



# FECAL TESTING

## Made Easy, Fast, Clean, *and* Accurate

Introducing leading-edge fecal flotation technology that can elevate your practice's diagnostic capabilities, bringing expert clinical results to general practitioners.

Despite the best efforts of veterinary professionals, and the wide availability of safe and effective parasite preventives, gastrointestinal parasites continue to threaten our patients' health. According to the Companion Animal Parasite Council (CAPC), in 2019 a total of 141,166 dogs and 65,316 cats were infected with roundworms, and 238,937 dogs and 10,832 cats were infected with hookworms.<sup>1-4</sup>

Possible explanations for these numbers include owner noncompliance with parasite prevention recommendations and lifestyle activities that increase exposure risk. Nevertheless, infections with these parasites pose a health risk for pets, and their zoonotic potential makes them a public health concern as well.

So, we do what we can, right? We educate clients about parasite prevention, recommend and dispense safe and effective preventive products, and test regularly to diagnose infections as quickly as possible. But should we be doing a better job with diagnostic testing?

### Current testing practices

Veterinary practices have the option of sending fecal samples to a diagnostic laboratory or performing in-house testing. However, in-clinic diagnostic accuracy can vary widely based both on methodology and on personnel training or experience level.<sup>5</sup>

Sending fecal samples to a diagnostic laboratory for centrifugation is a reasonable solution that historically has yielded more reliable results. But it also means waiting for those results, and potentially asking the owner to return another day to pick up medication—a return trip that may not happen in a timely manner, if it happens at all.

Wouldn't it be nice if point-of-care parasite testing was easy, fast, and accurate?

### What is VETSCAN® IMAGYST™?

VETSCAN® IMAGYST™, recently launched by Zoetis, is an in-office diagnostic platform that combines image-recognition technology with algorithms and cloud-based artificial intelligence to deliver fast, accurate fecal parasite test results to veterinary clinicians and pet owners. By delivering results quickly, diagnosis happens during the initial office visit, and treatment and prevention strategies can be implemented right away.

VETSCAN IMAGYST scans the customized coverslipped slide at optimized depth and magnification to locate, identify, and classify common, targeted gastrointestinal parasites. In just a few simple steps, VETSCAN IMAGYST's innovative and user-friendly system provides results comparable to those of centrifugal flotation when slides are read by a veterinary parasitologist using manual microscopy. The platform's algorithm performs consistently and with expert focus, which is unlikely to be duplicated using manual, in-hospital parasite screening techniques. And the process of sample preparation, slide scanning, and image analysis generally takes about 14 minutes.<sup>6</sup>

The VETSCAN IMAGYST diagnostic platform has 3 components: a sample preparation device, a whole slide imaging microscope scanner, and cloud-based, deep learning, data analysis software.

Following fecal sample preparation with an easy-to-use sampling device, samples are placed onto a microscope slide and delivered to the automated slide scanner, which scans the slides (at simulated 40x resolution) and creates a high-resolution image. The image is captured digitally and uploaded for processing and analysis using a cloud-based software algorithm that can read scanned microscope slide images. The automated scanner and artificial-intelligence algorithm software work together to locate, identify, and classify parasite ova on microscope slides. Following analysis, the results are displayed in a user-friendly report that is part of the VETSCAN IMAGYST platform.

### VETSCAN IMAGYST versus other diagnostic modalities

VETSCAN IMAGYST is efficient, clean, user-friendly, and accurate. It offers a systematic approach to parasite detection that is less likely to be influenced by methodology or user experience level.

In 2 recent laboratory studies, 200 pre-screened canine and feline fecal samples were analyzed to compare the diagnostic sensitivity and specificity of VETSCAN IMAGYST's microscope slide scanner and data analysis software with conventional methods of fecal analysis.<sup>6,7</sup> Each study had 2 objectives, which were to:

1. Assess the performance of the VETSCAN IMAGYST sample preparation methods compared with the standard reference methods of fecal centrifugation.
2. Evaluate the accuracy of the VETSCAN IMAGYST system to correctly identify internal parasite eggs, cysts, and oocysts in feces of naturally infected dogs and cats as compared with a manual evaluation by a board-certified veterinary parasitologist.

Six parasite species were included in the studies: *Ancylostoma*, *Toxocara*, *Trichuris*, Taeniidae, *Cystoisospora*, and *Giardia*. Identification of any ova, cyst, or oocyst from these species designated a sample as positive.

In the studies, the performance of the VETSCAN IMAGYST specialized fecal preparation device was analyzed. The egg, cyst, and oocyst recovery performance of the VETSCAN IMAGYST preparation device with centrifugation was compared with recovery performance of a conventional centrifugal flotation reference method. Both prepared slides were read by an expert clinical parasitologist. The sensitivity (recovery performance) of the specialized sample prep device can be seen in Table 1.

**Table 1.** Diagnostic sensitivity comparison of samples prepared with VETSCAN IMAGYST centrifugal flotation versus conventional centrifugal flotation (reference method), both read by a parasitologist<sup>6,7</sup>

	Hookworms ( <i>Ancylostoma</i> spp)	Roundworms ( <i>Toxocara</i> spp)	Whipworms ( <i>Trichuris vulpis</i> )	Tapeworms ( <i>Taeniidae</i> )	Coccidia ( <i>Cystoisospora</i> spp)	<i>Giardia</i>
Recovery sensitivity (%) (95% CI)	93.3 (83.3-98.1) 100 (87.8-100)*	87.0 (69.1-96.2) 94.4 (83.4-98.8)*	75.8 (59.4-87.8)	83.3 (56.4-96.4)	65.7 (49.2-79.7)	82.1 (68.0-91.6)
Recovery sensitivity with >10 opg/cpg (%) (95% CI)	N/A	N/A	N/A	N/A	84.2 (63.6-95.3)	92.3 (80.3-98.6)

\*Cat samples.  
95% Jeffreys confidence interval.  
cpg = cysts per gram; opg = oocysts per gram.

**Table 2.** Algorithm versus expert with common VETSCAN IMAGYST centrifugation sample preparation<sup>7,8</sup>

		Hookworms ( <i>Ancylostoma</i> spp)	Roundworms ( <i>Toxocara</i> spp)	Whipworms ( <i>Trichuris vulpis</i> )	Tapeworms ( <i>Taeniidae</i> )	Coccidia ( <i>Cystoisospora</i> spp)	<i>Giardia</i>
Study #1 algorithm v.0221	Sensitivity (95% CI)	97.7 (89.9-99.8)	95.2 (79.8-99.5)	100 (91.5-100)	100 (78.3-100)	N/A	N/A
	Specificity (95% CI)	80.4 (68.6-89.1)	93.7 (79.8-99.5)	93.1 (85.4-97.3)	97.8 (93.1-99.5)		
Study #2 algorithm v.3033	Sensitivity (95% CI)	100 (87.8-100)*	94.1 (82.4-98.8)*	N/A	N/A	96.3 (84.0-99.6)	75.8 (59.4-87.8)
	Specificity (95% CI)	98.4 (92.6-99.8)*	100 (94.7-100)*			93.1 (88.6-96.2)	97.0 (90.8-99.4)

\*Cat samples.  
95% Jeffreys confidence interval.

In the second study, 16/35 (46%) of the *Cystoisospora* samples and 13/29 (33%) of the *Giardia* samples contained 10 or fewer oocysts and cysts, respectively.<sup>6,7</sup> For this reason, an additional analysis was performed in which the sensitivity was calculated with the exclusion of those samples. When the additional analysis was performed, the *Cystoisospora* samples (>10 oocysts) had a sensitivity of 84.2% (95% CI: 63.6-95.3), and the *Giardia* samples (>10 cysts) had a sensitivity of 92.3% (95% CI: 77.5-98.4).<sup>7</sup>

Another analysis was done to exclude the low-count *Cystoisospora* and *Giardia* samples because parasite egg, cyst, and oocyst recovery can become very challenging with samples that have low counts. Parasite eggs, cysts, and oocysts do not distribute equally in the feces, which can make low-count samples more difficult to detect. To further this point, when collecting feces from the sample, it is possible that the subsample of feces that is gathered may not contain any parasite eggs, cysts, or oocysts. When collecting a small amount, it can become increasingly more conceivable that this can occur. For this reason, due to the nature of the samples (low parasite burden), the sensitivity increased when these low count samples were excluded for *Cystoisospora* and *Giardia*.

From the data, it can be seen that the performance of VETSCAN IMAGYST centrifugation was comparable to that of reference laboratory centrifugation regarding recovery when both samples were read by an expert with microscopy.<sup>6,7</sup> In addition, this study supported that cat feces, which has a different matrix due to dietary differences with dogs, did not seem to perform differently than dog feces with regard to egg recovery.<sup>7</sup>

The ability of the VETSCAN IMAGYST system to accurately identify eggs of targeted canine and feline parasites

is driven by the integrated deep learning object detection algorithm that reads the scanned slide images. The VETSCAN IMAGYST algorithm's performance was assessed by qualitatively comparing the expert analysis of the VETSCAN IMAGYST slide versus the algorithm's analysis of the same VETSCAN IMAGYST slide. Sensitivity measures the proportion (in %) of actual infected ("positives") that were correctly identified as infected, and specificity measures the proportion (in %) of uninfected ("negatives") that were correctly identified as uninfected.

The diagnostic sensitivity and specificity of the comparison ranged from 75.8% to 100% and 80.4% to 100%, respectively, for the 6 targeted parasites in the 2 studies (Table 2).<sup>7,8</sup> In study 2, 12/33 (36%) of the *Giardia* samples contained low number of cysts (≤10). An additional analysis was performed to re-calculate the sensitivity of *Giardia* with the exclusion of those fecal samples; the sensitivity of the *Giardia* samples (>10 cysts) improved to 95.2% (95% CI: 79.8-99.5).<sup>8</sup>

The 2 studies demonstrated that the algorithm performed well versus a parasitologist evaluating the sample with expert focus and attention, something that is less likely being done with each internal parasite screening in everyday practice.<sup>7,8</sup>

### What's the take-home message?

For veterinary clients and their families, the veterinary practice is the first line of defense against pet parasites in dogs and cats, especially zoonotic species. Routine parasite screening is critical for safeguarding public health and protecting the overall health of pets. VETSCAN IMAGYST is an innovative, scientifically rigorous platform for parasite screening that helps eliminate inconsistencies due to

methodology or user experience. It complements the work of technicians, while improving efficiency and accuracy. VETSCAN IMAGYST's artificial intelligence can also learn over time, improving image recognition and diagnostic utility.

Time is always a factor at a busy veterinary practice. Having fecal test results during the client's visit means dispensing parasite treatment and preventives, if needed, in a single visit. This saves clients a trip back to the office, and can improve compliance with your parasite control recommendations. Learn more at vetscanIMAGYST.com. ■

### REFERENCES

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