

PREDICTION OF DIGESTIBLE ENERGY CONTENT OF EXTRUDED DOG FOOD BY IN VITRO ANALYSES

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Introduction: Following the NRC (1985), the estimation of energy in pet foods is based on the chemical proximate analysis, assuming constant crude protein (CP), ether extract (EE) and nitrogen free extract (NFE) digestibilities. Recently, factorial equations based on the close relationship existing between the energy digestibility of foods and their crude fiber content have been proposed as good approaches for predicting energy content of food (Kienzle et al., 1998; Castrillo et al., 2001). The aim of this study was to develop a simple and reproducible *in vitro* method for predicting apparent energy digestibility of dry extruded dog foods.

Material and methods: The proposed method is based on the two-steps multi-enzymatic incubation assay described by Boisen & Fernández (1991), with some modifications related to time of incubation and enzyme concentration to be adapted to the characteristics of dog's digestion.

The *in vitro* organic matter disappearance (*in vitro* dMO) of 44 dry extruded commercial dog foods was determined and used as predictor of the *in vivo* apparent dMO and energy digestibility (dE) and the digestible energy content (DE). The apparent dE of all the foods was previously determined by *in vivo* balances, using 6 female beagles 2-6 years old. *In vivo* dMO and dE of experimental foods ranged from 0.6645 to 0.908 and from 0.6876 to 0.9087, respectively and their DE content from 3.26 to 4.99 Mcal/kg DM. The *in vivo* dMO and dE were closely related ($r=0.969$, $RSD=1.36$, $CV=1.60\%$).

Results and discussion: There was also a close linear relationship between the *in vitro* and *in vivo* dMO ($In\ vivo\ dMO, \% = -5.77 + 1.025 \times (in\ vitro\ dMO, \%)$, ($r=0.977$, $RSD=1.16$, $CV=1.37\%$)).

The *in vitro* dMO explained a 0.90 of the *in vivo* dE ($dE\ \% = -1.407443 + 0.97572 \times dMO\ in\ vitro\ \%$, $r = 0.950$, $RSD = 1.686$, $CV = 1.99\%$). As well, a close relationship between the *in vivo* and predicted DE (based on *in vitro* predicted dE and measured gross energy) was found ($r^2 = 0.96$, $RSD = 0.086$, $CV = 1.97$). The accurate of DE content prediction using the proposed *in vitro* method was higher than that obtained when the DE content was predicted from the chemical composition of foods using the digestible energy contents for CP, NFE and EE proposed by the NRC ($r^2 = 0.81$, $CV = 4.67\%$) and similar than that obtained when using the equations proposed by Castrillo et al. 2001 ($r^2 = 0.87$, $CV = 3.88\%$) and Kienzle et al. 1998 ($r^2 = 0.96$, $CV = 2.25\%$).

Conclusion: The proposed *in vitro* method provides a more accurate prediction of digestible energy* values than the ones proposed by the NRC and FEDIAF, and could be envisaged as an alternative system of evaluation of digestible energy content of this kind of foods. Enlarging the number and diversity of food composition (mainly on the fiber fraction) is considered in order to improve the predictive equation.

References:

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