



Fecal Diagnostics

When do they help and when do they stink?

Presenter: Dr. Jenna Goldt BVSc BSc DipVET

IDEXX

Learning Objectives

Fecal Diagnostics

1. Learn the different methods available for fecal testing
2. Understand the utility and interpretation of fecal testing in healthy patients
3. Understand when to utilize fecal testing in sick patients
4. Learn about limitations of fecal testing





Fecal Diagnostics in Healthy Patients

Why Test Healthy Patients?

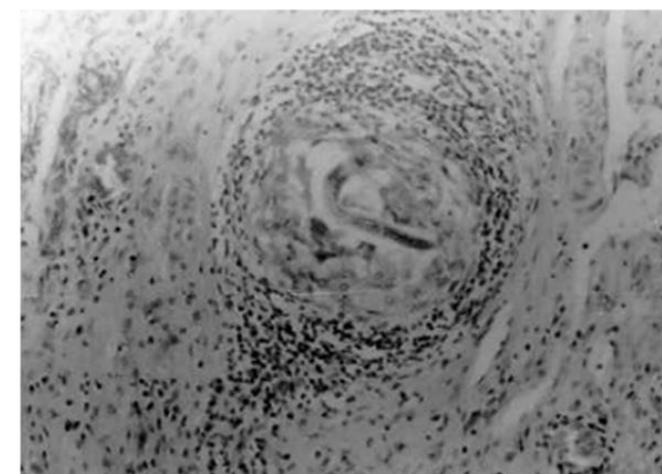
- + Prevent clinical change before it has a chance occur
- + Consider health implications for pet and zoonotic implications.
- + Peak body recommendations: AAHA and CAPC



Cutaneous larva migrans
(CLM)



Ocular larva migrans (OLM)



Visceral larva migrans (VLM)
in liver tissue

Source: Data on file at IDEXX Laboratories, Inc. Westbrook, Maine USA.

Source: Companion Animal Parasite Council.2025, April 24. Parasite testing and protection guided by veterinarians.
<https://capcvet.org/guidelines/general-guidelines/>

Prevention – Frequency of Fecal Testing

Taco

6 week old MI Staffordshire Terrier



Source: Microsoft

Bella

6yo FS Labrador Retriever



Source: Microsoft

Keeping our healthy dogs healthy

Sources: Companion Animal Parasite Council.2025, April 24. Parasite testing and protection guided by veterinarians.
<https://capcvet.org/guidelines/general-guidelines/>

Prevention – Frequency of Fecal Testing

Star – 8 week old FI Himalayan



Source: Microsoft

Grumpy – 12yo MN Maine Coon



Source: Microsoft

Keeping our healthy cats healthy

Sources: Companion Animal Parasite Council.2025, April 24. Parasite testing and protection guided by veterinarians.
<https://capcvet.org/guidelines/general-guidelines/>

What organisms are we looking for in **asymptomatic** patients?

+ Parasites

- + Hookworms

- + Whipworms

- + Roundworm

- + Tapeworms (*Taenia* sp, *Echinococcus* sp., *Dipylidium*)

- + *Giardia*?

- + *Cystoisospora*?

- + *Neospora/Toxoplasma*?

- + *Cryptosporidium*?

+ Bacteria?

+ Viruses?

+ Consider the risks to the individual, the household and their environment



<https://capcvet.org/maps#/>

Sources: Little, SE, Johnson EM, Lewis D, Jaklitsch RP, Payton ME, Blagburn BL, Bowman DD, Moroff S, Tams T, Rich L, Aucoin D. Prevalence of intestinal parasites in pet dogs in the United States. *Veterinary Parasitology*; 2009;166:144-152

Fecal Testing for Prevention

- + Fecal Smear
- + Fecal Ova and Parasite fecal flotation (with or without centrifugation)
- + Fecal Antigen Testing
- + Fecal PCR Testing

Fecal Smear

Direct Wet Prep

- + Small fecal sample
- + Add drop of 0.9% saline
- + Add cover slide
- + Looking for motility – 10x and 40x

Stained Fecal Smear

- + Add iodine to wet mount
 - + improves identification of some protozoa
- + Methylene Blue stain can help identify trophozoites (ie giardia)

Looking for high numbers of pathogen

Fecal Smear

Pros

- + Easy to do in house
- + FAST
- + Inexpensive
- + The larger the infestation the greater the chance to identify

Cons

- + Low sensitivity - <50%¹
 - + High risk for false negatives
- + Good to identify protozoa (like *giardia*) when high numbers^{2,3}
- + Not useful for bacteria²
- + Not useful for hookworm, whipworm, roundworm²
- + Messy

Source:

1. Humm K, Adamantos, S. Is evaluation of a faecal smear a useful technique in the diagnosis of canine pulmonary angiostrongylosis. *J Small Anim Pract*; 2010;51(4):200-3.
2. Little SE, Nagamori Y. Diagnostic techniques for identification of parasites. In: *Greene's Infectious diseases of the dog and cat*. 5th ed. Missouri: Elsevier Inc; 2023: 42-44.
3. Olson ME, Leonard NJ, Stout J. Prevalence and diagnosis of Giardia infection in dogs and cats using a fecal antigen test and fecal smear. *Can Vet J*; 2010;51(6):640-642.

Fecal Sample Collection

- + Fresh < 24 hours old¹
- + 3-5 grams of feces (minimum 1 gram) – or MORE!²
- + Refrigerate if not sending immediately²
- + Ship on ice? ²
 - + O&P/antigen no, PCR yes
- + Avoid contact with ground/litter for more than a few minutes (contaminants)¹
- + Avoid debris¹
- + Use the correct container – clean, dry fecal container, leak proof plastic container, fecal culture tube, etc.¹

Source:

1. Broussard JD. Optimal fecal assessment. *Clinical Techniques in Small Animal Practice*; 2003;18(4):218-230.
2. IDEXX, 2025. Specimen collection guidelines. <https://www.idexx.com/files/06-0013212-05-irl-specimen-guide-en-us.pdf>.

Fecal Sample Storage

- + <24 hours for best results¹
- + Ova and parasites
 - + 7 days at room temp or refrigerated (2-8 degrees Celsius)
- + Antigen
 - + 3 weeks at room temp or when refrigerated, (2-8 degrees Celsius)
- + PCR
 - + ~10 days when refrigerated, (2-8 degrees Celsius);

Source:

1. IDEXBroussard JD. Optimal fecal assessment. *Clinical Techniques in Small Animal Practice*; 2003;18(4):218-230.
2. IDEXX, 2025. Directory of Services: Storage and Stability. <https://www.vetconnectplus.com>.

Fecal Flotation – Ova and Parasites

Passive Fecal Flotation



Source: Usplastic.com

- + No longer recommended by CAPC²
- + Zinc sulfate, Sugar solutions²

Active Fecal Flotation

- + Modified Wisconsin technique →
- + Centrifugation is essential!¹
- + Arm-swing centrifuge ideal¹
- + Zinc sulfate, Sugar solutions¹

- 1** Measure 3 grams of fecal material into a 3-5 oz. paper cup
- 2** 15ml sugar solution is added to fecal matter
- 3** Stir solution and fecal matter until material has even consistency
- 4** Pour mixture into tea strainer and collect in 3-5 oz. cup
- 5** Use a tongue depressor to press as much material through strainer as possible
- 6** Pour strained mixture into a conical/graduated 15 ml centrifuge tube
- 7** Place tube in rack and top off with sugar solution (forms a meniscus)
 Cover with 22x22 mm cover slip and set aside for 2-4 mins
- 8** Lift cover slip directly upward and immediately place on microscope slide
- 9** Use microscope to scan entire cover slip for egg count

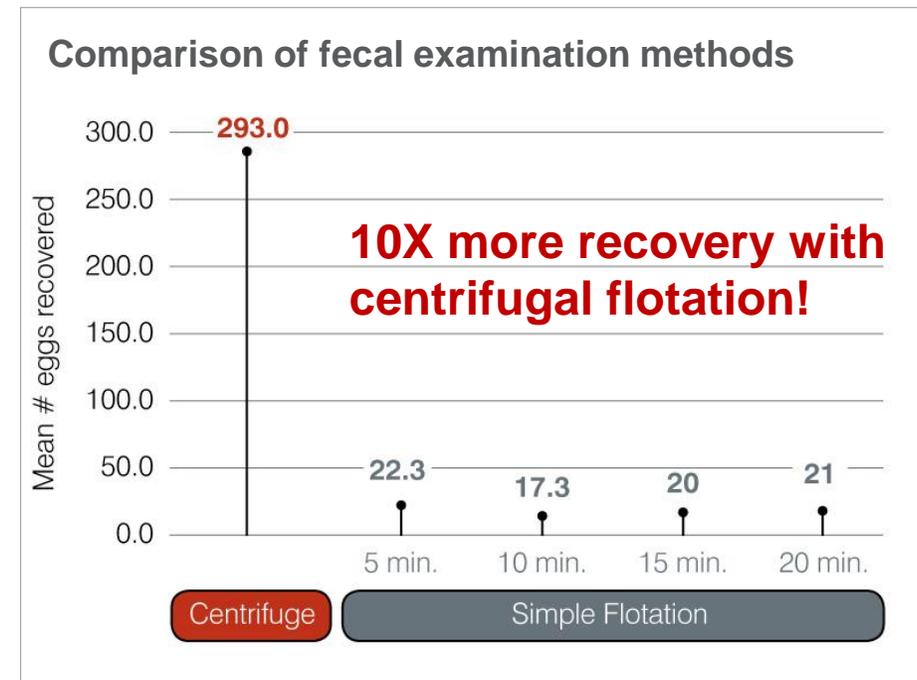
Source: <https://midamericaagresearch.net>

Source:

1. Ballweber LR, Beugnet F, Marchiondo AA, Payne PA. American association of veterinary parasitologists' review of veterinary fecal flotation methods and factors influencing their accuracy and use – Is there really one best technique?. *Veterinary Parasitology*; 2014;204(1-2):73-80.
2. Companion Animal Parasite Council, 2025. Microscopic fecal exam procedures. <https://capcvet.org/articles/fecal-exam-procedures/>.

Centrifugation makes a significant difference

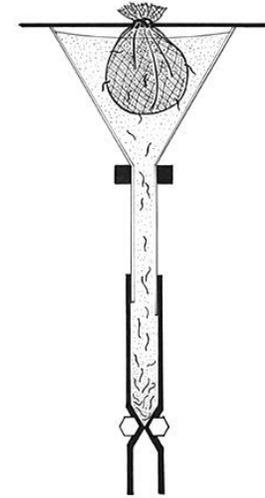
- + The centrifugation method recovered significantly more roundworm eggs
- + This increases the chance of successfully identifying infected pets.



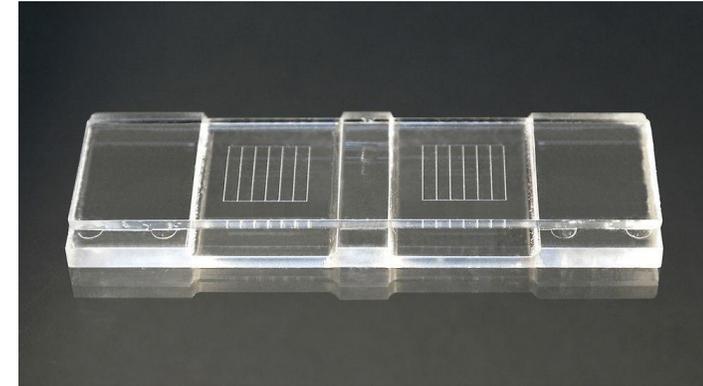
Source: Dryden MW, Payne PA, Ridley RK, Smith VE. Gastrointestinal parasites: the practice guide to accurate diagnosis and treatment. *Compend Contin Educ Pract Vet.* 2006;28(8)(suppl A).

Other Fecal Sediment Tests

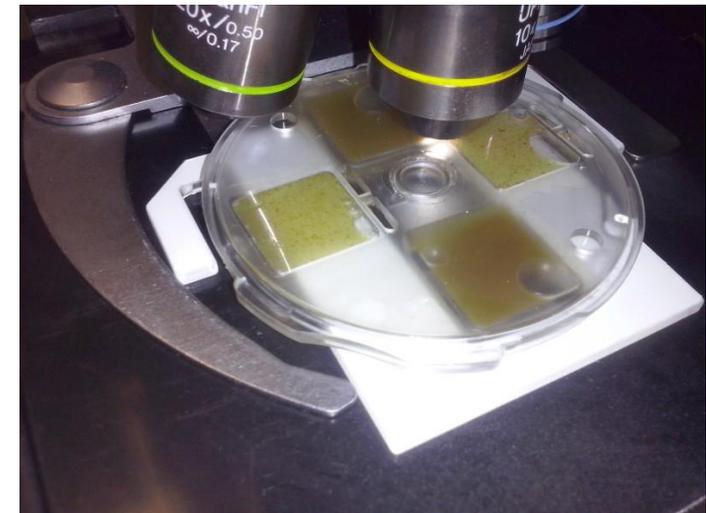
- + Baermann
 - + ie Lungworm
- + Modified McMaster fecal egg count
 - + ie Hookworms
- + FLOTAC and mini-FLOTAC – other forms of FEC
- + AI assessment of fecal flotation via centrifugation



Source: www.rvc.ac.uk



Source: www.vetslides.com



Source: www.clinicaveterinarianmarco.it

Source: Ballweber LR, Beugnet F, Marchiondo AA, Payne PA. American association of veterinary parasitologists' review of veterinary fecal flotation methods and factors influencing their accuracy and use – Is there really one best technique?. *Veterinary Parasitology*, 2014;204(1-2):73-80.

Fecal Antigen Testing

+ High-throughput immunoassay

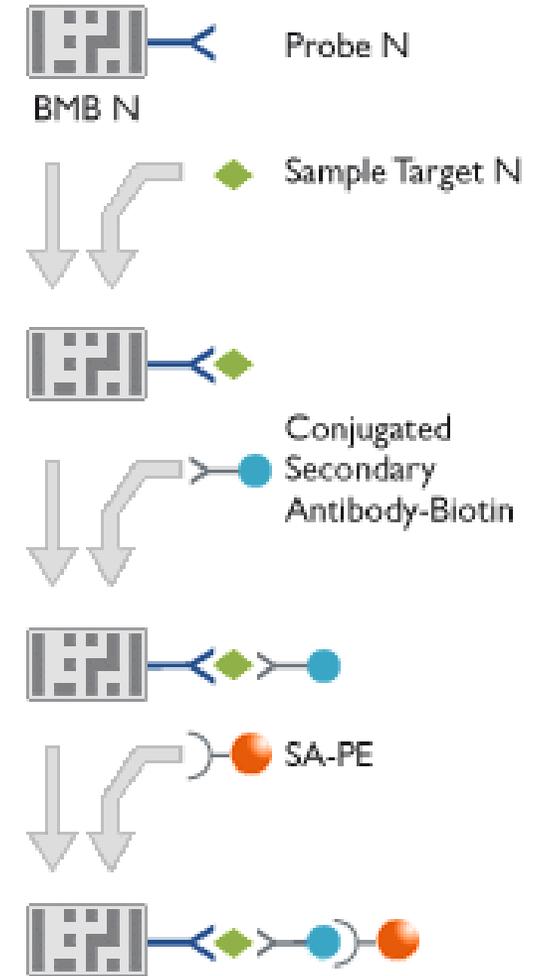
+ Reference Lab ELISA – Fecal Dx only through IDEXX:

- + Hookworm
- + Whipworm
- + Roundworm
- + *Cystoisospora*
- + Flea tapeworm (*Dipylidium*)
- + *Giardia*

+ Fecal Enzyme-linked immunosorbent assay (ELISA)

+ Point of care ELISA:

- + *Giardia*
- + Parvovirus



Source www.apbiocode.com

Source: IDEXX, 2025. Diagnosing intestinal parasite infections <https://www.idexx.com/files/fecal-dx-clinical-reference-guide-en-us.pdf>.

Fecal PCR

- + Polymerase chain reaction
 - + Detection and amplification of DNA via enzyme DNA polymerase
- + Reverse transcription PCR (RT-PCR)
 - + RNA used instead of DNA, then transcribed into complementary DNA via enzyme reverse transcriptase
- + Quantitative (real time) PCR (qPCR and RT-qPCR)
 - + Quantification of nucleic acid amplification via fluorescent labeling
- + Multiplex PCR (mPCR)
 - + More than one pathogen detected at once through the same reaction

- + GOAL: Detection and amplification of DNA and identification of the pathogen by its DNA content

Source: Cattaneo G, McCallum KE. Feline enteropathogen and molecular diagnostics: benefits, limitation and clinical applications. *J Feline Med Surg.* 2025;27(8).

Fecal PCR Detection

Fecal Parasite PCR and Diarrhea PCR panels

+ Parasites

+ Hookworm, Whipworm, Roundworm, *Giardia*, *Toxoplasma*, *Neospora*, Tapeworm (*Taenia sp.*, *Dipylidium*, *Echinococcus*), *Cystispora*, *Tritrichomonas*, *Cryptosporidium*

+ Bacteria

+ *Salmonella spp.*, *Clostridium perfringens*, *Clostridium difficile*, *Campylobacter sp.*

+ Viruses

+ Parvovirus, Canine Distemper Virus, Panleukopenia, Feline Coronavirus, Canine Circovirus, Canine Enteric Coronavirus, Canine Rotavirus

Fecal Culture

- + Not recommended as first line screening test
- + Risk of contamination and normal flora being misinterpreted



Source: www.Flickr.com

Positive Screening Test!

+ Star – 8 week old FI Himalayan



Positive alert!

Giardia positive on O&P and antigen

Asymptomatic

Do we treat?

Can we do any other tests?

Ova & Parasites - Zinc Sulfate Centrifugation ^a
Giardia Antigen
Cystoisospora Antigen
Flea Tapeworm Antigen
Hookworm Antigen
Whipworm Antigen
Roundworm Antigen

Giardia sp. cysts present, many (>30)
Positive
Negative
Negative
Negative
Negative
Negative



Source: Microsoft



Fecal Diagnostics in Sick Patients

What are we looking for in **symptomatic** patients?

+ **Parasites**

- + Hookworms
- + Whipworms
- + Roundworm
- + Tapeworms (*Taenia sp*, *Echinococcus sp.*, *Dipylidium*)
- + *Giardia*
- + *Cystoisospora*
- + *Neospora/Toxoplasma*
- + *Cryptosporidium*
- + And more

+ **Bacteria**

+ **Viruses**

+ **Dysbiosis**

+ **Specific enteropathies- specific tests**

Fecal Testing for Sick Patients

- + Fecal Smear
- + Fecal Ova and Parasite fecal flotation (with or without centrifugation)
- + Fecal Antigen Testing – including point of care tests
- + Fecal PCR Testing
- + Fecal Culture
- + Fecal Occult Blood Testing
- + Fecal Microbiota Dysbiosis
- + Others?

Diarrhea

- + Group 1:
 - + Acute onset <24h diarrhea, mild, patient still BAR and active
- + Group 2:
 - + Acute severe or hemorrhagic diarrhea
 - + Chronic persistent or recurring diarrhea
 - + Multiple animals affected

Source: IDEXX, 2025. Diagnosing intestinal parasite infections <https://www.idexx.com/files/fecal-dx-clinical-reference-guide-en-us.pdf>.

Taco –simple diarrhea

+ 6 week old MI Staffordshire Terrier



Source: Microsoft

Taco is BAR

Diarrhea for about 16 hours– no blood, no vomiting

Increased straining, urgency and frequency

Eating and drinking well

TPR normal

What tests did you choose?

Fecal ova and parasite with fecal antigen

Ova & Parasites
- Zinc Sulfate
Centrifugation

No ova or parasites seen.



Giardia Antigen
(#)

Negative

Cystoisospora
Antigen (#)

Negative

Tapeworm
(Dipylidium)
antigen (#)

Negative

Positive alert!

Hookworm
Antigen (#)

Negative

Whipworm
Antigen (#)

Positive

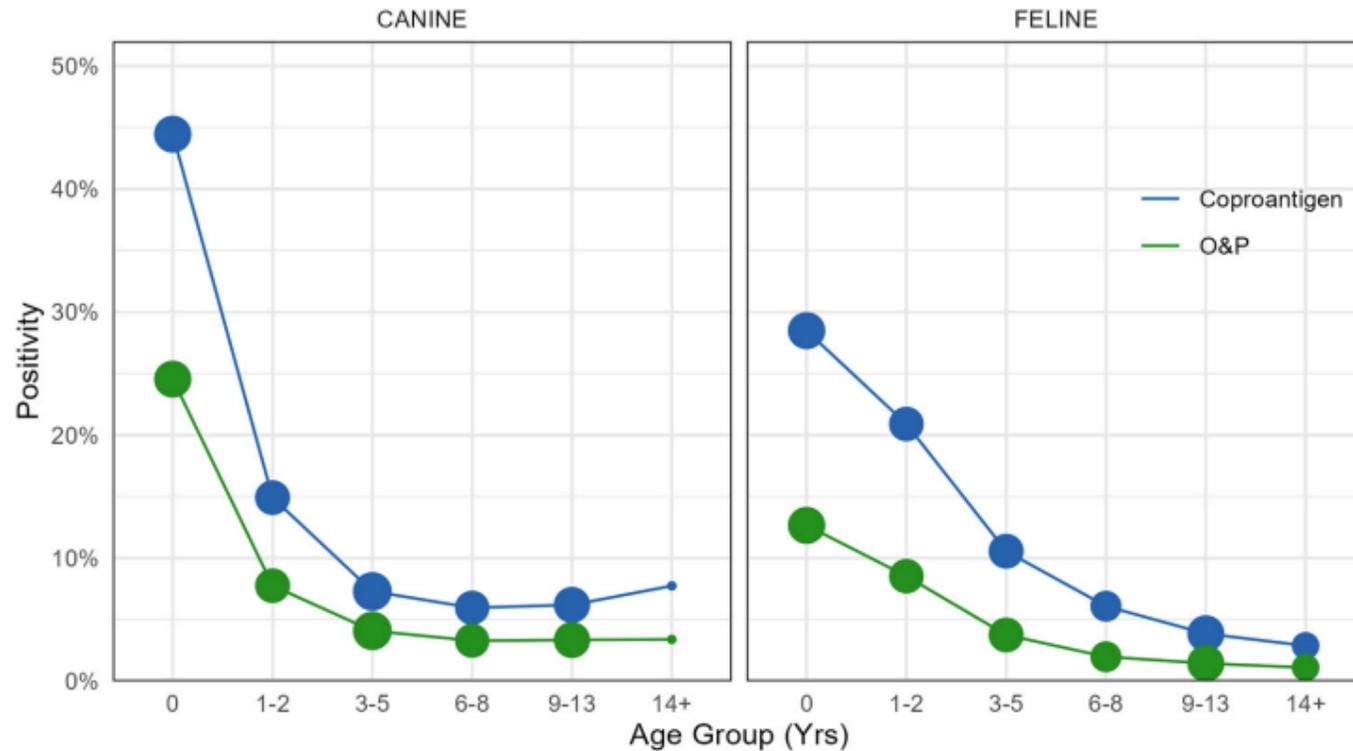


Roundworm
Antigen (#)

Negative

Source: IDEXX VetConnect Plus

Why test both Fecal O&P and Coproantigen together?



Fecal antigen testing will identify 2x the infections over O&P

Source: Burton, KW, Michael H, Drake C. The utility of coproantigen testing in screening populations. *Veterinary Parasitology*. 2025;(336).

Why is there a discrepancy?

positive antigen and negative O&P

- + Fecal antigen testing is far more sensitive than a fecal flotation
- + Intermittent shedding of ova
- + Consider the pre patent period
- + Single sex infections
- + Egg Density
- + Inadequate sample size
- + Technique for flotation

negative antigen and positive O&P

- + Coprophagy
- + Misidentification
- + Inadequate sample size

Why is there a discrepancy?

false negatives – is it really negative? But I saw a worm in the feces!

- + Unhealthy worms are likely to be expelled from the body
- + Metabolically inactive worms don't produce antigen or ova to detect
- + Prepatent period (early infection)

How does fecal Quantitative PCR compare to O&P?

- + Compared fecal O&P flotation via zinc sulfate centrifugation at a reference lab to qPCR (Keyscreen) for parasite detection
- + qPCR able to detect higher parasite frequency to O&P (679 to 437)
- + qPCR detected 3 x the number of co-infections
- + qPCR was able to detect species that O&P overlooked
- + qPCR can differentiate zoonotic species
- + Currently no studies comparing Fecal PCR to coproantigen testing

Source: Leutenegger CM, Lozoya CE, Tereski J, Andrews J, Mitchell KD, Meeks C, Wilcox JL, Freeman G, Richmond HL, Savard C, Evason MD.. Comparative study of a broad qPCR panel and centrifugal flotation for detection of gastrointestinal parasites in fecal samples from dogs and cats in the United States. *Parasites and Vectors*. 2023;16(288).

Did Bella party too hard?– Acute diarrhea

+ 6yo FS Labrador Retriever



Source: Microsoft

Presented 6 months after her annual wellness appointment for vomiting, bloody diarrhea and lethargy.

dull on presentation with tacky mucus membranes

normal HR and RR, fever of 104.5

At a birthday party yesterday

What would you test?

Fecal O&P, coproantigen and PCR panel

Positive alert!

Cryptosporidium spp. RealPCR	NEGATIVE					
Giardia spp. RealPCR	NEGATIVE					
Salmonella spp. RealPCR	POSITIVE	←		C. perfringens Alpha Toxin (CPA) Gene Quantity	5.1x10 ⁴ copies/g	←
Canine Circovirus RealPCR (#)	NEGATIVE			C. perfringens Alpha Toxin (CPA) Gene Interpretation	^b LOW LEVELS OF CPA GENE COPIES PRESENT	←
Canine Enteric Coronavirus RealPCR	NEGATIVE			C. perfringens Enterotoxin (CPE) Gene RealPCR	POSITIVE	←
Canine Parvovirus 2 RealPCR	NEGATIVE			C. perfringens Enterotoxin (CPE) Gene Quantity	^c 2.1x10 ⁴ copies/g	←
Canine Distemper Virus RealPCR	NEGATIVE			C. perfringens (CPE) Enterotoxin Gene Interpretation	^d LOW LEVELS OF CPE GENE COPIES PRESENT	←
Campylobacter jejuni RealPCR	NEGATIVE					
Campylobacter coli RealPCR	NEGATIVE					
C. difficile Toxin A/B Gene RealPCR	^a POSITIVE	←		C. perfringens CPnetE/F Toxin Gene RealPCR (#)	NEGATIVE	
C. perfringens Alpha Toxin (CPA) Gene RealPCR	POSITIVE	←				

Positive Fecal PCR

- + A positive PCR = presence of the DNA of that organism
- + Limited risk for false positives – typically very high specificity
 - + Cross contamination, environmental contamination during collection, PCR product carry over
- + Is the organism a part of the normal flora, opportunistic pathogen or commensal organism?
- + Is the organism known for acute, chronic or latent infections?
- + What is the incubation period and symptoms of the organism?
- + Vaccination within 2-4 weeks of PCR testing (sometimes a bit longer)

*Quantification may help to differentiate active infection from carrier/normal flora

Negative Fecal PCR

- + Early in infection
- + Low level infection – below the level of detection
- + Post treatment testing (especially antibiotics)
- + Chronic carrier status leading to low numbers
- + Mutation or new strain of organism – DNA does not match template

Does the positive patient need to be treated?

- + Does the history and signalment fit?
- + Do the clinical signs match the pathogen?
 - + Is the patient symptomatic?
- + Is this pathogen associated with the patient's duration of clinical signs?
- + Is the patient immunocompromised?
- + Previous treatment failures?
- + Population density and disease monitoring?
- + Is there zoonotic risk?
- + Is an antibiotic indicated?

Source: Cattaneo G, McCallum KE. Feline enteropathogen and molecular diagnostics: benefits, limitation and clinical applications. *J Feline Med Surg.* 2025;27(8).

What to do about Bella?

Salmonella spp. RealPCR		POSITIVE	
C. difficile Toxin A/B Gene RealPCR	^a	POSITIVE	
C. perfringens Alpha Toxin (CPA) Gene RealPCR		POSITIVE	
C. perfringens Alpha Toxin (CPA) Gene Quantity		5.1x10 ⁴	copies/g
C. perfringens Alpha Toxin (CPA) Gene Interpretation	^b	LOW LEVELS OF CPA GENE COPIES PRESENT	
C. perfringens Enterotoxin (CPE) Gene RealPCR		POSITIVE	
C. perfringens Enterotoxin (CPE) Gene Quantity	^c	2.1x10 ⁴	copies/g
C. perfringens (CPE) Enterotoxin Gene Interpretation	^d	LOW LEVELS OF CPE GENE COPIES PRESENT	

- + Salmonella spp.
 - + Suspect primary pathogen
 - + Chronic carrier?

- + Clostridium difficile
 - + Unknown pathogenicity
 - + Possibly contributing

- + Clostridium perfringens A/E
 - + Low numbers
 - + Opportunistic pathogens
 - + Unlikely contributing

Source: IDEXX VetConnect Plus

Source: Marks SL, Rankin SC, Byrne BA, Weese JS. Enteropathogenic bacteria in dogs and cats: diagnosis, epidemiology, treatment, and control. J Vet Intern Med; 2011; 25:1195-1208

Hematology Clues

- + Anemia
- + Eosinophilia
- + WBC changes

Neutrophils	7.78	3.00 - 9.74 K/ μ L	
Lymphocytes	2.55	0.98 - 4.20 K/ μ L	
Monocytes	0.60	0.14 - 0.74 K/ μ L	
Eosinophils	2.14	0.14 - 1.93 K/μL	H
Basophils	0.03	0.00 - 0.10 K/ μ L	

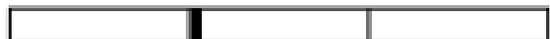
Source: IDEXX VetConnect Plus

WBC	* 0.39	5.05 - 16.76 K/μL	L
% Neutrophils	* 18.9	%	
% Lymphocytes	* 71.9	%	
% Monocytes	* 3.6	%	
% Eosinophils	* 5.7	%	
% Basophils	* 0.0	%	
Neutrophils	* 0.07	2.95 - 11.64 K/μL	L
Lymphocytes	* 0.28	1.05 - 5.10 K/μL	L
Monocytes	* 0.01	0.16 - 1.12 K/μL	L
Eosinophils	0.02	0.06 - 1.23 K/μL	L
Basophils	* 0.00	0.00 - 0.10 K/ μ L	

Source: IDEXX VetConnect Plus

Normocytic Normochromic Anemia

Normocytic normochromic
Fecal O&P
Fecal antigen
Fecal PCR

RBC	4.78	5.65 - 8.87 M/μL	L 
Haematocrit	30.1	37.3 - 61.7 %	L 
Haemoglobin	10.2	13.1 - 20.5 g/dL	L 
MCV	63.0	61.6 - 73.5 fL	
MCH	21.3	21.2 - 25.9 pg	
MCHC	33.9	32.0 - 37.9 g/dL	
RDW	15.2	13.6 - 21.7 %	
% Reticulocytes	1.4	%	
Reticulocytes	68.4	10.0 - 110.0 K/ μ L	

Source: IDEXX VetConnect Plus

“Iron Deficiency Anemia”

Microcytic hypochromic (esp iron deficiency anemia)

Fecal O&P

Fecal Antigen

Fecal PCR

Fecal occult blood

RBC	7.3	5.8 - 8.9 M/ μ L	
Haematocrit	43	41 - 60 %	
Haemoglobin	14.2	14.6 - 21.7 g/dL	L
MCV	58.9	62.0 - 76.0 fL	L
MCH	19.5	22.1 - 26.7 pg	L
MCHC	33.02	32.3 - 38 g/dL	
RDW	18.6	10.0 - 19.0	
% Reticulocytes	2.0	%	
Reticulocytes	146.0	21.0 - 140.0 K/μL	H
Reticulocyte Haemoglobin	20.2	23.8 - 28.3 pg	L

Source: IDEXX VetConnect Plus

Chemistry Clues

- + **Hypoalbuminemia**
- + Hyper or Hypoglobulinemia
- + Electrolyte abnormalities
 - + Ie hyper or hypokalemia
- + Elevated Liver enzymes
- + Increased BUN

Consider:

- Fecal O&P
- Fecal Antigen
- Fecal PCR
- Other?

Total Protein	36	52 - 82 g/L	L 
Albumin	12	23 - 40 g/L	L 
Globulin	24	25 - 45 g/L	L 
Albumin: Globulin Ratio	0.5		

Source: IDEXX VetConnect Plus

Total Protein	5.8	6.3 - 8.8 g/dL	L 
Albumin	2.0	2.6 - 3.9 g/dL	L 
Globulin	3.8	3.0 - 5.9 g/dL	
Albumin: Globulin Ratio	0.5	0.5 - 1.2	

Source: IDEXX VetConnect Plus

Sodium	143	142 - 152 mmol/L		147
Potassium	5.5	4.0 - 5.4 mmol/L	H 	5.7
Na: K Ratio	26	28 - 37	L 	26
Chloride	111	108 - 119 mmol/L		110

Source: IDEXX VetConnect Plus

Summary

1. Methods available for fecal testing
2. Improving sample collection and storage
3. When to utilize testing in healthy and sick patients
4. When to consider fecal testing and which tests to choose
5. Limitations to testing and the critical eye required in interpreting

Remember:

Prevention ensures that patients like Grumpy don't end up coming in more than they need to



Source: www.Flickr.com

IDEXX