Significant blood loss into the gastrointestinal (GI) tract can occur without visible changes in the feces. An average of 350 to 500 mg of hemoglobin/kg of body weight is needed to cause overt melena, while only 20 mg of hemoglobin/kg of body weight is needed to cause a positive fecal occult blood test (FOBT) in dogs, highlighting the utility of fecal occult blood testing in identification of GI bleeding.

Rectally obtained fecal samples can be used for fecal occult blood testing in dogs, and fecal immunochemical tests do not detect canine or feline blood.

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OBJECTIVE
The first objective was to determine if the sample collection method (naturally voided vs digital rectal examination collection) affected fecal occult blood test (FOBT) results. The second objective was to assess the ability of human fecal hemoglobin immunochemical tests to detect canine and feline blood.

ANIMALS
308 privately owned dogs, healthy and sick.

METHODS
Guaiac FOBTs were performed on paired voided and rectally obtained canine fecal samples. The kappa statistic was used to assess agreement between the 2 collection methods, and a multivariate regression model was used to identify factors associated with a positive FOBT. Two fecal immunochemical tests (FITs; Hemosure One Step and OC-Light S) were tested with serially diluted human, canine, and feline blood.

RESULTS
Voided and rectally obtained samples showed strong FOB-positivity agreement (k = 0.80), with 92.5% concordance and only 13/308 dogs negative on void but positive on rectal. Multivariate analysis showed dogs with gastrointestinal disease (P = .0008, rectal; P = .0001, void) were more likely and heavier dogs (P = .0037, rectal; P = .0022 void) were less likely to test FOBT positive. Health status, fasting status, NSAID use, and age were associated with FOBT results on univariate, but not multivariate, analysis. FITs did not detect canine or feline blood at any concentration while human blood performed as expected.

CLINICAL RELEVANCE
Rectally obtained fecal samples can be reliably used for FOBTs. Human FITs may not be suitable for companion animals, but evaluation of other available tests is needed.

Keywords: immunochemical, guaiac, occult, fecal, rectal

Significant blood loss into the gastrointestinal (GI) tract can occur without visible changes in the feces. An average of 350 to 500 mg of hemoglobin/kg of body weight is needed to cause overt melena, while only 20 mg of hemoglobin/kg of body weight is needed to cause a positive fecal occult blood test (FOBT) in dogs, highlighting the utility of fecal occult blood testing in identification of GI bleeding. Gastrointestinal blood loss can be a cause of unexplained regenerative anemia in dogs, so the accurate identification of GI bleeding can guide diagnostics to identify GI ulceration or neoplasia.

Fecal samples for use with FOBTs can either be obtained from naturally voided (NV) samples or via direct rectal examination (DRE). As canine patients generally do not defecate on command and often will go days without defecation while sick and/or anorexic in the hospital, waiting for an NV fecal sample can be impractical. The sample collection method for FOBTs has been heavily scrutinized in human medicine with many studies assessing the difference between NV and DRE for colorectal disease screening. Although a large meta-analysis showed...
no significant difference in detection of colorectal disease, nonadvanced adenomas, and colon cancer between NV and DRE samples, there were significantly fewer advanced adenomas detected by DRE in humans. It is for that reason that NV fecal samples are generally recommended in human medicine. Since the goal of FOBT assessment in these human patient populations is detection of colorectal disease, this recommendation is not directly applicable to veterinary medicine, where FOBT is most commonly performed to detect occult upper GI bleeding. To date, no studies have been performed assessing the effect of the sample collection method on FOBT results in cats or dogs.

Guaiac FOBT is currently the main test type available in veterinary medicine for assessment of fecal occult blood. Guaiac FOBT works by using gum guaiac-impregnated paper that is oxidized by hydrogen peroxide catalyzed by the peroxidase activity of hemoglobin. This test is nonspecific as it will react to any peroxidase in plants, meats, and medications. Because of these shortcomings, there has been increased use of fecal immunochemical tests (FITs) for detection of fecal occult blood in human medicine. FITs use an antibody against human globin to detect blood and therefore are unaffected by diet or medications. These tests detect smaller quantities of hemoglobin than guaiac FOBTs with higher sensitivity and specificity. FITs are specific to human globin and, for at least 1 commercial FIT, have no cross-reactivity with equine, porcine, galine, leporine, caprine, piscine, and murine hemoglobin. Human and canine hemoglobin amino acid sequences have 84% to 90% homology based on a basic local alignment search tool (BLAST) comparison (BLAST reference), suggesting that the human FIT kits might detect canine hemoglobin. No research to date has been published assessing the ability of these tests to detect canine and feline hemoglobin.

Our study had 2 objectives. The first objective was to determine if the sample collection method (naturally voided vs digital rectal examination collection) affects FOBT results. The second objective was to assess the ability of human FITs to detect canine and feline blood.

Methods

Sample collection method assessment: naturally voided versus direct rectal examination

For the prospective enrollment aspect of this study, NV and DRE samples were collected from 308 privately owned dogs, either presenting to the university teaching hospital for an appointment or owned by students/staff of the university teaching hospital between August 2021 and November 2022. The study was approved by the Institutional Animal Care and Use Committee of Iowa State University (IACUC-22-108, IACUC-21-191, and IACUC-20-164). Dog owners provided informed consent. Inclusion criteria included sick or healthy dogs greater than or equal to 3 kg with no exclusion criteria other than not having an adequate sample amount of both NV and DRE submitted or missing clinical information such as health status and current medications. NV fecal samples were collected by the owner within 24 hours before the performance of a routine digital rectal examination. To maximize owner compliance and minimize hemoglobin decline a timeframe of 24 hours was chosen based on a study in human medicine showing the decline, in hemoglobin in feces over time with a decrease from 100% to 82.5% in 24 hours, 60.5% in 48 hours, and 55.7% in 72 hours. The owners were asked to collect a fresh fecal sample immediately following defecation and to store it in a fecal collection bag or closed container until the appointment without refrigeration. A routine digital rectal examination was performed by a veterinarian or veterinary student, and if feces were present, a small sample was obtained. The rectally obtained feces were kept either in the rectal glove turned inside out or in a plastic container until the FOBT was performed. Minimal sample amount for both NV and DRE samples was subjectively considered enough sample to apply a thin smear onto the test card according to manufacturer instructions. The feces were sampled with the wooden applicator from multiple locations and then a thin smear was applied onto Hema-Chek’s testing card specimen area, as directed. Results were performed and interpreted as described below. All tests were performed within 24 hours of collection and interpreted by the same investigator (KC). The investigator was not blinded to the sample collection method (NV or DRE), the results of the paired sample, and other patient factors.

The owner or veterinarian filled out a questionnaire regarding diet, current medications (NSAIDs, steroids, anticoagulant/antiplatelet drugs, and vitamin C supplementation), appetite, fasting status, along with if the dog had experienced hematochezia, melena, or epistaxis within the last 2 weeks. The medical record, if available, was reviewed to obtain the following information: age, breed, sex, weight, and primary diagnosis at appointment (Supplementary Material S1). Based on the main diagnosis made at the appointment by the primary clinician, 1 of the following disease categories was assigned for each patient: apparently healthy, renal disease, respiratory disease, cardiac disease, endocrine disease, neurologic disease, orthopedic disease, GI disease, lower urinary tract disease, hepatobiliary disease, hematologic disease, or unknown/other. Patients were assigned into 1 category by a single investigator (KC) following review of the record. If bloodwork was performed by the primary clinician, bloodwork results were obtained including Hct, PCV, hemoglobin, MCV, mean corpuscular hemoglobin concentration (MCHC), platelet count, mean platelet volume (MPV), reticulocyte count, creatinine, BUN, phosphorus, albumin, prothrombin time, partial thromboplastin time, fecal parasite analysis, cobalamin, folate, trypsin-like immunoreactivity, and pancreatic lipase immunoreactivity.
FIT assessment

One guaiac FOBT (Hema-Chek Fecal Occult Blood Test; Siemens Healthcare Diagnostics) and 2 FITs (Hemosure One Step [Hemosure Inc] and OC-Light S [Polymedco Cancer Diagnostic Products]) were tested against human (13.3 g/dL hemoglobin), canine (14.5 g/dL hemoglobin), and feline (8.7 g/dL hemoglobin) blood in various dilutions to assess viability and limit of detection in veterinary patients compared to humans. The human blood was a commercially available, hematologic analyzer control (CBC-Tech Hematology Controls; R&D Systems, Inc), and the canine and feline blood samples were remnant aliquots from EDTA whole blood collected for clinical purposes and submitted to the clinical pathology laboratory; consent for use of these samples was obtained as part of the general hospital admission procedure and did not require prior IACUC authorization. For assessment of the 2 FITs, human, canine, and feline blood were diluted serially using the provided collection buffer to concentrations of 7.25 X 10⁷ (dog only), 5.375 X 10⁶ (cat only), 200,000, 2,000, 62.5, 50, and 37.5 ng hemoglobin/mL. For assessment of the guaiac FOBT, human, canine, and feline blood were diluted serially using Dulbecco’s phosphate-buffered saline (DPBS) to concentrations of 400, 200, 100, 50, 25, 12.5, 9.75, and 6.25 µg/mL.

For the Hemosure One Step Immunological Fecal Occult Blood Test, 3 drops of the blood/buffer solution were added to the sample well, and results were obtained at 5 minutes and 10 minutes based on the manufacturer’s instructions. For the OC Light S FIT, the sample end of the test strip was placed into the sampling bottle containing the buffer/blood mixture, and the results were obtained after 5 minutes based on the manufacturer’s instructions. Results were considered positive if any pink-colored line appeared in both the sample region and the control region. Results were considered negative if a line only appeared at the control region but not at the sample region. Results were considered invalid if no lines appeared or if a test line appeared without a line in the control region.

For Hema-Chek, 100 µL of each blood/DPBS solution was applied to the sample area on the front of the test card. Two drops of developer were added to the developing area on the back side of the test card. Results were considered positive with any trace of blue appearing within 30 seconds and negative if no blue color appeared within 30 seconds. A drop of control was then added to the control area of the test card, along with 2 drops of developer to confirm that the card was functioning correctly.

Statistical analysis

A sample size calculation was performed based on a human study on the positivity rate of fecal occult blood testing for naturally voided samples (3.8%) versus feces obtained during rectal examination (9.4%). Based on these numbers, it was determined that to find a difference between groups in dogs (α = 0.05; β = 0.2), 308 paired samples would be needed. Kappa analysis was performed between naturally voided and direct rectal examination samples to assess agreement between the 2 on guaiac FOBTs. Kappa-agreement levels were defined as follows: none (k = 0.0 to 0.20), minimal (k = 0.21 to 0.39), weak (k = 0.40 to 0.59), moderate (k = 0.60 to 0.79), strong (k = 0.80 to 0.90), and almost perfect (k > 0.90). Univariate logistic regression analysis followed by stepwise multivariate logistic regression analysis was performed to assess for associations between FOBT positivity and select signalment, diet, medication, and laboratory data parameters; separate analyses were performed for NV and DRE samples. Parameters identified as significantly associated with FOBT positivity in the univariate analysis were incorporated into the multivariate logistic regression analysis. Parameters in the multivariate model were considered associated with FOBT positivity if overall model fit and subcoefficients were significant and 95% CI of the OR did not include 1. The following parameters were evaluated in the logistic regression models: sex, neuter status, age, weight, dietary protein type, fasting status, disease category, current medications, Hct, hemoglobin, MCHC, MCV, MPV, platelet count, thrombocytopenia status, albumin, BUN, creatinine, phosphorus, and azotemia status. Thrombocytopenia was defined as platelet count < 200,000 platelets/µL, and azotemia was defined as creatinine > 1.4 mg/dL based on laboratory reference intervals. A rank-sum test was performed to compare differences in weight and age between FOBT-positive and -negative groups for both NV and DRE samples. Statistical significance was set at P < .05 for all analyses. Where applicable, data are presented mean ± SD or median (range). Statistical tests were performed with 2 commercially available software packages (Prism Version 10 [Graphpad Software] and MedCalc Version 22 [MedCalc Software Ltd]).

Results

Sample collection method assessment: naturally voided versus direct rectal examination

Three hundred and eight client-owned dogs were enrolled in the sample collection aspect of the study. The median age was 5.81 (0.12 to 17.74) years old, and the median weight was 17.2 (3.01 to 69.0) kg. There were 50.65% female dogs (127 female spayed and 29 female intact) and 49.35% male dogs (127 neutered males and 25 intact males). None of the intact females were showing signs of estrus or vaginal bleeding at time of examination based on review of medical records. Sixty-seven breeds were included with the most common being mixed breed (106 dogs, 34.4%), Labrador Retrievers (29 dogs, 9.4%), Australian Shepherds (23 dogs, 7.5%), American Staffordshire Terrier (9 dogs, 2.9%), and Golden Retrievers (8 dogs, 2.6%). One hundred and fifty-four dogs (50%) were considered apparently healthy while the remaining 154 dogs...
were considered sick and placed into 1 of the disease categories based on their primary diagnosis (Supplementary Table S1).

NV and DRE paired fecal samples showed strong guaiac FOBT-positivity agreement (k = 0.80; 95% CI, 0.72 to 0.88), with 92.5% result concordance. In 218 dogs, both NV and DRE fecal samples yielded negative results, and in 67 dogs, both NV and DRE samples were positive. There were 23 dogs with discordant results between NV and DRE samples (Figure 1).

Samples from dogs not classified as apparently healthy and samples from dogs with GI disease were associated with positive FOBT on both NV and DRE samples on univariate logistic regression analysis (Table 1). No association was found using univariate logistic regression analysis for the remainder of the disease categories (renal, respiratory, cardiac, endocrine, neurologic, orthopedic, lower urinary tract disease, hepatobiliary, hematologic, or unknown/other). Being fasted was significantly associated with a positive result on both NV and DRE samples using univariate logistic regression analysis.

Complete blood count data were available for 97 dogs, and chemistry data were available for 106 dogs. No association was found on univariate analysis in regard to select CBC and serum chemistry parameters (Hct, hemoglobin, MCHC, MCV, MPV, albumin, BUN, creatinine, and phosphorus). Platelet count was associated with FOBT positivity in DRE samples only, with a platelet count > 353,000 platelets/µL having increased risk of positivity (Table 1). Thrombocytopenia (n = 23 dogs) without platelet clumping and azotemia (10 dogs) both showed no association with either NV or DRE samples on univariate logistic regression analysis.

Sex and neuter status had no association on univariate analysis with NV or DRE samples. Although increasing age was significantly associated with positive results using both NV and DRE samples (Table 1) when assessed by univariate analysis, a rank-sum test showed the median age with dogs with a negative FOBT (4.5 years old [0.21 to 17.06]) was not significantly different than median age of dogs with FOBT positive results (6.2 years old [0.12 to 17.74]; P = .12, NV; P = .11, DRE). Weight was significantly inversely associated with positive results on univariate logistic regression analysis for both NV and DRE samples with higher weights being more likely to yield negative FOBT results. A rank-sum test showed that dogs with negative results had a significantly higher median weight (19.6 kg, 3.01 to 69) than dogs with positive results (10.5 kg, 3.02 to 44.8; P = .0004, NV; P = .0008, DRE).

There was no association between dietary protein type (chicken [n = 195 dogs], fish [17], hydrolyzed [17], beef [14], lamb [13], pork [2], turkey [2], raw diet [2], vegetarian/vegan [2], venison [1], duck [1], multiple [21], and unknown/other) and positive results using both NV and DRE samples on univariate logistic regression analysis. No associations were found on univariate analysis with steroid (n = 18 dogs) and anticoagulant/antiplatelet use (7) on both NV and DRE samples. NSAID use (10) was associated with a positive result with DRE samples but not with NV samples (Supplementary Table S2). No enrolled dogs were receiving sucralfate or vitamin C.

![Figure 1](image_url)—Dot plot representing the results of fecal occult blood testing using paired naturally voided (NV) and direct rectal examination fecal samples (DRE) from 308 canine patients. Each dot represents 1 patient.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Naturally voided</th>
<th>P value</th>
<th>Direct rectal examination</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not apparently healthy</td>
<td>1.83 (1.08–3.10)*</td>
<td>.024*</td>
<td>1.74 (1.04–2.92)*</td>
<td>.036*</td>
</tr>
<tr>
<td>Gastrointestinal disease</td>
<td>5.08 (2.45–10.54)*</td>
<td>.001*</td>
<td>4.76 (2.30–9.85)*</td>
<td>&lt; .001*</td>
</tr>
<tr>
<td>Fasted</td>
<td>1.82 (1.08–3.07)*</td>
<td>.024*</td>
<td>1.75 (1.05–2.92)*</td>
<td>.032*</td>
</tr>
<tr>
<td>NSAID use</td>
<td>3.15 (0.89–11.2)</td>
<td>.076</td>
<td>4.56 (1.25–16.61)*</td>
<td>.021*</td>
</tr>
<tr>
<td>Platelet count (&gt; 353,000 platelets/µL)</td>
<td>1.002 (0.999–1.005)</td>
<td>.073</td>
<td>1.004 (1.001–1.007)*</td>
<td>.021*</td>
</tr>
<tr>
<td>Age (&gt; 4.8 y NV) (&gt; 7.8 y DRE)</td>
<td>1.062 (1.001–1.127)*</td>
<td>.047*</td>
<td>1.063 (1.003–1.127)*</td>
<td>.040*</td>
</tr>
<tr>
<td>Increased weight (&gt; 13 kg)</td>
<td>0.95 (0.93–0.98)*</td>
<td>.001*</td>
<td>0.95 (0.94–0.98)*</td>
<td>.002*</td>
</tr>
</tbody>
</table>

For each parameter, an OR > 1.0 represents a greater chance of a positive result and an OR < 1.0 represents a lower chance of a positive result.

*P < .05, significant values.
Stepwise multivariate logistic regression analysis was performed with the following variables: health status, GI disease, fasting status, weight, NSAIDs (DRE only), platelet count (DRE only), and age. GI disease (NV: OR, 4.39; 95% CI, 2.06 to 9.35; \(P = .0001\); DRE: OR, 6.73; 95% CI, 2.21 to 20.50; \(P = .0008\)) remained associated with increased likelihood and increased weight (NV: OR, 0.96; 95% CI, 0.93 to 0.98; DRE: OR, 0.95; 95% CI, 0.91 to 0.99; \(P = .003\)) with decreased likelihood of positive FOBT results. Health status, fasting status, NSAIDs (DRE only), platelet count (DRE only), and age were not associated with FOBT results in multivariate logistic regression.

**FIT assessment**

Both FITs (Hemosure One Step and OC-Light) were negative at all tested dilutions with both canine and feline blood. With human blood, the lowest tested limit of detection of both FITs was 50 ng hemoglobin/mL buffer or 50 µg hemoglobin/g feces (Supplementary Table S3). The lowest tested limit of detection for human, canine, and feline blood with Hema-Chek was 12.5 µg hemoglobin/mL buffer. The reported limit of detection with human blood for Hemosure One Step is 50 ng hemoglobin/mL buffer or 50 µg hemoglobin/g feces and for OC Light S is 50 ng hemoglobin/mL buffer or 10 µg hemoglobin/g stool.\(^{12,16}\) The reported limit of detection with human blood for Hema-Chek is 6 mg hemoglobin/g feces.\(^6\)

**Discussion**

We found strong agreement with 92.5% concordance between NV and DRE fecal samples for use with guaiac FOBT, but it still must be noted that 7.5% of samples had discordant results between DRE and NV. As there were relatively similar numbers of discordant results between DRE and NV samples, it does not appear that mucosal trauma from a DRE was more likely to lead to a positive result than an NV sample. Furthermore, only 4.2% (13/308) of samples were positive on DRE and negative on NV. As definitive diagnosis of GI bleeding was not part of this study, it is unfortunately impossible to determine which of the discordant results are false positive or false negative. Thus, as with all tests, results should be correlated with the patient’s clinical picture.

Unsurprisingly, the greatest risk factor we identified for FOBT positivity was underlying GI disease. On univariate analysis, GI disease was the only disease category that was significantly associated with FOBT positivity, and the association was maintained on multivariate regression analysis with GI disease having an OR for FOBT positivity of 4.39 and 3.98 on NV and DRE samples, respectively. In dogs, GI ulceration has historically been associated with GI neoplasm, inflammatory bowel disease, and mechanical obstructions.\(^{17-19}\) Hepatobiliary disease was not associated with positive FOBT results in our study, in contrast to prior studies\(^{18,20}\) but similar to a recent study\(^{17}\) that showed no significant relationship between GI ulceration/erosion and hepatobiliary disease.

On multivariate analysis, other than GI disease, weight was the only other factor that remained significant; dogs with higher weights were less likely to test positive with both NV and DRE samples. Since the association was present with both NV and DRE samples, it is unlikely due to the fact that larger dogs have less trauma during DRE. As far as we are aware, this is the first time this association has been noted in veterinary medicine, and information regarding weight association was not found in the human literature. One potential explanation is that small-breed dogs are overrepresented with anal gland issues; therefore, it is possible that this is due to anal gland issues and not primary GI.\(^{21}\) Results should be correlated with the patient's clinical picture.

Although we speculated that thrombocytopenia could lead to false positive results in FOBTs of digitally collected samples, we found no increased risk of positive results with either NV or DRE samples. However, no patients in this study had severe thrombocytopenia; the lowest platelet count was 87,000/µL, which is a level unlikely to be associated with spontaneous or induced bleeding, and there were only 23 dogs with counts less than 200,000/µL. Further evaluation of the effect of thrombocytopenia, especially severe thrombocytopenia, on DRE results is warranted. When platelet count was assessed in relation to FOBT results, a higher platelet count had a slight, but significant, increased risk of FOBT positivity with DRE samples only. Secondary thrombocytosis can be seen with blood loss such as with chronic GI bleeding,\(^{22}\) which could explain these results but not the discordant impact of platelet count between DRE and NV samples.

NSAID use was significantly associated with positive FOBT results on univariate analysis with an OR of 4.56 with DRE samples, but the association was not significant with NV samples. The lack of significant association with NV samples is likely a type 2 error from low sample size as only 5 dogs with positive NV samples were receiving NSAIDs. In a recent study,\(^{23}\) 83.3% of canine patients receiving chronic NSAIDs (> 30 days) had evidence of GI erosion noted on video capsule endoscopy. A recent necropsy study\(^{27}\) showed that being on NSAIDs had an OR of 6.3 for having GI ulceration, which is consistent with our finding of an OR of 4.56 for FOBT positivity on DRE.

Although the association between diet and occult blood positivity was not the primary goal of this study and the study was not adequately powered to address this question, we found no association between diet and occult blood positivity. It may be that the historic concerns about diet impact on FOBT results are unwarranted, but further studies specifically designed to address this issue are needed as the recommendation regarding elimination diets with low peroxidase foods for days before testing are not feasible in sick, anemic hospitalized patients. Interestingly, we did find that dogs that were fasted were more likely to test positive. This could be related to having 2 different populations of patients: the first group of patients being presented for a scheduled appointment at a tertiary animal hospital with typical issues and not primary GI whereas the second group of patients were patients that needed as the recommendation regarding elimination diets with low peroxidase foods for days before testing are not feasible in sick, anemic hospitalized patients. Interestingly, we did find that dogs that were fasted were more likely to test positive. This could be related to having 2 different populations of patients: the first group of patients being presented for a scheduled appointment at a tertiary animal.
hospital who were often instructed to fast for reasons outside of this study and were more likely to be sick, and the second group of patients who were owned by staff or students who were not instructed to fast prior to sample collection and were more likely to be healthy. Therefore, these results may be more indicative of health status, and not solely fasting status, as univariate analysis found that dogs that were not clinically healthy were associated with an increased risk of FOBT positivity.

Fecal hemoglobin immunochemical tests were first developed in the 1970s and have since gained popularity for human colorectal cancer screening. With human blood, FITs have a superior limit of detection than guaiac FOBTs as highlighted in this study, with a limit of detection of 50 ng hemoglobin/mL for both FITs versus 12.5 µg hemoglobin/mL for the guaiac FOBT. Unfortunately, in this study, FITs did not detect canine or feline blood, even at high concentrations. In humans, there are a few different, distinct beta-globin genes with beta (HBB) being highly expressed as the major adult hemoglobin and delta (HBD) being minimally expressed. In dogs, the opposite is true with HBD being the highly expressed beta-globin while HBB expression is much lower. Similarly, in cats delta is the major beta-globin subunit. A BLAST comparison of amino acid sequence of canine and human HBB and HBD showed an 84% to 90% homology, with the highest homology (90%) between human HBB and canine HBD, suggesting that cross-reactivity with the FITs would occur. Although we only tested 2 FITs, as they are all centered around the same diagnostic principle of using antibodies against human globin, it is unlikely that other manufacturers’ tests would successfully detect canine or feline blood. Even if FITs were able to detect canine and/or feline hemoglobin, it is unclear how the digestion of hemoglobin in the upper digestive tract would affect testing, as in veterinary medicine we are generally using these tests to assess for upper GI blood loss versus colorectal bleeding used in human medicine where little to no digestion of hemoglobin would be occurring.

There were several limitations to our study. Although all tests were performed and interpreted by a single investigator (KC), there was no blinding to patient factors or to whether the sample was NV or DRE. As noted earlier, the goal of this study was to assess the association between NV and DRE samples for fecal occult blood testing; therefore, we did not confirm GI bleeding in our patients to differentiate true/false positive/negative results nor calculate diagnostic sensitivity and specificity. Furthermore, as the study was not designed to assess for associations between patient parameters and FOBT positivity, all associations or lack thereof noted in this study should be viewed as hypothesis generating. When assessing the FITs, blood from 1 canine and 1 feline patient was used. As 1 study showed different beta-globin gene assessments in different breeds of dogs, it is possible that blood from some breeds may have been able to be detected. Even if true, the test would not be practical for clinical use if only able to be used in select breeds. Patients less than 3 kg were excluded from the study due to concern for increased discomfort of rectal examination for those patients; therefore, FOBT results from DRE in dogs less than 3 kg should be interpreted with caution, as our study did not evaluate performance in this population. In addition, as having bloodwork was not part of our inclusion criteria, some of the secondary hematologic variables assessed had low numbers, which could have led to type 2 errors.

In conclusion, a strong correlation with 92.5% concordance was found between NV and DRE samples with guaiac FOBT, adding evidence for the use of DRE samples for FOBT in veterinary medicine. On multivariate analysis, dogs with GI disease were more likely, and heavier dogs less likely, to test positive for FOBT. Although we did not find a significant effect of thrombocytopenia on FOBT results, our study was not specifically designed to investigate this relationship. Additionally, the platelet count metrics of our study population made it impossible to truly assess both the relationship between thrombocytopenia and FOBT results along with the effect of sample collection methodology in dogs with severe thrombocytopenia. Future targeted studies on the relationship between platelet count and FOBT positivity are warranted. Unfortunately, the assessed FITs did not detect canine or feline blood precluding their use in veterinary medicine.

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References

Supplementary Materials

Supplementary materials are posted online at the journal website: avmajournals.avma.org