

## Diet and Feline Obesity<sup>1,2</sup>

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### EXPANDED ABSTRACT

KEY WORDS: • cats • feline • diet • obesity • nutrition

An epidemiological study of 2092 cats from 31 privately owned veterinary hospitals determined that 20% of cats were heavy and that an additional 5% were obese (Scarlett et al. 1994). Overweight (heavy and obese) cats were more likely to be male, neutered, middle-aged, living in an apartment, consuming nongrocery-store dry cat foods and two widely used prescribed diets, and not hunting. These findings prompted us to reexamine the cats after 4 y, evaluating associations among body condition, diet and health. In this report, we characterize diet and feeding management in the follow-up study, 1994–1996.

**Materials and methods.** Veterinarians in our 1991–1992 study were invited to participate again. Information was extracted from the medical records of previously studied cats (Scarlett et al. 1994). Permission was obtained to contact participating clients, who were surveyed by telephone and mail.

Surveys requested information regarding demographics, health, diet, body weight, body condition (fat:lean) and fate of the cat. Body condition was scored by clients and veterinarians guided by six silhouettes as follows: cachectic (#1), lean (#2), optimal-lean (#3), optimal (#4), heavy (#5) and obese (#6) (Scarlett et al. 1994).

Diet was categorized by form (canned, dry, semimoist), sales outlet (grocery or veterinary practice), prescribed or specialty, noting type (e.g., weight control, urine pH control) and treats. Table foods and miscellaneous foods were categorized as meats, fats and oils, milk, other dairy, fruit, human snacks (e.g., potato chips), commercial multivitamins, coat supplements and hairball preventives. Feeding management was categorized by method (meals or free choice), meal number and frequency and hunting activity.

The data were entered into R-base (Microrim, 1987) and edited and analyzed using SAS (SAS Institute 1985). The

number of data varied among variables because records and surveys were incomplete. Associations between body condition and diet variables were evaluated using the  $\chi^2$  test (Fleiss 1981).

**Results.** Data on 1359 (65%) of the original 2092 cats were provided by 27 (87%) of the original 31 hospitals. Data were also obtained from 1380 (66%) of the original 2092 owners. In all, follow-up data were found for 1654 cats (79%). Data on cat demographics, health and survival will be published elsewhere.

Distribution of body condition score remained relatively constant from the first (1991–1992) to the second (1994–1996) study (Fig. 1), in which most cats (61%) were in optimal-lean or optimal condition. Fewer cats were lean (13%) and cachectic (1.3%) than heavy (20%) and obese (4.5%).

Of the optimal-lean and optimal group in the first study, owners of 41% (254 of 619) reported no change, and 40% (249 of 619) reported that their cat had gained weight. For initially heavy cats, 28% (55 of 194) remained unchanged and 42% (81) gained weight. For initially obese cats, 37% (16 of 43) remained about the same, whereas 10 (23%) gained weight. Weight loss was reported by owners for 40% (17 of 43) of initially obese cats, for 30% (58 of 194) of initially heavy cats, for 18% (58 of 326) of initially optimal and for 20% (58 of 293) of initially optimal-lean cats. Body condition was maintained within two silhouettes in 57% (460 of 804) cats, whereas 23% (181 of 804) increased body condition and 20% (163 of 804) lost condition by at least two silhouettes.

Outdoor access was permitted for 42% (608 of 1448) cats, with no difference among body condition groups. However, relatively fewer obese cats engaged in outdoor hunting activity (Table 1).

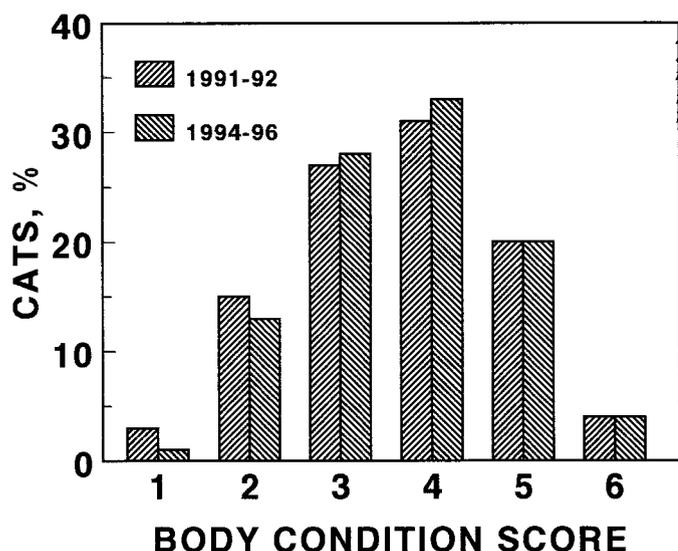
About 80% of cats had “food left out” all day (Table 1). Because food bowls were often empty at the end of the day, food left out was considered distinct from unlimited food intake. For cats fed ad libitum, most were offered dry cat food (Table 1). There were no differences in meal frequencies among body conditions.

Overall, more cats were fed commercial dry cat food than canned or semimoist (Table 2). There was a trend for

<sup>1</sup> Presented as part of the Waltham International Symposium on Pet Nutrition and Health in the 21st Century, Orlando, FL, May 26–29, 1997. Guest editors for the symposium publication were Ivan Burger, Waltham Centre for Pet Nutrition, Leicestershire, UK and D'Ann Finley, University of California, Davis.

<sup>2</sup> Funded in part by Ralston Purina, St Louis, MO.

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**FIGURE 1** Distribution of body condition scores remained relatively constant from the first (1991–1992) to the second (1994–1996) study, which related to 2092 and 1654 cats, respectively.

overweight cats, compared with cachectic and lean cats, to consume relatively more dry food and “senior” products than other types of cat food (Table 2). Overweight cats consumed significantly more weight-reducing foods than

**TABLE 1**

*Feeding management of cats as it varied with body condition<sup>1</sup>*

	Hunting	Food left out	Free-choice canned	Feeding dry
Cachectic, % (n)	33 (46)	88 (52)	0.0 (39)	63 (46)
Lean, % (n)	35 (98)	80 (106)	0.0 (78)	42 (105)
Optimal-Lean % (n)	38 (180)	84 (192)	0.0 (135)	47 (190)
Optimal, % (n)	30 (246)	76 (259)	1.7 (181)	46 (254)
Heavy, % (n)	23 (223)	77 (239)	0.7 (152)	39 (241)
Obese, % (n)	10 (61)	86 (63)	0.0 (34)	58 (62)
Total, n (n)	249 (854)	726 (911)	4 (619)	410 (898)
P	<0.001	NS	NS	<0.05

<sup>1</sup> Number of cats (n) in column. Multiple responses were allowed so percentages do not equal 100. NS, not significant.

other types of food, compared with cats with trimmer body conditions (Table 2).

Within canned foods, there were no significant differences in products among body conditions. There was a trend for lean (7%) and obese (3%) cats to be fed more grocery cat foods marketed to control urine pH, compared with cats with cachectic (0%), heavy (0.7%), optimal-lean (1.5%) and optimal (1.7%) body conditions.

Within dry foods, use of grocery dry foods was associated with body condition ( $P < 0.002$ ), with heavy (25%) and obese (37%) cats less likely to be fed these foods, compared with cachectic (44%), lean (30%), optimal-lean (42%) and optimal (29%) cats. Similarly, use of store-brand economy dry foods was associated with body condition ( $P < 0.002$ ), with heavy (0%) and obese (0%) cats less likely to be fed these products, compared with cats with lean (11%), optimal-lean (2%) and optimal (0.4%) body conditions. Use of prescribed nongrocery low energy dry cat foods was also associated with body condition ( $P < 0.002$ ), with heavy (14%) and obese (18%) cats more likely to be fed these products, compared with cats that were cachectic (0%), lean (3%), optimal-lean (6%) and optimal (8%). No differences in body condition were found in the more than 60% of cats fed table foods.

Almost one third of cats were offered commercial cat treats, but few were given multivitamin preparations or coat supplements. About one third received over-the-counter preparations for hairball prevention.

**Discussion.** These data relate to two populations of overweight cats, i.e., a large group of heavy cats and a small cluster of truly obese cats. A substantial proportion of each was fed reducing diets, 35% of heavy cats and 64% of obese, but weight loss was reported for only 30% of heavy and 40% of obese. Weight changes were not quantified in our study. However, when a shift in body condition of at least two silhouettes was considered to represent significant weight loss or gain, then only 20% of cats lost weight in 4 y.

These findings are similar to experiences of others enrolling pet cats in weight-loss programs (Butterwick et al. 1994, Butterwick and Markwell 1996). Although controlled laboratory trials of cats fed reducing diets may demonstrate significant weight loss, clinical trials of pet cats show inconsistent results (Butterwick et al. 1994, Butterwick and Markwell 1996).

Leanness was associated with consumption of store-brand economy dry cat foods. This may reflect nutritional inadequacies or reduced palatability of the economy products.

Risk factors for obesity should be considered when design-

**TABLE 2**

*Types of commercial cat foods offered to cats by body condition<sup>1</sup>*

	Can	Dry	Semimoist	Reducing	Medical	Senior
Cachectic, % (n)	75 (52)	88 (52)	14 (52)	1.9 (52)	25 (52)	0.0 (47)
Lean % (n)	72 (106)	97 (106)	11 (106)	3.8 (106)	23 (106)	1.0 (100)
Optimal-Lean % (n)	70 (191)	98 (191)	12 (191)	8.9 (192)	17 (191)	4.9 (184)
Optimal, % (n)	66 (260)	95 (262)	14 (262)	24 (262)	22 (258)	2.0 (246)
Heavy, % (n)	60 (240)	97 (242)	8.6 (242)	35 (241)	23 (239)	7.1 (225)
Obese, % (n)	54 (63)	98 (63)	19 (63)	64 (62)	14 (63)	1.6 (61)
Total, n (n)	599 (912)	882 (916)	110 (916)	209 (915)	190 (909)	32 (863)
P	NS	0.07	NS	<0.001	NS	0.07

<sup>1</sup> Number of cats (n) in column. NS, not significant

ing weight-loss programs. For example, obese cats engaged in less hunting activity, although they spent equivalent amounts of time outdoors. This suggests that energy expenditure from hunting may improve energy balance.

Traditionally, owners have been counselled to avoid table foods and snacks for their obese cats (Sloth 1992). In this study, overweight cats consumed table foods and snacks with the same frequency and variety as cats with optimal body condition. These data suggest little or no advantage to restricting table foods and snacks as a part of feeding management for weight-control or weight-loss programs. Indeed, permitting owners to offer snacks and treats may improve compliance with weight management programs while maintaining the owner-pet bond.

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