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Hindgut Digestibility in the Dog (*Canis familiaris*)

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Ishwani Singh

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Abstract

Digestibility trials are important tools used by nutritionists to establish the nutrient requirements of an animal. The most common method used is total faecal collection, which involves the total collection of faeces over a limited period of time. Digestibility trials can also use indigestible markers, such as chromium oxide and titanium oxide, which eliminate the need for a total faecal collection and instead uses sub-sampling methods

The major aim of this thesis was to compare the suitability of chromium oxide (Cr_2O_3) and titanium dioxide (TiO_2) as indigestible markers in dogs. Due to constraints in the study design (limited space in the facility and therefore a requirement to house dogs in pairs), it needed to be established if TiO_2 interfered with the chemical analysis of Cr_2O_3 before any animal trials were undertaken. Different concentrations of both markers were added to freeze dried dog faeces. The indigestible markers were then analysed for in the laboratory and recoveries calculated. It was established that there was no interference of the analysis by either marker.

After a pilot study confirmed that coprophagy did not occur in the dogs, the first study (Chapter 2) used 12 entire female Harrier hounds housed in pairs in 6 concrete floor pens. The dogs were fed twice daily with one of 4 treatment diets; a high nutrient diet containing Cr_2O_3 or TiO_2 or a low nutrient diet containing Cr_2O_3 or TiO_2. Daily intake was recorded for each dog. Each dog received each of the 4 diets over 4 consecutive evaluation periods of 14 days each. This study showed that 100% recovery of markers was not achieved in the dogs. Recoveries of Cr_2O_3 were 58% and 76% respectively for high and low nutrient diets, and recoveries of TiO_2 were 80% and 74% respectively for the same two diets. These results suggest that TiO_2 is currently the best indigestible marker for use in dogs.

Study 2 (Chapter 3) used 5 adult female Beagle dogs with surgically prepared ileal cannulas. The ileal cannulation was conducted according to the method of

Walker *et al.* (1994), and the dogs were housed individually in floor pens in temperature controlled rooms. The dogs were fed 5 commercial AAFCO approved diets with free access to water. Dogs were randomised in a replicated 5 × 5 Latin-square design with 14 day periods, consisting of a 10 day adaptation period and a 4 day ileal and faecal collection period. It was found that there were significant differences between ileal and faecal digestibility of dry matter, crude protein, organic matter and carbohydrates of the nutrients that we tested, indicating that there was significant metabolism of nutrients in the hindgut of the dog.

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