with limited training.

### ... TO YOUR PATIENTS

Key pearls to put into practice:

- 1** USG is an important component of urinalysis, and certainty of accurate results is crucial.
- 2** Although this study found excellent agreement between categorization of patient urine concentrations and azotemia, a single USG value should not be used alone; further diagnostics and repeated USG measurements should be performed to confirm categorization of urine concentration and azotemia.
- 3** Measurement of USG by different users, regardless of experience level, did not appear to result in clinically relevant differences, which is important in clinical practice where various members of staff may be reading USG values.

### References

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2. Rudinsky AJ, Wellman M, Tracy G, Stoltenberg L, DiBartola SP, Chew DJ. Variability among four refractometers for the measurement of urine specific gravity and comparison with urine osmolality in dogs. *Vet Clin Pathol.* 2019;48(4):702-709.
3. Tvedten HW, Ouchterlony H, Lilliehöök IE. Comparison of specific gravity analysis of feline and canine urine, using five refractometers, to pycnometric analysis and total solids by drying. *N Z Vet J.* 2015;63(5):254-259.

## Research Note: Species Identification of Sepsis-Associated Bacteria

Early identification of the causative agent of bacteremia in a septic patient is critical. Standard bacterial culture takes  $\geq 48$  hours, and accuracy can be subject to variations in methodology. Matrix-assisted laser desorption/ionization time of flight mass spectrometry (MALDI-TOF MS) is a new method of identifying bacteria by their unique protein fingerprints. Results are usually available in  $\approx 20$  minutes. This study evaluated whether MALDI-TOF MS is a reliable tool for use in dogs and cats. Aseptically collected dog and cat blood was inoculated with reference samples of 6 common sepsis-inducing bacteria into a liquid blood-culture medium, which was then analyzed. Species identification obtained through MALDI-TOF MS as compared with classical microbiologic analysis was identical for all 72 samples tested. Investigators concluded that MALDI-TOF MS is reliable for identifying sepsis-inducing bacteria in dogs and cats.

### Source

Ulrich S, Gottschalk C, Straubinger RK, Schwaiger K, Dörfelt R. Acceleration of the identification of sepsis-inducing bacteria in cultures of dog and cat blood. *J Small Anim Pract.* 2020;61(1):42-45.