Pet feeding practices of dog and cat owners in the United States and Australia

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More than 60% of households in the United States own at least 1 pet, which accounts for > 140 million cats and dogs.1 Similarly, more than 60% of Australian households have at least 1 dog or cat.2 Most pet dogs and cats in the United States, Australia, and other developed countries are fed commercial foods.1,3-6 The widespread use of nutritionally complete and balanced commercial diets has been cited as a contributing factor for longer, healthier life spans in pets.7 However, there appears to be increasing interest among veterinarians and pet owners regarding use of noncommercial foods for their pets, including homemade and raw food diets.1,8-10 Proponents of home-prepared or raw food diets cite various benefits, including control over ingredients used, avoidance of artificial preservatives, and preservation of natural enzymes and phytonutrients.11-14 However, no published data are available to support an actual health benefit to pets fed such diets. On the contrary, 1 large study6 revealed a decreased incidence of numerous health problems when dogs were fed commercial foods rather than homemade diets. Research to evaluate the nutritional adequacy of homemade diets has identified a number of nutritional deficiencies.15 In addition, there are published case reports16-18 on the development of pancreatitis, fatal salmonellosis, and other clinical problems in pets fed homemade or raw food diets.

Despite the perception that raw and homemade diets are in widespread use, limited data are available to quantify the actual prevalence for use of such diets by pet owners. The primary objective of the study reported here was to determine what and how dog and cat owners feed their pets. A telephone survey involving a random sample of pet owners was used to ensure a population representative of the general population of pets and pet owners. Because regional differences may exist for the variables of interest, surveys were conducted in multiple locations in the United States as well as in 1 location in Australia.

Materials and Methods

Survey—The study was designed as part of a larger survey conducted to obtain information about pet feeding habits, pet-owner interactions, and owner attitudes toward their pets and pet care. The survey questionnaire was developed with the assistance of trained marketing research specialists. Each question was intended to gather information regarding signalment, activities, feeding behavior, sources of information about pet care, and other information. For each pet, closed-ended questions were used to identify the species, age, breed, sex, and neuter status as well as to determine the health status (ie, healthy, generally healthy, or unhealthy) and frequency of visits to a veterinarian. Closed-ended questions also were used to quantify feeding behaviors and food choices provided to the pets. Multiple-choice questions wherein respondents were read questions and provided a number of choices from which to select a response were used to assess body condition, activities, and sources of information about pet care. The experimental protocol was reviewed and approved by the institutional review boards of participating institutions.

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Procedures—The survey was validated by administering it to selected populations at each institution. Telephone surveys were conducted at 5 locations (University of California, Davis; Michigan State University; University of Pennsylvania; Tufts University; and the University of Queensland) by a total of 6 veterinary students between May and August 2004, as described elsewhere. Students were trained and supervised by mentors in accordance with standardized guidelines applied at all locations.

Potential participants were selected from local telephone directories by use of a predetermined randomization process. The survey was administered to individuals who were the owner and primary caregiver of 1 or more dogs or cats. For participants who owned both dogs and cats, a computer-generated, 2-treatment randomization list was used to determine which species would be the subject of the survey. When a participant owned > 1 animal of the species being addressed, the owner was asked to identify 1 pet to be the subject of the survey and all subsequent questions pertained to that particular pet. The study design prospectively limited data collected about pets fed therapeutic diets on the basis of the assumption that such pet owners would have limited choices regarding feeding and would not be representative of the general pet-owning population. Therefore, pets identified as being fed therapeutic diets were excluded from sections regarding feeding management and sources of pet care information.

Students read the questions and, when appropriate, stated specific response options; they then recorded the owner responses. Each survey required 15 to 20 minutes to complete.

Statistical analysis—Data from all 5 study locations were pooled for analysis. Statistical analyses were performed by use of commercially available software. Descriptive data were reported as actual counts and the percentage of respondents. Differences between results for dogs and cats were considered significant at $P < 0.05$.

Table 1—Distribution of sex, age, and owner-perceived body condition of 635 dogs and 469 cats represented in a survey conducted to determine feeding practices by pet owners in the United States and Australia.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Dogs</th>
<th></th>
<th></th>
<th>Cats</th>
<th></th>
<th></th>
<th>$P$ value†</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td></td>
<td>No.</td>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female, sexually intact</td>
<td>40</td>
<td>6.3</td>
<td></td>
<td>14</td>
<td>3.0</td>
<td></td>
<td>0.018</td>
</tr>
<tr>
<td>Female, spayed</td>
<td>276</td>
<td>43.5</td>
<td></td>
<td>231</td>
<td>40.3</td>
<td></td>
<td>0.064</td>
</tr>
<tr>
<td>Male, sexually intact</td>
<td>64</td>
<td>10.1</td>
<td></td>
<td>17</td>
<td>3.6</td>
<td></td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Male, neutered</td>
<td>255</td>
<td>40.2</td>
<td></td>
<td>207</td>
<td>44.1</td>
<td></td>
<td>0.216</td>
</tr>
<tr>
<td>Age (y)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 1</td>
<td>43</td>
<td>6.8</td>
<td></td>
<td>20</td>
<td>4.3</td>
<td></td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>1 to 6</td>
<td>339</td>
<td>52.4</td>
<td></td>
<td>254</td>
<td>54.2</td>
<td></td>
<td>0.849</td>
</tr>
<tr>
<td>7 to 11</td>
<td>188</td>
<td>29.6</td>
<td></td>
<td>138</td>
<td>29.0</td>
<td></td>
<td>0.881</td>
</tr>
<tr>
<td>12 to 15</td>
<td>59</td>
<td>9.3</td>
<td></td>
<td>36</td>
<td>7.7</td>
<td></td>
<td>0.408</td>
</tr>
<tr>
<td>16 to 25</td>
<td>6</td>
<td>0.9</td>
<td></td>
<td>23</td>
<td>4.9</td>
<td></td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Body condition</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underweight</td>
<td>2</td>
<td>0.3</td>
<td></td>
<td>5</td>
<td>1.1</td>
<td></td>
<td>0.205</td>
</tr>
<tr>
<td>Slightly underweight</td>
<td>24</td>
<td>3.8</td>
<td></td>
<td>31</td>
<td>6.6</td>
<td></td>
<td>0.049</td>
</tr>
<tr>
<td>Ideal</td>
<td>415</td>
<td>65.4</td>
<td></td>
<td>271</td>
<td>57.8</td>
<td></td>
<td>0.012</td>
</tr>
<tr>
<td>Slightly overweight</td>
<td>158</td>
<td>24.9</td>
<td></td>
<td>131</td>
<td>27.9</td>
<td></td>
<td>0.293</td>
</tr>
<tr>
<td>Overweight</td>
<td>36</td>
<td>5.7</td>
<td></td>
<td>31</td>
<td>6.6</td>
<td></td>
<td>0.623</td>
</tr>
</tbody>
</table>

*Values within a variable may not sum to 100% because of rounding. †Represents the comparison between results for dogs and cats; values were considered significant at $P < 0.05$. 
responses from cat owners and dog owners were determined by use of the z test for proportions. A t test was used to determine species differences in age between dogs and cats (reported as mean ± SD) in the study population. Differences were considered significant at values of P < 0.05.

Results

The students made 18,194 telephone calls at the 5 study sites, which resulted in 1,104 (6.1%) respondents representing 635 dogs and 469 cats completing the survey. Completed surveys were approximately evenly divided among the 5 study sites, with at least 200 surveys completed for each site. Most dogs (627 [98.7%]) and cats (462 [98.5%]) were considered by their owners to be healthy or generally healthy with minor or infrequent problems. More puppies than kittens were represented in the study population, and more cats > 15 years old were included than dogs of the same age group (Table 1). This resulted in a significantly lower mean ± SD age for dogs (5.75 ± 3.95 years) than for cats (6.27 ± 4.34 years). Most of the pets were neutered, and cats were significantly (P < 0.001) less likely to be sexually intact than were dogs. Most dogs and cats were reported to be in ideal body condition. Cats were significantly (P = 0.049) more likely to be reported as slightly underweight, whereas a significantly (P = 0.012) higher proportion of dogs were reported to be in ideal body condition.

Cats were significantly (P = 0.037) more likely than dogs to live indoors, but more than half of dogs and cats were indoor pets (Figure 1). Reported amounts of activity did not differ between dogs and cats, with most pets having 0.5 to 3 hours of activity/d. Among the common activities shared by owners and their pets, petting and talking to the animal topped the list for both dog and cat owners (Table 2). A similar percentage of dog and cat owners (22.2% and 26.2%, respectively) reported eating with their pet. However, dog owners were significantly (P < 0.001) more likely to share physical activities with their dog (such as running or walking, playing fetch, or riding in the car together), whereas cat owners were significantly (P < 0.001) more likely to sleep with their cat or watch their cat eat.

Dogs were taken to their veterinarian significantly (P < 0.001) more frequently than were cats. Mean number of visits to a veterinarian for dogs was 1.9 times

![Figure 2](https://via.placeholder.com/150)

**Figure 2**—Number of visits to veterinarians during the past 12 months for 635 dogs (black bars) and 469 cats (gray bars). †With in a category, value differs significantly (P < 0.001) between dogs and cats. See Figure 1 for remainder of key.

![Figure 3](https://via.placeholder.com/150)

**Figure 3**—Distribution of feeding frequency for 621 dogs (black bars) and 449 cats (gray bars). “Other” includes any feeding schedule not listed. See Figure 2 for remainder of key.

**Table 2**—Activities most commonly shared by owners and their dog or cat.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Dogs (n = 635)</th>
<th>Cats (n = 469)</th>
<th>P value†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pet or cuddle with animal</td>
<td>602 (94.8)</td>
<td>451 (96.2)</td>
<td>0.341</td>
</tr>
<tr>
<td>Talk to pet</td>
<td>562 (88.5)</td>
<td>426 (90.8)</td>
<td>0.251</td>
</tr>
<tr>
<td>Walk or run with pet</td>
<td>504 (79.4)</td>
<td>60 (12.8)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Play with toys together</td>
<td>424 (66.8)</td>
<td>243 (51.8)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Watch pet play</td>
<td>415 (65.4)</td>
<td>339 (72.3)</td>
<td>0.018</td>
</tr>
<tr>
<td>Groom pet</td>
<td>405 (63.8)</td>
<td>270 (57.6)</td>
<td>0.043</td>
</tr>
<tr>
<td>Play fetch with pet</td>
<td>393 (61.9)</td>
<td>77 (16.4)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Watch television together</td>
<td>342 (53.9)</td>
<td>280 (59.7)</td>
<td>0.063</td>
</tr>
<tr>
<td>Ride in car (other than for a veterinarian visit)</td>
<td>331 (52.1)</td>
<td>22 (4.7)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Watch pet eat</td>
<td>200 (31.5)</td>
<td>215 (45.8)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Sleep together</td>
<td>192 (30.2)</td>
<td>284 (60.6)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Obedience or agility training</td>
<td>180 (28.3)</td>
<td>34 (7.2)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Eat together</td>
<td>141 (22.2)</td>
<td>123 (26.2)</td>
<td>0.142</td>
</tr>
<tr>
<td>Go to work together</td>
<td>46 (7.2)</td>
<td>7 (1.5)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Other</td>
<td>37 (5.8)</td>
<td>13 (2.8)</td>
<td>0.026</td>
</tr>
</tbody>
</table>

*Owners could select > 1 activity. †Represents the comparison between results for dogs and cats; values were considered significant at P < 0.05.
during the past 12 months, compared with 1.3 times during the same period for cats. However, 45 (7.1%) dogs and 66 (14.1%) cats were not taken to a veterinarian during the past 12 months (Figure 2).

Among dogs and cats represented in the survey, 11 (1.7%) dogs and 17 (3.6%) cats were fed therapeutic diets. In accordance with the initial study design, additional data were not collected for these pets. Thus, all information on feeding management and sources of pet care information was based on pets fed nontherapeutic diets. Surveys for 6 additional pets (3 dogs and 3 cats) were removed from further evaluation because of incomplete data. Therefore, all subsequent analyses were based on responses from 621 dog owners and 449 cat owners.

Most dogs were fed once or twice each day (Figure 3). Cats were significantly \( (P < 0.001) \) less likely than dogs to be fed once daily and more likely to be fed ad libitum. More than 90% of dogs consumed commercial pet food for at least half their intake, with dry food being the form most commonly fed (Figure 4). The percentage of cats consuming commercial food for at least half their intake was significantly (\( P < 0.001 \)) higher than the percentage of dogs (98.8% vs 93.2%, respectively). Cats were significantly (\( P < 0.001 \)) more likely to receive at least half of their diet from canned commercial food (130 [29.0%] cats vs 71 [11.4%] dogs, respectively).

Significantly (\( P < 0.001 \)) more dogs than cats received noncommercial foods, including table scraps, leftovers, or homemade foods, as part of their diet (Figure 5). These noncommercial foods were fed as part of the main diet to 190 (30.6%) dogs and 59 (13.1%) cats and constituted at least a fourth of the diet for 108 (17.4%) dogs and 28 (6.2%) cats. Among the 54 pet owners who provided at

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**Figure 4**—Percentage of diet from all commercial foods (A), dry commercial foods (B), or canned commercial foods (C) fed to 621 dogs (black bars) and 449 cats (gray bars). See Figures 1 and 2 for remainder of key.

**Figure 5**—Percentage of diet from all noncommercial foods (A) or home-prepared foods (B) fed to 621 dogs (black bars) and 449 cats (gray bars). All noncommercial foods include table scraps, home-prepared foods, and other foods prepared for human consumption. Home-prepared foods include only foods prepared specifically for the pet’s consumption. See Figures 1 and 2 for remainder of key.
least half of the diet from homemade foods specifically prepared for their pet, only 16 reported use of a recipe designed for pets. Of these recipes, 8 were from a veterinarian, 3 were obtained from the Internet, and 5 were from other sources.

Bones or raw foods were provided as part of the main meal to 101 (16.2%) dogs and 43 (9.6%) cats. An additional 46 (7.4%) dogs and 4 (0.9%) cats received raw meat or bones as a treat or snack at least weekly. More than 80% of the cats and dogs fed raw bones or meat resided in Australia. Among 62 dog owners who fed at least half of the diet as homemade or other noncommercial foods, 39 (62.9%) included raw bones or meat. All 12 cat owners who fed at least half of the diet as noncommercial foods included raw bones or meat in the diet. Beef and poultry were the most commonly fed raw foods.

Most dogs received snacks at least weekly, with 353 (56.8%) receiving treats of some type at least once daily (Table 3). Cats were significantly (P < 0.001) less likely than dogs to receive treats of any type, with 117 (26.1%) receiving treats daily. Vitamins or other supplemental dietary components were provided to 56 (9.0%) dogs and 14 (3.1%) cats on a regular basis and to an additional 26 (4.2%) dogs and 11 (2.4%) cats on an infrequent basis.

Veterinarians were the most frequently cited source of information about pet health, pet nutrition, and other pet care by dog and cat owners (Table 4). Cat owners were significantly more likely than dog owners to obtain information about pet health (P = 0.002) and other pet care (P = 0.020) from family and friends and significantly (P < 0.001) less likely than dog owners to obtain information from breeders, groomers, and other pet paraprofessionals. In comparison, significantly more dog owners than cat owners obtained information about pet nutrition (P = 0.005) and other pet care (P = 0.001) from pet paraprofessionals.

Discussion

Veterinarians were the most commonly cited source of information about pet care and nutrition in the study reported here, a finding that has also been reported in another survey. However, approximately 16% and 17% of cat and dog owners, respectively, cited the Internet and other media as a primary source of information on pet nutrition. These results confirm the importance of nutritional education provided for veterinarians and by veterinarians to their clients. It is important that veterinarians be aware of the nutritional needs of their patients and the feeding habits and other related activities
of their clients so that they can provide sound nutritional advice.

Pets represented in the study reported here appeared to be a typical population of dogs and cats, which suggested that extrapolation of these data to the general pet population would be appropriate. Although a random sample of predominantly healthy pets was evaluated in this study, the general characteristics of our population differed only slightly from those of patients at primary-care veterinary clinics. Because fewer puppies and kittens were included in our study population, the mean age for pets in our study was slightly higher than that of typical veterinary patients. A slightly greater proportion of dogs and cats in our study were castrated or spayed, compared with the proportion in other studies. The distribution for body condition was similar to that reported for typical veterinary patients, despite the fact that many pet owners underestimate the body condition of their pet. The frequency of veterinary visits for the dogs and cats in our study also was similar to that reported by others. " Feeding practices may differ among regions or between rural and urban populations. This study was designed to include various regions (through the selection of 5 study sites) to provide a study population representative of the general population of pets. However, no attempt was made to differentiate regional effects within these data.

In the study reported here, > 93% of dogs and cats received at least half their diet as commercial pet foods. This is consistent with results in other reports. However, many owners in our study fed other foods. An important finding from the study reported here was the frequent consumption of raw meat or bones by approximately 1 in 4 dogs and more than 1 in 10 cats represented in the study. Although most of these pets were in Australia, raw food is also fed to pets in the United States. Among dog owners who provided home-prepared foods for at least half of their dog's diet, 63% included raw meat or bones in the diet. This percentage increased to 100% among cat owners who provided home-prepared foods.

In addition to the risks of nutritional imbalances associated with any homemade diet, diets that include raw bones or meat may carry additional risks, such as obstruction or perforation of the gastrointestinal tract and transmission of infectious agents. Although published data reporting the prevalence of gastrointestinal blockage or perforation attributable to bones are lacking, anecdotal evidence suggests that this problem occurs with some frequency. Raw meats are often contaminated with bacteria and may contain parasites or other infectious agents. These organisms can cause disease.

In addition to the potential risk to any pet that consumes contaminated foods, there are zoonotic risks. Environmental contamination with Salmonella spp, Campylobacter spp, or other organisms is likely when pets are fed raw food diets, which poses a risk to owners and their families. Salmonella organisms can persist in feeding bowls of pets after washing with soap and water and even after treatment with bleach. The feeding of raw meat diets to pets that have contact with livestock poses an additional risk for transmission of parasitic cestodes. Veterinarians should be aware of the frequency of feeding of bones and raw meat to pets and should ensure that their clients are aware of the potential risks.

Veterinarians who make dietary recommendations for their patients should take into account their client's motivations for the feeding regimens. A comprehensive dietary evaluation must take into consideration anything that is fed and not focus solely on the main diet. When clients feed a high percentage of noncommercial food to their pets, advice should be provided to ensure that the clients are aware of potential risks to their pet as well as the client, the client's family, and any other animals in the household if raw diets are fed.
Clinical Summary

The survey reported here was completed by 635 dog owners and 469 cat owners in the United States and Australia and provided information regarding how dog and cat owners typically feed their pets. Results of the survey confirmed that veterinarians are the most common source of information about pet health, nutrition, and other pet care for dog and cat owners. Therefore, it is important that veterinarians pursue continuing education in nutrition and be aware of the nutritional issues related to their patients.

More than 90% of pet dogs and cats were fed commercial foods for most of their diet, but noncommercial foods (such as table scraps, raw foods, and home-prepared diets) comprised at least 25% of the diet for 17.3% of dogs and 6.3% of cats. Bones or raw foods were provided at least weekly to 23.6% of dogs and 10.5% of cats as a main meal or treat. Most of the pets receiving raw foods lived in Australia. Raw meat diets have been associated with a number of health risks, including zoonotic risks. Veterinarians have the responsibility of ensuring that clients understand the risks when they feed this type of food. A comprehensive dietary evaluation must take into consideration all that is fed, not just the main diet.

With regard to dietary issues, veterinarians often focus on sick pets in need of therapeutic diets. In the study reported here, only 2.5% of pets were fed a therapeutic diet. Results of this study can serve as a reminder that most pets, even those examined by primary-care veterinarians, are generally healthy. Therefore, veterinarians need to be prepared to provide nutritional advice for healthy pets as well as for pets that are ill.

References

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