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## ABSTRACT

Commercially available dog treats have become very popular and a common part of the pet's diet, yet very little is known about peoples' opinions and feeding habits; therefore, a survey was shared on a popular social network.

Most of the self-selected interviewed owners ( $n = 1833$ , 83%) use treats regularly, mainly to reward their dog's behavior or during training-sports activities. Owners usually buy several types of treats, of which biscuits and dental care sticks are the most common, and usually hand out one to five pieces to their dogs every day. Most owners read the labels of the treats to seek the ingredients list and the claimed health benefits; contrarily, many owners look for non-nutritional values, such as flavor ( $n = 321$ , 18%), brand ( $n = 72$ , 4%) or shape ( $n = 46$ , 3%). Seventy-five percent of the owners ( $n = 1369$ ) follow the feeding instructions provided by the producers on the label.

Treat feeding is a common practice among dog owners and there is great variability among regimens (e.g., types and quantities provided). Understanding the owner's attitudes could help veterinarians educate them to manage treats in the dog's diet.

**KEYWORD** Dog; nutrition; pet food; survey; treats

## Introduction

The canine treats market has been characterized by steady worldwide growth in recent years (Assalco-Zoomark, 2017). Commercially available dog treats such as biscuits, tenders, meat strips, and chews, for both pastime and oral care, have slowly become a common part of the dog's diet. Almost every pet food brand produces many dog treats that differ in shape, size, composition, flavor, and function. This wide variety of treats also follows the demands of the owners, who tend to try different products and search constantly for new ones better suited to their lifestyles (e.g., vegetarian or organic treats). The increase in dog treat sales reflects the role of the dog in today's society: owners are paying closer attention to their dog's health and wellness, and buy such products not for their nutritional value but as a way to reinforce the bond with their pet (Linder & Mueller, 2014). Owners usually use treats as rewards during training sessions to reinforce correct dog behavior, as a food to enrich the dog's diet, as a pastime for the dog, or as a teeth cleaner (Assalco-Zoomark, 2017).

Even if the popularity of dog treats has been shown by many surveys (Bland, Guthrie-Jones, Taylor, & Hill, 2009; Courcier, Thomson, Mellor, & Yam, 2010; Heuberger & Wakshlag, 2011; Laflamme et al., 2008; Robertson, 2003; Rohlf, Toukhsati, Coleman, & Bennett, 2010; White, Ward, Pink, Craigon, & Millar, 2016), very little is known about these products. Only a few studies have considered dog treats, and especially their role in the spread of pathogens has been demonstrated, since most such studies focused on analyzing treat bacterial contamination (Clark et al., 2001; Freeman, Janecko, & Scott Weese, 2013; Galvão et al., 2015; White et al., 2003). Moreover, the assessment of many owners' feeding practices has shown that snack feeding can lead to the development of canine obesity (Bland et al., 2009; Courcier et al., 2010; Robertson, 2003). The first survey on dog treats was part of a study by Freeman et al. (2013) in which not only the microbiological quality of one treat type (e.g., bully sticks) was tested, but caloric density was also evaluated and owners were asked opinions of this kind of product. Only one recent study (White et al., 2016) specifically investigated the motivations behind dog owner snack-feeding habits in the UK: although most owners did not consider treats to be an integral part of their dog's diet, the majority of the interviewed people stated to feed treats regularly, and a wide range of both positive and negative views were expressed, with some emphasizing the beneficial effects while others fearing the potential weight gain.

Further investigation is needed to understand how people perceive dog treats and how these products are involved in the relational aspects of the human–animal bond. The aim of this study therefore is to better determine the feeding practices and motivations of people who feed their dogs treats.

## Materials and methods

### *Dog owner recruitment and survey design*

A questionnaire in Italian language was created to recruit dog owners via internet. The survey was created with Forms (Google) and then shared on a popular social network (Facebook) for two weeks between September and October 2014. The questionnaire consisted of 28 questions, and was divided into 3 sections. In the first section, the pet owner's details were collected (hometown, sex, age, job); the second collected information on the dog (age, breed, body weight, body condition according to the owner's perception, past and current diseases); the third part of the survey queried dog owners' attitudes regarding treats. In this section, questioning aimed to determine how treats were incorporated into the dog's diet, which types of treat were purchased most, how often treats were fed, how many treats were fed daily, whether the owner was interested in reading the label or not and why, whether the feeding instructions (i.e., recommended doses) were followed and when they were exceeded, why the owner had decided to buy a certain product, which flavor the dog seemed to appreciate most, and where the treats were usually bought. Except for the owner's hometown and the dog signalment (age, breed, weight, pathologies) whose questions were open-ended, all other questions were multiple-choice. If "other" was included as a possible option, the respondent could make a specification in a dedicated free-text box.

All data were checked to verify that no multiple entries from the same individual were included. This was done by comparison of variables (such as time of submission, postcode area, gender, age etc.) for included respondents. This study was open to Italian-speaking owners, but no respondents were excluded from the study if their postcode or hometown were outside Italy.

### *Statistical analysis*

Dogs were divided into four sizes by body weight: small-size dogs ( $\leq 10$  kg), medium-size dogs (11–25 kg), large-size dogs (26–45 kg) and giant-size dogs ( $>45$  kg). All data collected were transferred into a spreadsheet (Excel, Microsoft) and underwent a descriptive analysis. For two-way contingency tables of counts, standard Chi-square tests of association were used. These included the analysis conducted to investigate whether there was any association between treat feeding and owner's profession, and between label reading and dog size. *K* proportions contrasts among different levels were calculated using Marasquillo procedure. *P* values lower than 0.05 were considered significant.

## Results

### *Owner's data*

Through the survey, 2217 dog owners participated (Table 1). Most participants were women (82%) between 20 and 30 years of age (41%). The respondents were asked whether their job dealt with dog care: 6% were dog trainers; 4% were veterinary medicine students; 2% were dog breeders; 1% were veterinarians.

### *Dog signalment*

The number of dogs ( $n = 2376$ ) was higher than the number of respondents ( $n = 2217$ ) because some owners signaled more than one dog in the same survey. Table 2 describes the population of dogs involved in this study.

### *Owner attitudes regarding snacks*

Most of the owners interviewed (83%) said they purchase treats regularly, and the main reason they give their dog a treat is to reward the behavior (42%), as a reward during training-sports activities (26%), as a pastime for the dog (6%) and to give their dog a product with health benefits (5%); 21% said they had no specific reason. Among the survey respondents, 17% stated they did not complement their dog's diet with commercial treats, the majority of whom (36%) simply because they were not used to doing so. Concerns about the composition of the treat or the harmful substances they might contain were the main reasons that discouraged owners from buying this kind of product, as reported in Figure 1. Statistical analysis suggested that veterinarians and veterinary students used treats least ( $P < 0.001$ ).

Dog owners usually buy several types of treats (from 2 to 5, 68%), and the most common are biscuits (58%), sticks for dental care (55%), tender treats (39%), rawhides (38%), and meat-based strips (21%). Treat administration frequency is reported in Table 3, and it appeared that more than half the respondents give their dog one to several treats every day. The owners were then asked to estimate how many treats they give their dog in a day: 32% of the respondents hand out just one treat; 52% from 2 to 5 treats; 10% from 6 to 10; 2% from 11 to 15; 2% more than 15 treats per day; 2% gave no answer.

Table 1. Demographics of survey respondents (n = 2217).

		Dog owners, n (%)
Gender	Male	394 (18)
	Female	1823 (82)
Age, years old	<20	123 (6)
	20–30	910 (41)
	31–40	464 (21)
	41–50	426 (19)
	51–60	237 (11)
	>60	57 (3)
Geographic location	North	1436 (65)
	Central	423 (19)
	South	341 (15)
	Other countries	17 (1)
Profession	Veterinarian	24 (1)
	Veterinary Medicine student	82 (4)
	Dog breeder	48 (2)
	Dog trainer	126 (6)
	Other	1937 (87)

Table 2. Characteristics of dogs enrolled in the study (n = 2376).

		Dogs, n (%)
Age, years old	<1	367 (15)
	1–2	669 (28)
	3–7	926 (39)
	8–10	236 (10)
	>10	178 (7)
Weight, kg	Mean ± SD	19.5 ± 13.2
	Median (Range)	17.0 (0.7–90.0)
Body condition (according to owner)	Underweight	173 (8)
	Normal weight	1856 (84)
	Overweight	177 (8)
	Obese	6 (0)
Most represented breeds (9 out of 123)	Mixed-breed	582 (24)
	Labrador Retriever	216 (9)
	Border Collie	190 (8)
	Pug	73 (3)
	German Shepherd	67 (3)
	Jack Russell Terrier	66 (3)
	Golden Retriever	60 (3)
	miniature Pinschers	57 (2)
	West Highland White Terriers	53 (2)
	Health problem	Allergy
Musculoskeletal disorder		133 (6)
Skin and hair disorder		122 (5)
Gastrointestinal or hepatobiliary disorder		69 (3)
Urolithiasis		55 (2)
Neurologic disorder		37 (2)
Reproductive system disease		35 (1)
Cardiovascular disorder		32 (1)
Ophthalmic disorder		19 (1)
Other		38 (2)

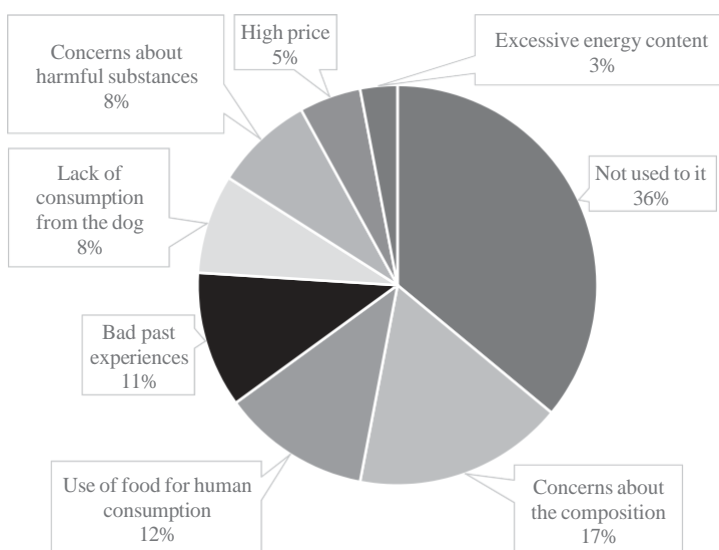
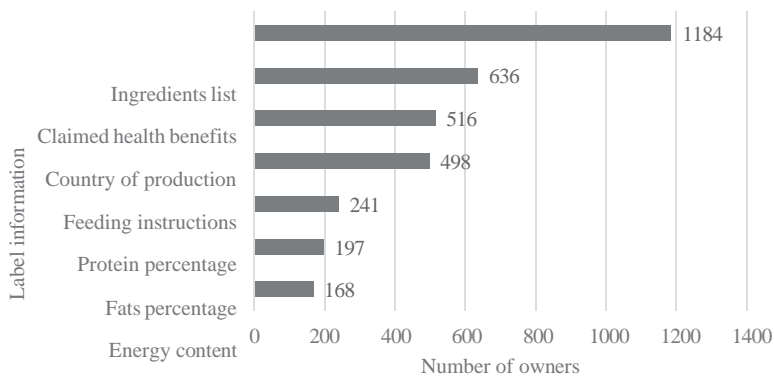


Figure 1. Main reasons why dog owners (n = 384) do not purchase treats.

Most owners (84%) affirmed they read the label on the packaging of the treats they purchase. For those who do not usually read the label, the main reason is their inability to understand the information reported on it (61%), while others do not want to (23%) or have no interest in doing so (16%). For those who *do* read the label, the most important information desired is the ingredients list, as shown in Figure 2. Seventy-five percent of the owners declared to follow the feeding instructions written on the label, especially small-size dog owners ( $P < 0.001$ ). Greater quantities of treats than those habitually provided were distributed during training/sports activities (55%),

**Table 3.** Frequency of treat administration as percentages of owners feeding treats ( $n = 1833$ ) and numbers of owners of overweight/obese dogs and of ideal/underweight following the same frequency.

Frequency	Total, n (%)	Overweight/obese, n (%)	Ideal/underweight, n (%)
More than once per day	613 (34)	50 (8)	563 (92)
Once, everyday	418 (23)	39 (9)	379 (91)
A few times a week	572 (31)	37 (6)	535 (94)
Once a week	103 (6)	11 (11)	92 (89)
Seldom (< one time a week)	116 (6)	11 (9)	105 (91)



**Figure 2.** Most important information dog owners who read treat labels ( $n = 1532$ ) look for (multiple choice).

when the dog liked that treat particularly (15%) or when the treat was labeled as low-calorie (4%); 25% overfed without reason, and 1% did not answer.

Owners were asked to indicate the main reason they choose to purchase a certain product, and the features that attract them most are reported in [Figure 3](#). Health benefits for the dog and the ingredients listed in the label prevailed noticeably; 2% did not answer. When asked whether they were aware of any taste preference shown by the dog, 57% of the owners answered they noticed no preference, while the remaining reported chicken or turkey (n = 355), fish (n = 199), ham (n = 157), lamb (n = 132), cheese (n = 111), beef (n = 101), vegetables only (n = 15), and other flavors (n = 46). Fifty-one percent of the respondents declared to buy treats only in pet shops and 10% only in supermarkets, while 39% of the owners reported buying them in both stores indifferently.

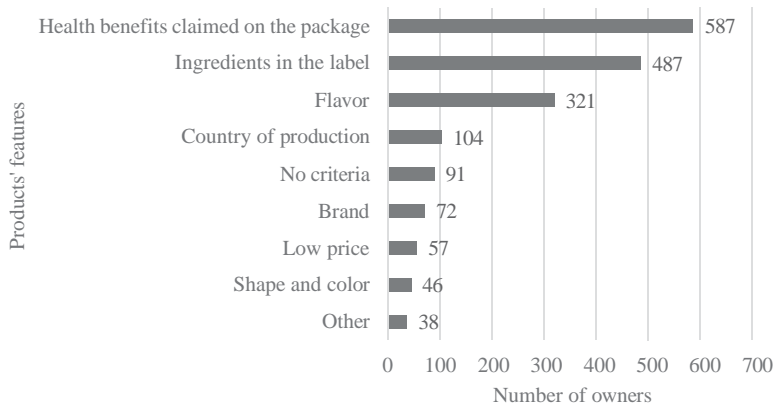


Figure 3. Products' features dog owners (n = 1803) are mostly attracted by at the purchase.

## Discussion

Despite the fact that dog treats represent a sector of pet food with a steady year-on-year growing trend, very little attention has been directed to investigating people's interest in these products. Although several surveys on dog-feeding habits have been conducted so far, only the most recent have included a few questions on treat feeding (Bland et al., 2009; Courcier et al., 2010; German, Holden, Gernon, Morris, & Biourge, 2011; Heuberger & Wakshlag, 2011; Laflamme et al., 2008; Robertson, 2003; Rohlf et al., 2010). Conversely, our survey focused on snack-feeding habits only, like the recent one by White et al. (2016) which gathered data from dog owners interviewed in the UK. Ours, however, dealt with the use of commercial treats exclusively, and the large number of respondents who filled in the questionnaire gives an idea of the importance dog owners ascribe to this kind of pet food. Treats have become a common part of dog diets also because they play a role in reinforcing the owner-dog bond (Linder & Mueller, 2014): owners provide treats to establish moments of daily routine (e.g., before going to work, before going to sleep), to motivate the dog in performing sports and obedience activities (i.e., during exercise, after a walk on leash), or merely to express their love. Owners even seem reluctant to give up on treats, as eliminating them was ranked as the last strategy they would implement to make their overweight dogs lose weight (Bland, Guthrie-Jones, Taylor, & Hill, 2010; German et al., 2011).

Most of the respondents to our questionnaire were women, probably because they are the members of the household who usually handle the dog's diet (Rohlf et al., 2010). A high prevalence of women was also recorded in two other studies focused on dog treats, respectively 87% in that of Freeman et al. (2013) and 72% in that of White et al. (2016). In the latter study, the owners interviewed were recruited personally in outdoor locations and mostly aged 46 to 59 (41%), while in our study most of the people interviewed were from 20 to 30 years old. The use of Facebook to collect as much data as possible may account for the young age of the population involved in the survey; however, the authors do not believe the answers to have been biased by the age of the population selected.

Although the owners were asked to signal just one dog, someone reported information about more than one in the typing space. However, the data collected about any other dog were used only in the signalment analysis, whereas information on the owner profile and on feeding motivations and practices were not represented more than once. Most of the dogs included in this survey had the ideal weight according to their caregivers, and such a high prevalence was confirmed in other studies as well (Bland et al., 2009; Heuberger & Wakshlag, 2011; Laflamme et al., 2008; Robertson, 2003). It has been demonstrated that owners' perceptions of their dog's body condition contrasts with the body condition scores (BCS) assigned by veterinarians, and the most significant discordance consists in underestimating overweight dogs (White et al., 2011). One study by Diez et al. (2015) demonstrated that 34% ( $n = 847$ ) of the dogs examined who were visited by veterinarians had a BCS  $>3/5$ , confirming that overweight condition and obesity are the most underrated common disorders. An even higher prevalence of non-ideal weight dogs was found by veterinarians who took part in the study by Courcier et al. (2010), with 39% ( $n = 271$ ) of the dogs visited being classed as overweight and 20% ( $n = 142$ ) as obese. Given that the body conditions of the dogs in our study is probably underestimated because they were assessed by the owners, we cannot draw firm conclusions.

The results of previous studies confirm the positive correlation between treat feeding and obesity, however. Robertson (2003) found such correlation in his study involving 842 dogs, since overweight individuals were more likely to have been fed treats ( $P < 0.05$ ). Bland et al. (2009) similarly investigated the feeding practices of 219 dog owners, 99% of whom handed out treats routinely, and demonstrated that owners of ideal-weight dogs gave treats significantly less frequently than owners of obese dogs ( $P < 0.001$ ). Again, Courcier et al. (2010) showed that dogs receiving treats at any frequency (monthly, weekly, or daily) were significantly more likely to be overweight ( $P = 0.001$ ,  $P = 0.041$  and  $P = 0.028$ , respectively). On veterinary nutritionists' advice, treats should be fed to cover only up to 10% of the dog's daily energy requirements (DER) (Freeman et al., 2011). As revealed by the survey performed by Freeman et al. (2013), the energy provided by chewable treats

(as kcal/piece) was underestimated by half of the 852 responding owners. European manufacturers are currently not required to state the energy content (expressed as kcal/100 g or kcal/piece) on treat labels (Regulation EC 767/2009), and therefore owners may have misconceptions about the actual amount of calories each product provides. It is of paramount importance that owners become aware of the actual body condition of their dog as well as the energy content of all foods administered. Although dog treats are not often considered part of the dog's diet by owners (White et al., 2016), they should be taught to follow an appropriate feeding plan for their pet in which both maintenance foods and treats are considered (Baldwin et al., 2010; German et al., 2011). Dog treats can be used during a weight-loss regimen without impairing the percentage or the rate of weight loss if maintenance food is reduced appropriately (German et al., 2011). Significant differences in administration frequency and daily amount of treats were found between ideal-weight and overweight dogs. Bland et al. (2009) found that ideal-weight dogs receive treats less frequently than obese dogs, and Kienzle, Bergler, & Mandernach (1998) demonstrated that obese dogs were fed a significantly higher number of treats per day than ideal-weight dogs.

Treats are used by the majority of the owners interviewed, and this is in agreement with the results of other surveys (Bland et al., 2009; Courcier et al., 2010; Heuberger & Wakshlag, 2011; Laflamme et al., 2008; Robertson, 2003; Rohlf et al., 2010; White et al., 2016). Among those who do not purchase treats, many owners worry they might harm their dog's health and have doubts about the real composition of these products. The survey by Freeman et al. (2013) showed that owners consider the risk that chewable snacks (bully sticks) might get stuck in the dog's GI tract or break its teeth (86% and 30%, respectively), while others stated a fear of bacterial contamination (59%) and residual pharmaceutical substances (13%). Some owners have misgivings about pet food by-products in general, and believe prohibited ingredients such as feces, road kill, and euthanized pets should be included in commercial products (Freeman et al., 2013). Dog treats are generally seen by owners as a relational tool to reward their dogs rather than as a pastime or healthy supplement. In accordance with the results of Rohlf et al. (2010) and White et al. (2016), dog owners usually purchase more types of treats, and the ones most selected are biscuits and chewable treats. This could be due to their desire to vary their dog's diet, which the owner often sees as monotonous, or the need to use the most suitable type of treat for any given activity (White et al., 2016). The anthropomorphization of dogs by their owners appears to be a main influencing factor in the growth and trends of the pet food market, leading some people to spend more on non-necessity products (Boya, Dotson, & Hyatt, 2015). As demonstrated by a recent study, people exhibit different dog food-related choice patterns driven by the nature of their relationships with their pets (Boya et al., 2015). In fact, owners who are more connected to their dogs are also particularly concerned by the quality of their animals' diet, including how food tastes and how much variety is provided (Boya et al., 2015). Major pet food producers recognize that this kind of people focus more on the dog's eating experience therefore the treat industry accommodates this trend by emphasizing quality, fun, variety, flavors and holistic ingredients of the products (Boya et al., 2015).

From our survey, it is possible to state that more than half the respondents feed their dog one or more treats daily, similar to as reported by Laflamme et al. (2008) and Rohlf et al. (2010).

Most owners read the labels of the treats they buy, and the most important information they seek regards ingredients, health benefits, and the producer's country of origin rather than composition and calorie content, which are underestimated in quality appraisal. For those who do not usually read the labels, the main reason given is the inability to interpret them, given that labels are often unclear, imprecise, and lacking in essential data (e.g., caloric content) (Anonymous, 2015). Most of the interviewed owners follow the feeding instructions provided by treat producers on the label in order to feed their dogs the proper amounts. A previous study by this author (Morelli et al., 2018) showed that in many cases producers' recommendations provide more than 10% of dogs' DER, thus exceeding the indications mentioned above. In particular, feeding instructions for small size dogs were the least precise, and this could be a concern because our survey showed their owners to be the most careful followers. Most owners exceeded feeding instructions when performing training

sessions and sports activities, perhaps because they were aware that these higher amounts of treats were compensated by the dog's higher energy expenditure. However, 25% of the owners said that they exceeded daily recommended amounts with no specific purpose, confirming the fact that the caloric content of treats is often not taken into consideration. Treat choice is not random but based on precise product characteristics: pet owners seek products that claim health benefits, probably because producers often emphasize the presence of nutrients in their composition that may increase the dog's wellbeing.

The main limitation of this study is that the body condition of the dogs was evaluated by the owners only, without the verification by a veterinary professional; this did not enable the authors to perform reliable statistical analyses to correlate dog overweight to treat-feeding regimes. However, the results from this study yielded some important insights into people's psychology linked to this kind of dog food, and a better understanding of their perspectives is needed to recognize the role treats may play in the growing pet obesity epidemic as well as in the pet-owner bond.

## Conclusions

Dog treats are very popular among dog owners, and the high number of responses to this survey demonstrates the interest in this kind of pet food. As confirmed by this study, most dogs are given treats, and veterinarians should investigate owner treat-feeding regimes during routine examinations because they may represent a conspicuous part of the pet's diet. Furthermore, owners should be instructed to look critically at treat labels and to build treats into their dogs' diet appropriately. Understanding owners' attitudes toward dog treats may help veterinarians in their educational role.

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