The use of inert markers for protein digestibility studies in dogs

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Digestibility markers are commonly used in animal nutrition studies, especially where the total collection of faecal material is not practical. Whilst it is customary to employ this methodology in production animal studies, digestibility trials in dogs and cats traditionally rely on the total collection of faeces. Consequently, there are relatively few reports of the use of inert markers in dogs, and even fewer examples of their validation. The aim of this study was to compare three different digestibility markers in dogs and validate these against digestibility values calculated by total faeces collection. The digestibility markers were evaluated in 12 dogs (4 small, 4 medium and 4 large). The markers were incorporated into a dry extruded diet at the following inclusion levels:

1. Hexatriacontane (C_{36} H_{74}) – 200 mg/kg
2. Titanium dioxide (TiO_2) – 1g/kg
3. Celite – 20g/kg

Dogs were fed this diet as their sole nutrient intake once daily at 3 pm for 14 days, and all faeces produced during the final 5 days were collected. Amounts fed were calculated to meet maintenance energy requirements (MER) as determined by the formula MER (kcal) = 140 x BW(kg)$^{0.75}$. Fresh faeces were collected from the concrete floors twice daily, weighed, and then dried to constant weight at 80°C. Dried samples were ground and representative samples analysed for crude protein (CP) using the LECO FP 2000 system.

Results of CP digestibility (%) calculated using each of these 3 markers and from total collections (TC) differed significantly (P<0.001), as seen in Table 1. Digestibility values calculated using the inert markers were generally higher than values obtained by total collection. Subsequent regression analyses revealed a significant linear relationship (P<0.01) between TC values and values obtained using hexatriacontane (R^2 = 0.63). However, relationships between TC values and values determined using titanium dioxide (R^2 = 0.08) and celite (R^2 = 0.04) markers were weak and not significant. The diet used in this study had a relatively high fat content (14%), and this may explain the success of hexatriacontane, which has an affinity for fatty substances. This study suggests that, for digestibility trials in dogs, the markers tested may not give results which are as accurate as the traditionally used total collection method.

Table 1 CP digestibility (%) in dogs of different sizes (n = 4), calculated by different methods.

	TC	C36	TiO_2	Celite
Small	76.5[a]	79.9[b]	84.0[c]	84.3[c]
Medium	76.1[a]	78.7[a]	83.6[b]	83.5[b]
Large	80.9[ab]	81.6[ab]	79.3[a]	83.9[b]
All dogs (n = 12)	77.9[a]	80.0[b]	82.3[c]	83.9[c]

[a,b,c,d]Within rows, means with a common superscript are not statistically different (P>0.05)

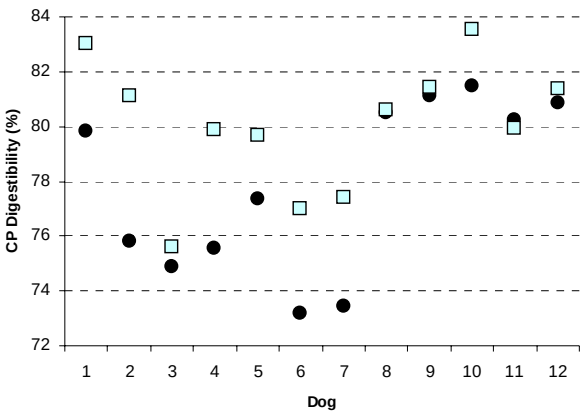

Figure 1 CP digestibility in individual dogs (n = 12) determined by total collection (●) and hexatriacontane marker (□) methods.