BRIEF REPORT

Comparison of measured and predicted energy density of an oral care chew for dogs

Danielle Nuttall1*, Richard Butterwick2, Katja Strauhs3 and Phil McGenity1
1Mars Care and Treats, Birstall WF17 9LU, UK
2WALTHAM Centre for Pet Nutrition, Waltham-on-the-Wolds LE14 4RT, UK
3Mars Petcare Germany, Eitzer Straße 215, D-27283 Verden (Aller), Germany

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Abstract
The dog chew studied here is a starch-based, twin-screw cooker extruded dog care and treat (C&T) product with oral health benefits. The manufacturing process and nutrient profile of such products are markedly different from those of main meal pet foods. Predicted metabolisable energy (PME) in pet food is calculated using equations derived from main meal feeding studies so it is unclear whether these equations can be applied to C&T products. The present study aimed to directly measure metabolisable energy (ME) content of the dog chew in dogs and compare with calculated PME. A batch of dog chews was manufactured and the product rendered micronutrient complete to allow solus feeding. Following a 3-d standard diet pre-feed phase, the test product was fed solus to a panel of seven adult dogs for a period of 8 d. Dietary intake was recorded daily and faecal matter collected for the last 5 d. Test product and pooled faecal samples were analysed for proximate nutrients, and digestibility coefficients were calculated as the difference in intake and faecal excretion (7–11 d). Digestible energy was converted to ME by correcting for energy losses in urine. PME was calculated using proximate analysis and modified Atwater factors according to National Research Council 2006. The results showed close agreement between actual ME (1272 (SD 12.1) kJ/100 g) and calculated PME (1268 (SD 12.6) kJ/100 g), indicating transferability of the NRC 2006 PME equations to the dog chew tested here.

Key words: Metabolisable energy; Canine treats; Digestible energy; Predicted v. analysed energy content

Dog care and treat (C&T) products are often used by dog owners as a means of bonding, for training reinforcement and to deliver functional benefits to their pet. The dog chew studied here is a twin-screw extruded chew with proven efficacy in reducing the build up of dental calculus in dogs(1). This product must be fed daily to provide the documented benefits so it is important to know the energy density of the product to understand its contribution to the recommended daily energy intake. This knowledge is applied to feeding guides, which help owners balance their pets’ energy consumption and avoid inadequate nutrient intake when considering nutritionally incomplete C&T products. The most accurate way of measuring the energy content of pet foods is via animal feeding studies. Due to the labour intensity and cost of this method, predictive equations are routinely used. The widely used National Research Council (NRC) (2006) predicted metabolisable energy (PME) equations have been derived from main meal feeding study data(2). Main meal pet food is produced within a processing environment which is substantially different from that used to produce many C&T products. Dry main meal pet food is generally manufactured using single-screw extrusion at a moisture content of about 30 %, with a subsequent drying step, whilst wet main meal pet food is generally manufactured at a moisture content of

Abbreviations: C&T, care and treat; DE, digestible energy; GE, gross energy; ME, metabolisable energy; NFE, N-free extract; NRC, National Research Council; PME, predicted metabolisable energy.

* Corresponding author: D. Nuttall, email danielle.nuttall@effem.com

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about 80%. The chew in the present study was processed by twin-screw extrusion at a moisture content close to its final moisture content (about 15%). Given this, it is unclear whether the NRC (2006) PME equations are applicable to the dog chew. The aim of the present study was to directly measure the metabolisable energy (ME) content of this C&T product in a panel of dogs and to compare with calculated PME.

**Experimental methods**

A panel of seven healthy adult neutered dogs of various breeds was studied. Within the panel were three males and four females, ranging in age from 1 year and 6 months to 4 years and 3 months, body weights ranging from 9.1 to 30.7 kg (mean 18.9 kg). The study took place at the Verden Pet Centre (Mars Petcare) and all methods were conducted in accordance with paragraph 11 of the Animal Protection Law as approved by the Veterinary Inspection Office, Germany. Dogs were housed in pairs throughout the study in kennels equipped with indoor and outdoor runs. Each dog received a daily socialisation period of 40 min and had *ad libitum* access to water throughout the 11 d main study.

To investigate the energy density of the dog chew (PEDIGREE® Dentastix™; Mars Petcare), the product was rendered nutritionally adequate for solus feeding (i.e. the test product represented the only nutrient source) by the addition of vitamins and minerals. The tartar sequestrant sodium tripolyphosphate (STPP) was removed from the product to ensure rendered nutritionally adequate for solus feeding (i.e. the test product as two meals per d, to provide their individual daily socialisation period of 40 min and had *ad libitum* access to water throughout the 11 d main study.

The main study comprised a 3 d pre-feed phase where dogs received standard diet as described previously, followed by an 8 d phase of feeding the test product solus. Dogs received the test product as two meals per d, to provide their individual daily energy requirement according to the following equation:

### Table 1. Analyzed proximate nutrient content of the test product

<table>
<thead>
<tr>
<th>Nutrient (g/100 g)</th>
<th>Test product*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture</td>
<td>15.25</td>
</tr>
<tr>
<td>Protein</td>
<td>7.29</td>
</tr>
<tr>
<td>Fat</td>
<td>1.50</td>
</tr>
<tr>
<td>Fibre</td>
<td>0.20</td>
</tr>
<tr>
<td>Ash/inorganic matter</td>
<td>6.07</td>
</tr>
<tr>
<td>NFE</td>
<td>69.70</td>
</tr>
</tbody>
</table>

NFE, N-free extract.

* Values shown are means of analyses run in duplicate and are shown on an ‘as is’ basis.
The present study indicates that the NRC 2006 method for predicting ME is adequate for the product tested here.

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K. S. was responsible for running the study. D. N. contributed to the study design and performed data analysis. P. M. contributed to the study design and critical revision of the manuscript. R. B. contributed to the study design and critical revision of the manuscript.

All authors are employees of Mars.

References