



Study of ingredients, nutrient composition and energy content of some commercially available treats for dogs

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Abstract. Commercial dog treats are now widely consumed by pets and have gained a lot of popularity. Treat feeding is a common practice among dog owners and there is great variability among regimens. Eighteen dog treats were selected from the market with the aim of being analyzed regarding the ingredients, analytical composition and energy content. The most widely represented ingredient categories were 'meat and meat by-products', 'vegetable by-products' or 'vegetable protein extracts', 'cereals', vegetable by-products, 'sugars', 'oils and fats'. Minor ingredients included 'glycerin' and 'milk and milk derivatives'. The most calorically dense treats were rawhide colored treats, (412 Kcal ME/100 g) followed by biscuits (342 Kcal/100 g). Rawhides had the highest protein value (42%), while dental treats had the lowest content (4%). Regarding fat, the lowest value was in dental treats (0.26%) and biscuits had the highest percentage (13%). Selected treats were generally low in fiber, ranging from 0.01 to 1%. Rawhides showed the lowest ash level, and in the case of carbohydrates, the highest value has been registered for dental treats (77%), followed by biscuits (66%) and strips treats with meat and cereals, all three categories having cereals as the main ingredient. Nutrition plays a major role in the evolution of our dog's life. Given the significant role that treats can play, it is critical to ensure that they have no adverse effects on our dog's health.

Key Words: canine nutrition, feeding, nutrient profiles, rewards.

Introduction. Although, lately, dog owners have been paying more and more attention to their dog's health and well-being, they still purchase treats as a way to strengthen the bond with their pet (Linder & Mueller 2014; Morelli et al 2020). Dog treats represent the world's fastest growing segment of the pet food industry today, and there are a variety of such products on the market. The majority of pet owners feed their animals commercial ready-made food (assalco.it).

Given that cereals contain gluten, which gives the right textural features and makes production easier, the majority of dog treats on the market are baked and wheat-based. Treats are not a complete food; rather, they are a supplement. Complementary pet food is defined by law as pet food that contains a high concentration of a certain component but, according to its composition, is only adequate for a daily ration when combined with other pet foods (Kepinska-Pacelik et al 2023). Commercial dog treats, which come in a variety of shapes, size, flavor, compositions, such as crunchy treats (biscuits), soft treats, freeze-dried and jerky treats, dental chews, rawhide, meat strips, animals bones, pig ears, are now an everyday ingredient in many dogs' diets (Morelli et al 2018). There are no clear guidelines defining recommendations for nutritional balance in dog snacks, but we must keep in consideration that they should not make up more than 10% of the animal's daily food intake (FEDIAF 2021). Despite the growing popularity of these products, very little is known about the nutritional value or their impact on a dog's diet and health. Therefore, the aim of this study was to evaluate some types of dog treats in terms of their chemical composition and caloric density.

Material and Method. Eighteen dog treats of different international pet food brands were collected from different stores (pet shops, supermarkets, veterinary clinics). The selected samples were divided into six categories, as follows: 5 biscuits, 3 jerky beefs, 2 meat-based strips, 4 meat-based strips with cereals, 2 sticks for dental-care, 2 beef rawhide chew colored sticks. Labels of the selected samples were examined regarding: product name, brand, number and type of ingredients and their label order, analytical composition, including moisture, crude protein (CP), ether extract (EE), crude fiber (CF), ash, net weight and/or number of pieces per pack, recommended quantities of treats/day. Eighteen types of dog treats were evaluated in terms of chemical composition (dry matter, protein, fat, fiber, ash) as well as energy value. Moisture, protein, fat, fiber, and ash were measured using AOAC (2012) official methods. The carbohydrate content of the treats was calculated by difference. In our study, we used calories as the unit of measurement for energy (Castrillo et al 2009), and the energy value per 100 g produced was calculated (NRC 2006).

Results and Discussion. The most widely represented ingredient categories were 'meat and meat by-products', 'vegetable by-products' or 'vegetable protein extracts', 'cereals', 'oils and fats', 'sugars'. Minor ingredients included 'glycerin' and 'milk and milk derivatives'. Seven treats were composed of 5 ingredients, four of 2 ingredients, three treats contained four ingredients, and the other four were composed of 8 ingredients. The composition of the treats was indicated on the label by a list of specific ingredients and in most cases by category of ingredients. Biscuits included dry treats mainly made of cereals, meat by-products, sugars, fatty oils, vegetable by-products. Beef jerky treats were made of beef meat and meat by-products, cereals and vegetable by-products. Meat-based strips were made of dry chicken meat and glycerin. Meat-based strips and cereals included cereals, meat and meat by-products, glycerol, vegetable protein, sugars extracts, oils, fats, milk and milk by-products. Dental treats were made from cereals, vegetable by-products, meat and meat by-products, fatty oils. Beef rawhide chew colored sticks were made by rawhide beef and rice starch.

The energy value of each category of treat (kcal/100 g) and the nutrient composition are reported in Table 1. The most calorically dense treats were rawhide colored treats, (412 Kcal/100 g) followed by biscuits (363 Kcal/100 g). The lowest density was found in the jerky beef treats and meat-based strips (258 Kcal/100g, 271 Kcal/100 g, respectively).

Table 1

Nutrient composition obtained from the analysis of dogs treats

	<i>Biscuits</i>	<i>Jerky beef</i>	<i>Meat-based strips</i>	<i>Strips with cereals and meat</i>	<i>Dental treats</i>	<i>Rawhide colored sticks</i>
Kcal/100 g food	342	258	271	322	304	412
DM (%)	93	71	75	80	88	90
CP (%)	13	29	30	12	4	42
CF (%)	10	3	1	5	0.26	6
Fiber (%)	0.04	1	0.02	0.23	0.01	0.4
Ash (%)	5	6	4	4	7	3
Carbs (%)	66	32	40	59	77	39

Note: DM - dry matter; CP - crude protein; CF - crude fat; Carbs - carbohydrates

Three categories of treats showed dry matter (DM) between 70 and 80%, and three categories showed DM greater than 80%, with biscuits showing the highest and jerky beef the lowest value. Rawhides had the highest protein value (42%), while dental treats had the lowest content (4%). Regarding fat, the lowest value was in dental treats (0.26%) and biscuits had the highest percentage (11-13%). Selected treats were generally low in fiber, ranging from 0.01 to 1%. Rawhides showed the lowest ash level, and in the case of carbohydrates, the highest value has been registered for dental treats

(77%), followed by biscuits (66%) and strips treats with meat and cereals, all three categories having cereals as the main ingredient. Unfortunately, after comparing the analytical composition obtained from the analyses and those on the label, we could observe large variations especially in the case of proteins, with values much lower than those indicated on the label, especially in the case of meat-based treats and/or rawhide with a difference of up to 25% in the case of the rawhide colored sticks. There were also variations in the case of ash, the values we obtained being much lower than those indicated on the label.

Research indicates that over 50% of pet owners give their animals treats at some point in their lives (Rohlf et al 2010; Prata 2022). Unfortunately, there is a lack of literature regarding the nutritional content of dog treats. The majority of research on these treats evaluated the possibility that any bacterial contamination could endanger consumers and even pet owners (Clark et al 2001; White et al 2003; Freeman et al 2013; Galvao et al 2015; Morgan et al 2023).

The results showed that dog treats widely varied in chemical composition among the categories analyzed. Significantly, the ingredient categories listed most often in the treatments were 'meat and meat derivatives', 'plant by-products' and 'cereals', only some of which allowed the exact identification of animal species. Several of the treats have components that are not often found in pet food, like "milk and milk derivatives", "sugars", and glycerin. These ingredients are specified on product labels, and it is likely that many of them are added to make the treats more palatable. Dog treats' nutritional content can change based on the ingredients and manufacturing processes used. Certain dog treats have high protein and fat content, but might cause weight gain in less active dogs (Morelli et al 2018). Due to their possible high mineral content, treats should be carefully examined in the diets of dogs suffering from chronic kidney disease and heart failure (Morelli et al 2018).

Dogs' daily energy requirements might vary based on a variety of factors, such as age, breed, size, level of exercise, and overall health. The obesity epidemic, which affects both people and domestic animals, has been a major source of concern for the worldwide health system. The energy content of treats can vary greatly and, in some cases, surpass the recommended daily energy intake for dogs, according to a study on the nutritional evaluation of commercial dog food (Linder & Freeman 2010). When rewards account for up to 20% of a dog's daily energy needs, this is considered inappropriate treat consumption.

The feeding guidelines are an important detail on the pet food label. Many pet owners still do not know how to incorporate these kinds of treats into their diet. They view treats as gifts and underestimate the number of calories they contain and the impact they will have on their pet's energy balance (Lähteenmäki 2014). Dog treats known as "bully sticks" have grown in popularity in recent years. It is essential to remember, though, that a dog's daily calorie consumption can be significantly increased by just one piece of bully stick. One bully stick daily would supply about 9% of the daily calorie requirements for a medium-sized dog, while one bully stick daily would give around 30% of the daily caloric needs for a small-sized dog (Freeman et al 2013). The obesity epidemic, which affects both people and domestic animals, has been a major source of concern for the worldwide health system (Preet et al 2021).

For both owners and veterinarians, information on the label serves as a crucial reference point for feeding instructions. Therefore, it is important to keep an eye on how many treats and other supplemental foods pets are eating. It is crucial to select treats that are suitably balanced for their dietary needs. A feeding plan that takes into account the specific nutritional requirements of each pet is necessary to guarantee that supplemental meals are balanced and provide sufficient energy (Linder & Freeman 2010). Customers may be misinformed about the true calorie content of each treat because European producers are not compelled by EC Regulation 767/2009 to indicate the energy content on the labels of the treats (EU 2009).

Conclusions. Nutrition plays a major role in the evolution of a dog's life. Given the significant role that treats can play, it is critical to ensure that they have no adverse

effects on the dog's health. The small number of treats that were analyzed is one limitation of this study. Treats categories considered in this study showed wide variability in chemical composition and they contain many types of ingredients. To increase the amount of information available about treats, additional studies are required. Labels should be more specific and include more comprehensive details about the ingredients. Given that treats have been identified as a risk factor in obesity, the energy values of products should also be specified to help owners manage more effectively the use of these treats.

Conflict of Interest. The authors declare that there is no conflict of interest.

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