

Faecal calprotectin lateral flow testing detects subclinical gastrointestinal inflammation after NSAID administration in dogs

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Background

Non-steroidal anti-inflammatory drugs (NSAIDs) are central to perioperative analgesia and chronic pain control, including for osteoarthritis management. Most dogs tolerate NSAIDs well, but cyclooxygenase (COX) inhibition can reduce prostaglandin synthesis and so compromise important physiological functions, particularly those mediated by COX-1. The gastrointestinal (GI) tract is the most frequent site of adverse effects.¹

Importantly, much of this pathology develops without clinical signs. In a study of dogs receiving NSAIDs for a median of six months, more than 80% had mucosal erosions on video capsule endoscopy (VCE).²

Faecal calprotectin is a stable, neutrophil-derived biomarker that reflects mucosal inflammation,³ offering a potential monitoring test for detecting GI adverse effects.

Objectives

- 1 Define a lateral flow test (LFT) diagnostic threshold for faecal calprotectin that differentiates healthy dogs from dogs with histologically confirmed chronic inflammatory enteropathy (CIE).
- 2 Using this threshold, assess whether the test detects NSAID-associated GI inflammation after 14 days of treatment in dogs without diagnosed GI disease.

Study cohorts

- Healthy controls (n=50): adult dogs with no history of GI disease, no acute GI signs, no recent antibiotics or specialised diet.
- Clinical GI disease (n=50): dogs with histologically confirmed CIE.
- NSAID group (n=20): dogs without diagnosed GI disease sampled pre-NSAID and day 14 after starting treatment.

Methods

- Faecal calprotectin was measured using a rapid point-of-care lateral flow immunoassay employing monoclonal antibodies against canine calprotectin (GIQuest, Carus Animal Health).
- Faecal calprotectin levels were calculated using a best fit curve derived from Table 1, relating LFT visual score to known calprotectin concentrations.
- Parallel quantification was performed using an Axxin lateral flow reader (Axxin Pty Ltd, Australia).
- Quantification of faecal calprotectin was also performed using a research grade ELISA (Cusabio).
- Diagnostic threshold was determined by Youden's J; group comparisons used standard inferential statistics (R).

VISUAL SCORE (LFT)	CALPROTECTIN LEVEL (MG/KG)
1	2 mg/kg
2	2.5 mg/kg
3	3 mg/kg
4	3.75 mg/kg
5	4.5 mg/kg
6	5.6 mg/kg
7	6.5 mg/kg
8	7.7 mg/kg
9	12.8 mg/kg
10	>16 mg/kg

Table 1. Visual score (LFT) versus known calprotectin level.

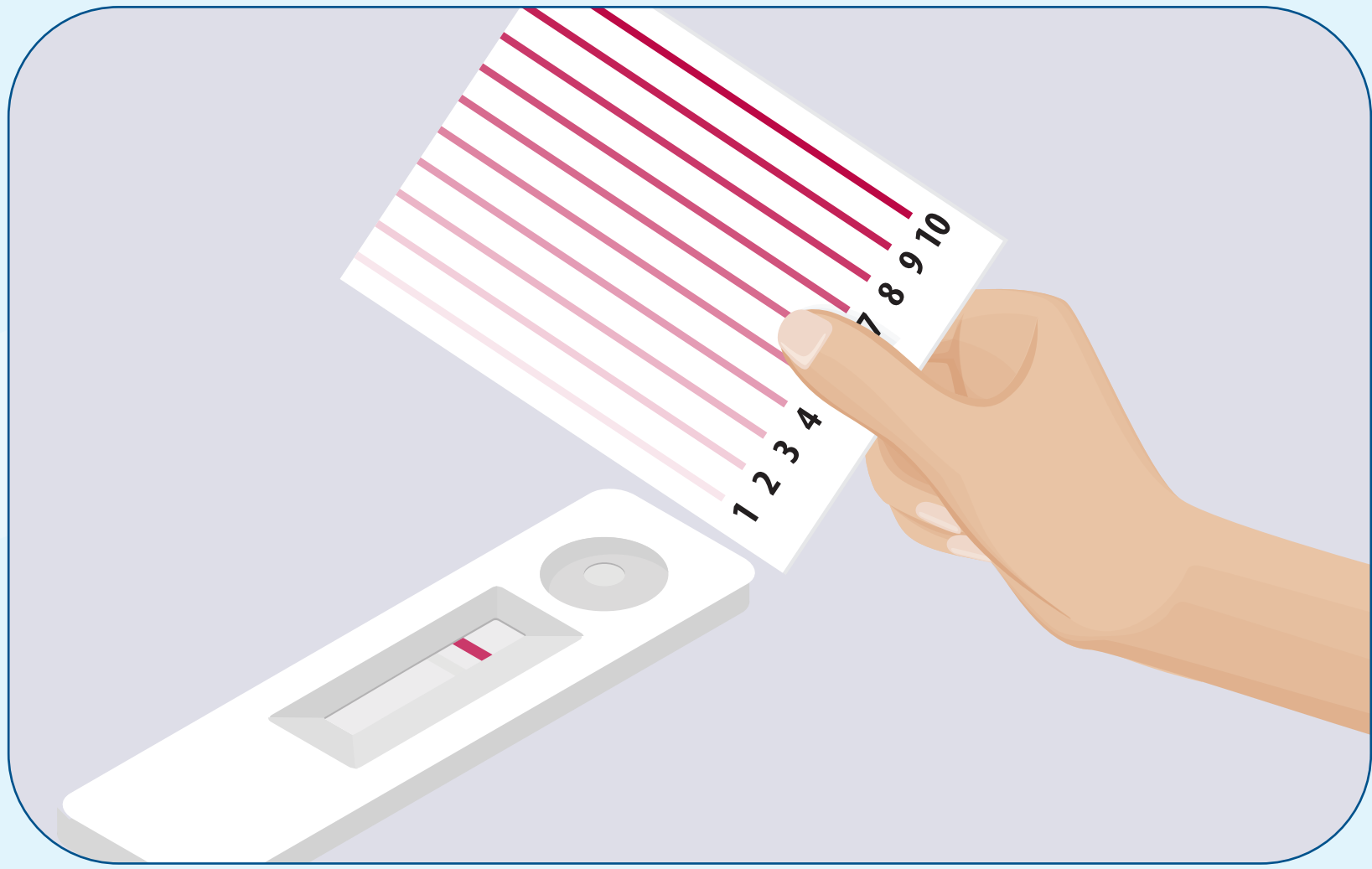


Figure 1. Comparison of colour intensity to visual score card

After 14 days of NSAIDs, 25% of dogs exceeded the faecal calprotectin inflammatory threshold despite no reported clinical signs.

This supports LFT-based monitoring as a practical way to detect subclinical GI inflammation during NSAID therapy.

Results

- 1 Diagnostic threshold validation
 - LFT score distributions clearly separated healthy controls from histologically confirmed CIE ($p < 0.0001$).
 - To determine the optimal diagnostic threshold for calprotectin scores, Youden's J statistic was used.

Diagnostic thresholds (LFT visual score; Youden's J):

LFT SCORE	INTERPRETATION
≤ 1	Negative
2	Borderline
≥ 3	Inflammatory range

Specificity: 96% | Sensitivity: 94%

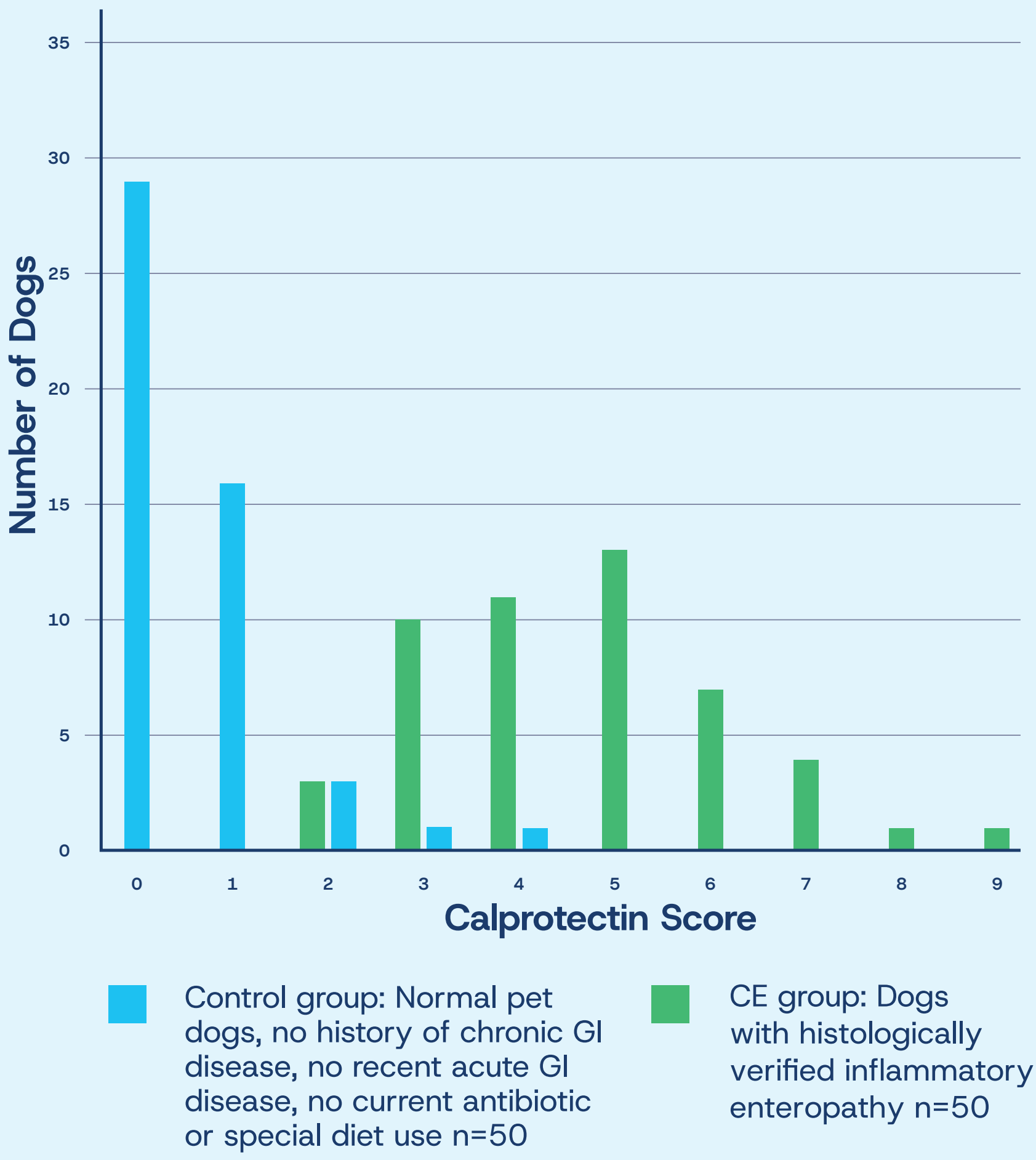


Figure 2a. Distribution of LFT scores (from scorecard grading) in controls and histologically confirmed CIE groups.

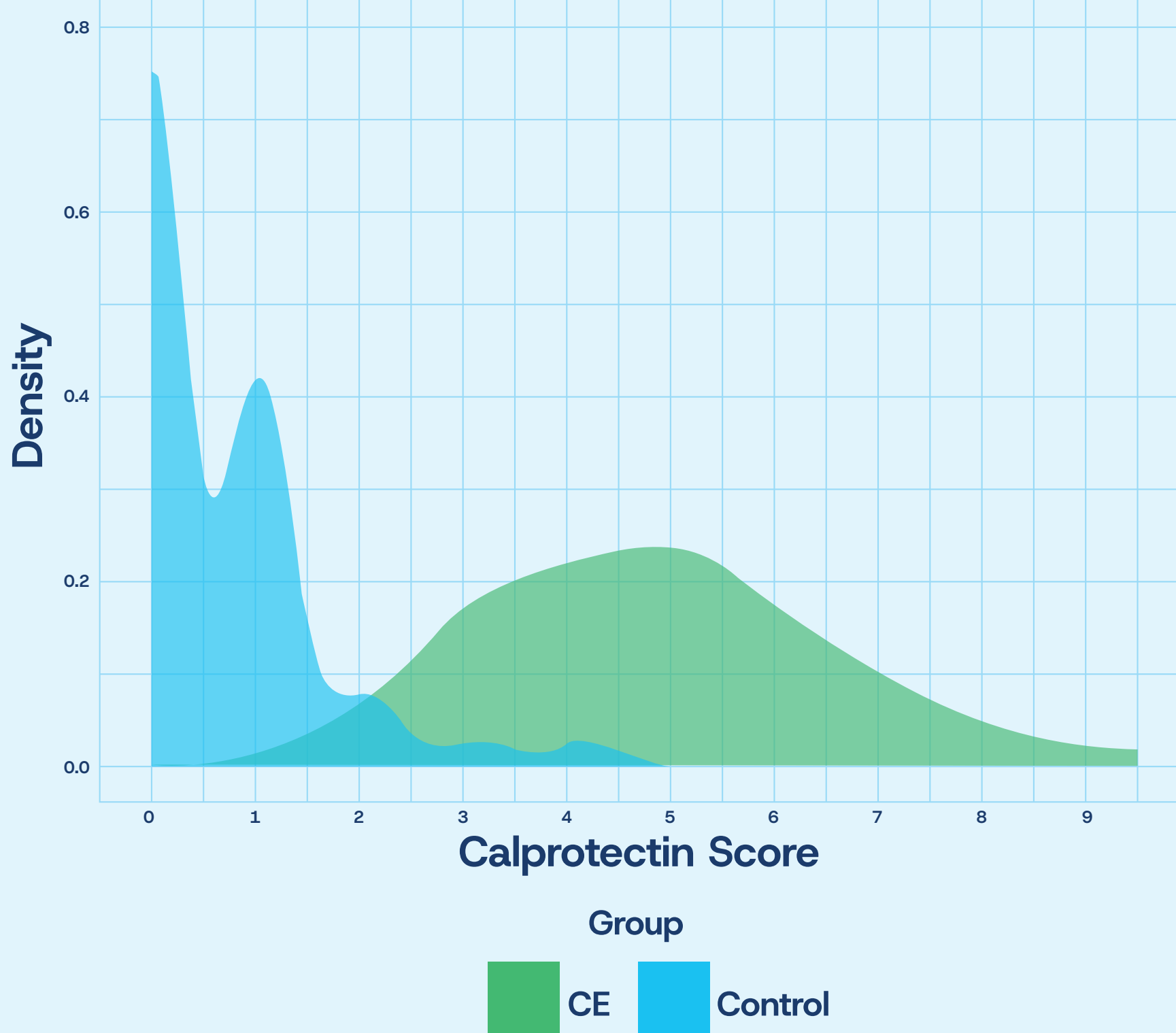


Figure 2b. Derived density distribution of calprotectin scores in control and histologically verified CIE groups.

2 NSAID-associated GI inflammation

- Dogs receiving oral NSAIDs for 14 days showed an increase in faecal calprotectin:
- Mean LFT score increased from 0.45 to 1.5 (corresponding to an estimated increase in calprotectin concentration of 1.88 to 2.43 mg/kg).
 - At day 14, 25% of dogs exceeded the inflammatory threshold (visual score ≥3) (Figure 3)
 - No clinical signs were reported in these dogs.

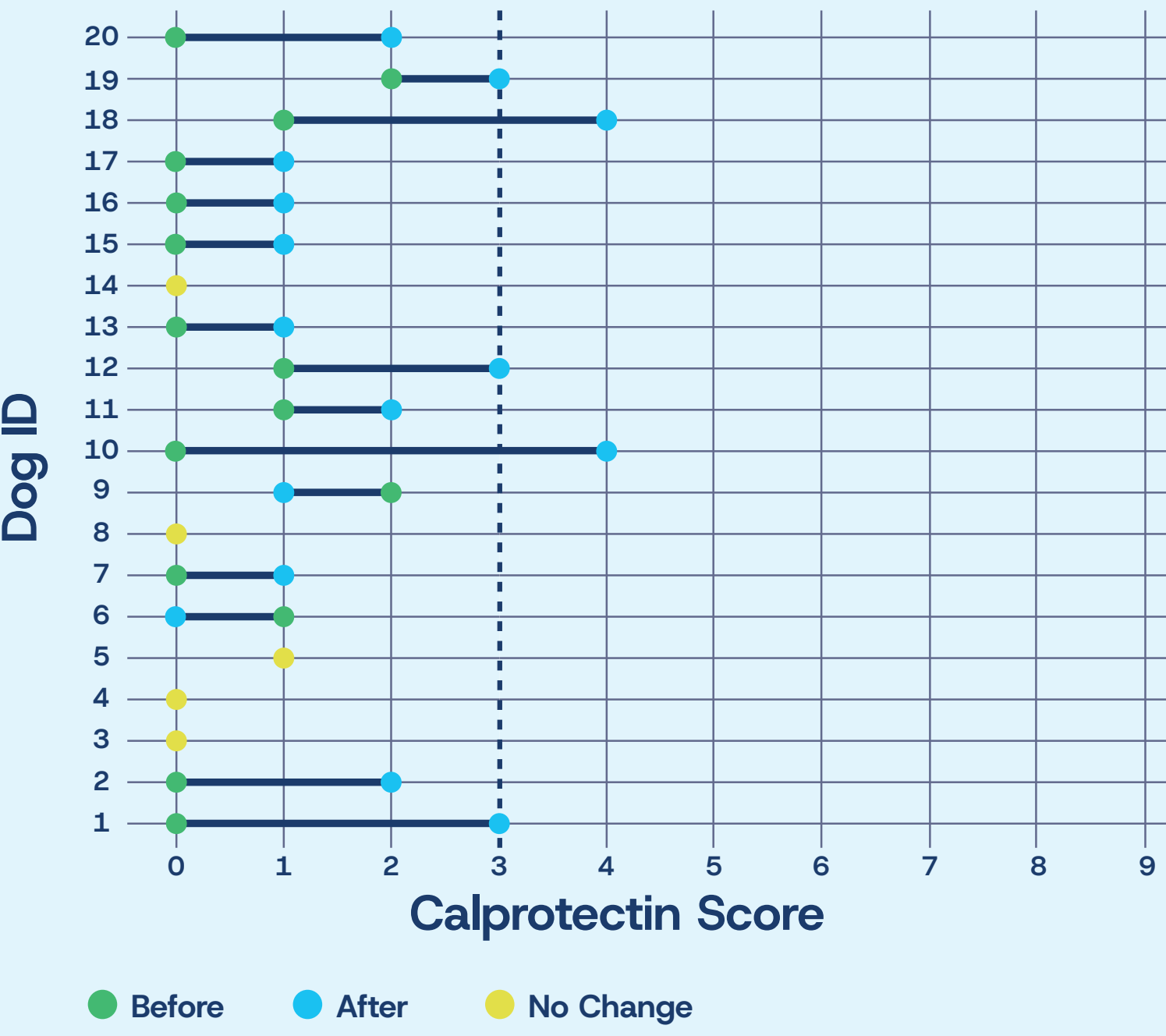


Figure 3. Increases in faecal calprotectin after 14 days of NSAIDs; 1 in 4 dogs reached inflammatory-range values without clinical signs.

Conclusions

- A point-of-care faecal calprotectin LFT provides a simple visual score that distinguishes healthy dogs from histologically confirmed inflammatory enteropathy with specificity 96% and sensitivity 94%.
- In dogs prescribed NSAIDs, the LFT detected increases in calprotectin after 14 days, with 25% exceeding the inflammatory-range threshold without clinical signs.
- A faecal calprotectin LFT provides a practical monitoring tool to identify dogs developing subclinical NSAID-associated GI inflammation, enabling earlier reassessment of NSAID strategy (including dose, duration, gastroprotectants, alternative analgesics) and follow-up where appropriate.

References: 1. Hunt, J.R. et al. (2015) An analysis of the relative frequencies of reported adverse events associated with NSAID administration in dogs and cats in the United Kingdom. Vet J. 206:183–190. 2. Mabry, K, Hill T, & Tolbert, M. (2021) Prevalence of gastrointestinal lesions in dogs chronically treated with nonsteroidal anti-inflammatory drugs. J Vet Intern Med. 35(2):853–859. doi: 10.1111/jvim.16057. 3. Jukic, A. et al. (2021) Calprotectin: from biomarker to biological function. Gut. 70(10):1978–1988. doi: 10.1136/gutjnl-2021-324855.

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