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Short Communication

The nutritive value of selected commercial dry dog foods

Michal Rolinec*, Daniel Bíro, Branislav Gálik, Milan Šimko, Miroslav Juráček, Kristína Tvarožková, Andrea Ištoková
Slovak University of Agriculture in Nitra, Slovak Republic

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The goal of this study was to analysed and compared the nutrients content of dry dog foods with nutrient content, which is declared by the manufacturer of the dry dog foods. Fifteen dry dog foods bought in the Slovakia were analysed for dry matter, crude protein, crude fat, crude fiber, nitrogen free extract and ash concentration. Nutrients analysis of dry dog foods were realised in Laboratory of Quality and Nutritional Value of Feeds according to the regulation of the Slovak Ministry of Agriculture no. 2145/2004-100. We found, that only 6 from 15 dry dog food samples were in interval ±5% from declared crude protein concentration; no sample was in interval ±5 % from declared crude fat concentration; only 2 from 15 dry dog food samples were in interval ± 5 % from declared crude fiber concentration; only 4 from 15 dry dog food samples were in interval ±5 % from declared ash concentration. Analysed dry dog food samples have very different nutritive value in comparison to on bale declared nutritive value. The highest shortage was detected by the fat concentration. The highest excess was detected by the fiber concentration.

Keywords: dogs, dry food, nutrients concentration, evaluationn

1 Introduction

The most important consideration in choosing a commercial pet food for a companion animal is its nutrient content. Nutrient content refers not only to the exact levels of nutrients in the food, but also to the digestibility and availability of all the essential nutrients (Case et al., 2011). There are many types of pet foods: dry pet foods, wet pet foods, semi moist pet foods (Tvarožková, 2015). Dry dog foods are very convenient for owners and are the most common type of pet food bought by pet owners (Harlow, 1997). In general, these products are more economical to feed than wet or semi moist foods and their store well because of their low moisture content (Samuelson and Cutter, 1991). There are two primary types of wet pet foods: those that provide complete and balanced nutrition and those that provide a dietary supplement or treat in the form of a canned/pouched meat or meat by-product. Complete and balanced wet foods may contain blends of ingredients such as muscle meat, poultry or fish meats or by-products, cereal grains, texturized vegetable protein and vitamins and minerals. Semi moist pet foods contain 15 % to 30 % water and include fresh or frozen animal tissues, cereal grains, fats and simple sugar as their principal ingredients. These products are softer in texture than dry pet foods, which contribute to their acceptability and palatability for some animals (Case et al., 2011). In general, wet foods are more palatable and digestible than many dry pet foods and they contain a higher dry matter proportion of protein and fat (Kallfelz, 1989). The aim of this study was to compare the analysed nutrients content of dry dog food with nutrients content, which is declared by the manufacturer of the dry dog food. We focused on selected commercial dog foods bought in Slovakia.

2 Material and methods

Fifteen dry dog food samples bought in Slovakia were used for nutrients analysis. Dry dog food samples were bought in different pet shops and were from different producers. Analysed dry dog foods were determined for different types of dogs. Nine from fifteen analysed dry dog foods were used for feeding of adult dogs in normal condition; two dry dog food samples were used for feeding of working dogs and four dry dog food samples were used for feeding of puppies. Five dry dog foods were made in Slovakia, 10 dry dog foods were made in other countries. Manufacturer's declared nutrients content of analysed dry dog foods are shown in table 1.

Analysis of dog food samples were realised at Department of Animal Nutrition (Slovak University of Agriculture in Nitra) in Laboratory of Quality and Nutritional Value of

***Corresponding Author:** Michal Rolinec, Department of Animal Nutrition, Faculty of Agrobiology and Food Resources, Slovak University of Agriculture in Nitra, Trieda Andreja Hlinku 2, 94976 Nitra, Slovak Republic. E-mail:michal.rolinec@uniag.sk

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Table 1 Manufacturer's declared average nutrients content of dry dog foods (g kg^{-1} original matter)

Nutrient	n	$\bar{x}$	sd	x_{min}	x_{max}	CV
Crude protein	15	265.67	33.75	200.00	300.00	12.70
Crude fat	15	155.00	40.84	75.00	220.00	26.35
Crude fiber	15	26.53	7.74	15.00	42.00	29.19
Ash	15	70.07	12.63	51.00	90.00	18.02

Feeds. During time from purchase to analyse of dry dog food samples were these samples stored at -40 °C in a deep-freeze cabinet (EVERmed, Italy). Analysis of crude protein, crude fat, crude fiber and ash concentration was realized according to the regulation of the Slovak Ministry of Agriculture no.2145/2004-100. Content of dry matter (DM) was determined gravimetric by drying of sample to constant weight by temperature 103 ±2°C. Crude protein was measured using the micro-Kjeldahl method, crude fat: extraction by light petroleum, ash: ashing to the use of a muffle furnace by 550°C, crude fiber: gravimetrically as the residue remaining after extraction in acid and alkali reagent. Nitrogen free extract (NFE) and organic matter (OM) was calculate (NFE = dry matter-crude protein-crude fiber-fat-ash, OM = dry matter-ash). Concentration of analysed nutrients is shown in grams per kilogram of original matter. Nutrient concentration in dry dog food declared by manufacturer was crib from bale of dry dog food. Results were statistical analyzed in statistic program SAS Enterprise Guide 5.1. (SAS Institute, Inc).

3 Results and discussion

Like all living animals, dogs require a balanced diet to grow normally and maintain health once they are mature. A dry dog food is the most common type of dog food. Many dog owners prefer feeding dry foods because they can leave a bowl of food available to their dog for a period of time without worrying about spoilage (Samuelson and Cutter, 1991). In our study we focused on nutrients concentration determination of dry dog food bought in Slovakia. Nutritive value of analysed dry dog food samples is shown in table 2.

The nutrient content recommendations for a dry dog food published by Case et al. (2011) are: no less than 26 % of crude protein; no less than 15 % of crude fat; not more than 5 % of crude fiber; carbohydrate concentration about 37 %; mineral content is estimated to be about 7 % and no more than 10 % of moisture. From our results is clear, that average concentration of dry matter, crude protein, crude fiber and ash is similar with recommendation. However, some of these dry dog food samples have low concentration of crude protein and ash. Crude fat was a nutrient with shortage in almost all dry dog food samples.

The aim of this study was to compare analysed content of nutrients with content of nutrients, which is declared by manufacturer. The average difference between analysed and declared nutrients content of some dry dog foods bought in Slovakia is shown in table 3. Difference between analysed and declared nutrient content was in dry dog foods very high. This statement confirms value of standard deviation as well coefficient of variation. Similar results of differences in nutrient concentration in pet food published Lasek et al. (2013). Analysed dry dog foods have very different nutritive value in comparison to declared nutritive value. Without correct information about nutrient content in dog food is correct feeding of dogs impossible. Then the result of feeding with such feed is, that some dogs are overfeed or underfeed with concrete nutrient and this can lead to various diseases.

Only 6 from 15 samples had crude protein content in range of ±5 % in comparison to declared crude protein content. In one sample was the crude protein content less

Table 2 Average nutrient content in analysed dry dog food samples (g kg^{-1} original matter)

Nutrient	n	$\bar{x}$	s.d.	x_{min}	x_{max}	CV
Dry matter	15	929.23	14.40	900.90	956.20	1.55
Crude protein	15	279.10	40.47	191.70	346.6	14.50
Crude fat	15	123.24	34.44	47.70	184.70	27.95
Crude fiber	15	31.79	12.19	18.40	61.50	38.34
Nitrogen free extract	15	417.67	50.73	328.00	549.50	12.15
Ash	15	77.43	9.83	58.90	92.00	12.70
Organic matter	15	851.79	17.62	819.60	883.10	2.07

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Table 3 Average difference between analysed and declared nutrients content of dry dog foods (g kg^{-1} original matter)

Nutrient	n	$\bar{x}$	sd	x_{min}	x_{max}	CV
Crude protein	15	+13.43	28.92	-38.10	+83.50	215.27
Crude fat	15	-31.76	23.59	-82.80	+26.00	-74.27
Crude fiber	15	+5.25	10.15	-13.40	+23.50	193.16
Ash	15	+7.36	14.12	-13.10	+32.00	219.21

than 90 % from declared value. It is known, that dietary protein serves several important functions. Dog owners must watch especially this nutrient to cover daily needs of essential amino acids of dog as published Kronfeld (1982). The worst situation was by the fat concentration. In 12 of 15 samples were concentration of fat under 90 % from declared fat content. We detected deficit of fat in high of minus 30 % or more in 4 from 15 dry dog food samples. This deficit of fat concentration in dry dog food is dangerous, because the fat is the main source of energy (Mudřík et al., 2014) and fatty acids (Herkeľ et al., 2014; Varga, 2014) and belongs to most digestible nutrient (Píšová, 2015). Fat in the diets for companion animals also plays a role in contributing to the palatability and texture of food (Bauer, 2006). This high deficit of fat in dry dog food could lead to the energy shortage mainly by dogs used for different kinds of work. Dietary fiber cannot by broken down by enzymes of intestinal tract of dogs to monosaccharide units for absorption in the small intestine. However a part of fiber can be digest by microbes found in the large intestine of dogs. This bacterial fermentation produces short-chain fatty acids and other end products. The short-chain fatty acids are an important energy source for epithelial cells lining the gastrointestinal tract and these fiber sources help to maintain gastrointestinal tract health (Alvarez and Sanchez, 2006; Case et al., 2011). Only two samples were in range of ±5 % from declared crude fiber content. Nine from 15 samples contain 120 % or more fiber and 3 from 15 samples contain more than 160 % of fiber in comparison to declared fiber content. So high concentration of fiber can limits digestibility of other nutrients. Minerals are inorganic elements that make up only 4 % of animals total body weight, nonetheless, the essential minerals must be present in the diet to sustain life and maintain health (Case et al., 2011). Minerals are essential mainly for growth of young animals (Hanušovský, 2014). However long-time intake of food with high concentration of minerals has bad effect on health (Tvrdá et al., 2013). We found that only 4 from 15 samples have content of ash in range ±5 % from declared value. Two from 15 samples contain 150 or more percent of ash in comparison to declared ash content. Long-time feeding with such food may be unhealthy for dogs.

4 Conclusions

Our results point out on the most common limitations of nutrient concentration declarations of dry dog foods bought in Slovakia. Only 6 from 15 samples had laboratory analysed crude protein concentration in the range of ±5 % from declared crude protein concentration. We detected deficit of fat in level of minus 30 % or more in 4 from 15 dry dog food samples. This high deficiency in fat concentration could lead to the energy shortage mainly by dogs used for different kinds of work. 9 from 15 samples contain plus 20 % or more fiber and 3 from 15 samples contain more than plus 60 % of fiber in comparison to declared fiber content. High concentration of fiber restrict digestibility of other nutrients. 2 from 15 samples contain over 50 % of ash in comparison to declared ash content. Long-time feeding with such food may be unhealthy for dogs. Feeding without exact knowledge about nutrient concentration in dog foods can never cover the nutrient needs of dog. Therefore it is necessarily exact declaration of nutrient concentration of dog foods by manufacturer.

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