

# Evaluation of owner education as a component of obesity treatment programs for dogs

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**Objective**—To compare results of a conventional obesity treatment program with those of an obesity treatment program that included education of owners of obese dogs.

**Design**—Nonblinded prospective clinical trial.

**Animals**—60 obese dogs with a body condition score (BCS) of 8/9 or 9/9.

**Procedure**—Dogs were randomly assigned to control or owner education (EDU) treatment groups. A 6-month weight loss period was followed by an 18-month weight maintenance period. Daily caloric intake to induce loss of 1% of body weight/wk was calculated for each dog after assessment of prior diet history. The daily caloric intake for weight maintenance was estimated to be 20% greater than that calculated for weight loss with adjustments of  $\pm 5\%$  as required. Weight and BCS were recorded monthly for each dog. Owners of dogs in the EDU group were required to attend monthly classes that addressed nutrition-related topics during the 6-month weight loss period.

**Results**—Dogs in both treatment groups had significantly lower weight at the end of the weight loss period, compared with initial weight. Mean weight loss at 6 months was 14.7% in the control group and 15% in the EDU group; this difference was not significant. During the weight maintenance period, percentage weight loss was maintained in both treatment groups. Mean changes in BCS at 6 months (relative to time 0) were  $-1.5$  in the control group and  $-1.7$  in the EDU group. At 24 months, mean changes in BCS (relative to time 0) were  $-2.1$  in the control group and  $-2.2$  in the EDU group. No significant differences in BCS were identified between treatment groups at either 6 or 24 months.

**Conclusions and Clinical Relevance**—Mean decrease in BCS of 2 and mean weight loss of 15% were achieved and maintained in all dogs. An obesity treatment program that included dietary changes and monthly weight checks during the weight loss and weight maintenance periods was sufficient to achieve these results. (*J Am Vet Med Assoc* 2004;224:1932–1935)

Obesity is associated with a variety of medical disorders and orthopedic problems in dogs.<sup>1-3</sup> Although these associated conditions are well-known, the benefits of obesity prevention and weight loss are still being investigated. In overweight dogs with hip

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joint osteoarthritis, loss of 11% to 18% of body weight resulted in fewer clinical signs of lameness.<sup>4</sup> Kealy et al<sup>5</sup> reported that the median life span of dogs could be increased via restriction of caloric intake and maintenance of lean body condition. Neither of the 2 studies, however, evaluated client-owned dogs.

Weight loss protocols and obesity management techniques in dogs have been described; however, few reports<sup>6-10</sup> have addressed weight maintenance after weight loss. Laflamme and Kuhlman<sup>11</sup> evaluated laboratory dogs that had lost weight for 26 weeks after the weight loss period. Dogs whose food intake was restricted during the 26-week weight maintenance period maintained their reduced weights; dogs fed ad libitum gained weight.

To be effective, obesity treatment programs must promote weight loss and maintenance of weight after weight loss. Obesity treatment programs for humans that include behavioral interventions in conjunction with dietary changes and increased physical activity achieve higher success rates than those that do not include behavior modification; these programs are the most effective methods for weight loss and subsequent weight maintenance.<sup>12</sup> The success of obesity treatment in dogs may depend on a change in the behavior of the owner.<sup>7</sup> Treatment of obese children may be comparable to that of obese dogs because a change in the behavior of the parent is required. The family environment may shape attitudes about food preferences and lead to overeating and a sedentary lifestyle.<sup>13</sup>

The purpose of the study reported here was to compare a conventional obesity treatment program with an obesity treatment program that included owner education intended to result in behavior changes in owners of obese dogs. The objectives of the study were to determine whether the amount of weight loss would differ between treatment groups and whether owner education would result in more successful weight maintenance after weight loss.

## Materials and Methods

**Dogs**—Healthy obese pet dogs of any breed or sex were considered for the study. Enrollment criteria required that all dogs be 12 months to 10 years of age, neutered, and have a body condition score (BCS) of 8 or 9, on the basis of a validated 9-point scale.<sup>14</sup> A BCS of 8/9 or 9/9 is considered obese on this scale. A complete physical examination, CBC, serum biochemical analyses, urinalysis, and serum thyroxine concentration determination were performed in each dog. Dogs in which laboratory test results were outside reference ranges used at The Ohio State University Veterinary Teaching Hospital were excluded from the study. Dogs that weighed  $< 18.2$  kg ( $< 40$  lb) were considered small dogs, and dogs that weighed  $\geq 18.2$  kg ( $\geq 40$  lb) were considered large dogs. Dogs were randomly assigned to the control or owner education (EDU) group.

**Weight loss period**—Control dogs began a conventional obesity treatment program used at The Ohio State University Veterinary Teaching Hospital. The EDU group began an identical obesity treatment program, except that owner education intended to result in behavior changes in owners was included. The target weight after 6 months of weight loss was set as a 20% reduction from the initial weight. Dogs in both groups followed an individualized diet plan. A thorough diet history was obtained from each owner, and the daily caloric intake of the dog was approximated. The caloric intake estimated to induce a loss of 1% of body weight/wk was calculated by use of the following equation: estimated daily caloric intake = weight [lb]  $\times$  0.01  $\times$  3,500 kcal/lb/7 d. Adjustments of  $\pm$  10% of estimated daily caloric intake were made for individual dogs if required; these adjustments were made on the basis of owners' reasons for failure of previous weight loss attempts (ie, not counting calories in treats or not feeding the prescribed amount of dog food). After a 2-week acclimation period during which dogs were switched over to the new diet without adjustment of intake, dogs were fed a prescribed quantity of the commercial canine weight-control diet.<sup>a</sup> Ten percent of the estimated daily caloric intake could consist of treats. Owners were allowed to feed any type of treat as long as the total daily treat caloric intake recommendation was not exceeded. Owners were given a list of commercially available treats, vegetables, and fruits; the list included serving sizes and caloric content of each treat to assist them in their choices. Owners were also given diet plans, BCS charts, measuring cups, and information regarding the commercial food. Owners were also encouraged to increase the physical activity of their dog.

Owners and dogs in both groups were required to return to the Veterinary Teaching Hospital monthly for assessment of progress. Weight and BCS were recorded for each dog. Dorsoventral and lateral photographs were taken at the beginning of the treatment program (time 0) and at 6 and 24 months.

The primary caregiver of each dog in the EDU group was required to attend monthly classes that addressed nutrition-related topics during the 6-month weight loss period. Other adults in the household were encouraged to attend the meetings. The six 1-hour classes focused on the following topics: BCS, obesity-related diseases, increasing the physical activity of the dog, reading pet food labels, and proper use of treats.

The weight loss period for each dog ended when it had completed 6 months of the study or achieved a loss of 20% of body weight.

**Weight maintenance period**—The 18-month weight maintenance period followed the weight loss period. The daily caloric intake for weight maintenance was estimated to be 20% greater than the daily caloric intake for weight loss. Adjustments ( $\pm$  5%) were made as required to maintain weight. Dogs were fed the same commercial diet during the weight maintenance period. Body weight and BCS were recorded monthly. Weight maintenance programs were identical for both treatment groups.

**Owner compliance**—Our study greatly relied on owner cooperation and involvement; therefore, every effort was made to assure owner compliance, specifically by use of information given to each owner and by provision of rapid accessibility to the investigators. The drop-out rates in each group were recorded.

**Data and statistical analyses**—Data for initial weight, weight change, and percentage weight change were expressed as mean  $\pm$  SD (range). Data for BCS and changes in BCS were expressed as mean  $\pm$  SD at 6 and 24 months relative to time 0. Differences in weight change and percentage weight change between groups between 0 and 6 months and

6 and 24 months were compared by use of an ANOVA and a *t* test. Weight change was calculated as the difference between the initial weight (time 0) and the 6- and 24-month weights. Percentage weight change was calculated relative to initial weight at time 0. The Wilcoxon rank sum test was used to compare differences in the changes in mean BCS from time 0 to 24 months between treatment groups. The relationship between BCS and weight was compared by use of  $\chi^2$  analysis to determine if BCS could be used as a surrogate for weight. For all comparisons, a value of  $P \leq 0.05$  was considered significant.

## Results

Sixty dogs were enrolled in the study; however, only 32 dogs completed the 24-month program. No significant differences in sex distribution and initial weight (time 0) were found between treatment groups (Table 1). The mean  $\pm$  SD BCS at the beginning of the weight loss period (time 0) was  $8.3 \pm 0.35$  in the control group and  $8.1 \pm 0.48$  in the EDU group. No significant difference between groups was found for BCS at time 0. Several breeds of dogs were enrolled in the study, and no significant difference in distribution of breeds between treatment groups was identified. Only 4 small dogs completed the 24-month program; therefore, the effect of dog size on results could not be determined. Twenty-eight dogs left the study for various reasons, including poor owner compliance ( $n = 15$ ), health reasons (11), and withdrawal during the acclimation period (2). No significant differences in reasons for not completing the study were detected between groups.

Dogs in both treatment groups had a significantly ( $P < 0.001$ ) lower weight at the end of the weight loss period (6 months), compared with initial weight (time 0). At 6 months, no significant differences in weight change or percentage weight change between treatment groups were identified (Fig 1; Table 2). No significant differences in weight change or percentage weight change were found between males and females. The mean  $\pm$  SD BCS at the end of the weight loss period (6 months) was  $6.8 \pm 0.7$  in the control group and  $6.4 \pm 1.1$  in the EDU group. Mean  $\pm$  SD changes in BCS at 6 months (relative to time 0) were  $-1.5 \pm 0.75$  in the control group and  $-1.7 \pm 0.7$  in the EDU group. No significant differences in mean BCS or change in BCS between groups were found.

During the weight maintenance period (6 to 24 months), no significant differences were found in weight or percentage weight change at 24 months,

Table 1—Mean  $\pm$  SD (range) of initial weight (kg) of dogs enrolled in a conventional obesity treatment program (control) and dogs enrolled in an obesity treatment program that included owner education (education)

Group	Sex	No. of dogs	Weight
Control	Both	16	41.5 $\pm$ 15.8 (14.1 to 62.3)
	Female	7	46.6 $\pm$ 14.9 (17.5 to 62.3)
	Male	9	37.6 $\pm$ 16.4 (14.1 to 61.8)
Education	Both	16	35.3 $\pm$ 11.0 (13.6 to 50.9)
	Female	12	37.0 $\pm$ 9.45 (18.0 to 50.9)
	Male	4	30.0 $\pm$ 15.0 (13.6 to 46.4)

To convert kg to lb, multiply by 2.2.

No significant differences in sex distribution and initial weight were found between treatment groups.

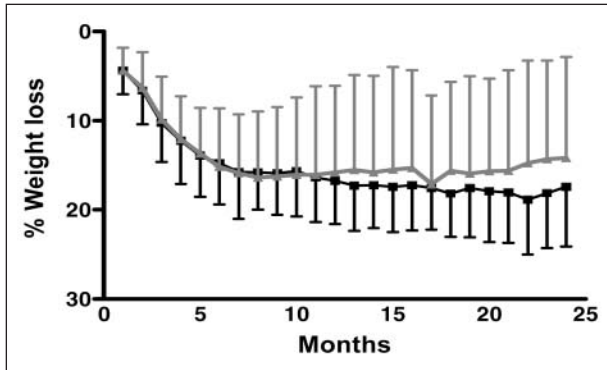


Figure 1—Mean  $\pm$  SD percentage weight loss relative to initial weight in dogs enrolled in a conventional obesity treatment program (control, black squares) and dogs enrolled in an obesity treatment program that included owner education (EDU, gray triangles) during the weight loss period (0 to 6 months) and the weight maintenance period (> 6 to 24 months). At the end of the weight loss period (6 months), no significant difference in percentage weight loss was found between treatment groups. At the end of the weight maintenance period (24 months), no significant difference in percentage weight loss was found between treatment groups.

Table 2—Mean  $\pm$  SD (range) of weight change (kg) and percentage weight change in dogs ( $n = 16$ /group) enrolled in a conventional obesity treatment program (control) and dogs enrolled in an obesity treatment program that included owner education (education) at the end of a weight loss period (6 months, relative to time 0) and at the end of a weight maintenance period (24 months, relative to 6 months)

Variable	Control	Education
6 Months		
Weight change (kg)	$-6.1 \pm 3.0$ (-10.0 to -0.9)	$-5.4 \pm 3.5$ (-14.0 to -1.2)
Weight change (%)	$-14.7 \pm 4.6$ (-22.6 to -5.2)	$-15.0 \pm 6.5$ (-27.5 to -3.9)
24 Months		
Weight change (kg)	$-1.2 \pm 2.4$ (-6.4 to 3.2)	$-0.05 \pm 2.7$ (-6.5 to 4.5)
Weight change (%)	$-2.7 \pm 5.2$ (-12.2 to 5.8)	$0.8 \pm 6.5$ (-12.7 to 10.8)

To convert kg to lb, multiply by 2.2.  
No significant differences in weight change or percentage weight change were found between treatment groups.

compared with 6 months in both groups (Table 2). No significant differences in weight change or percentage weight change between treatment groups were found. The mean  $\pm$  SD BCS at the end of the weight maintenance period (24 months) was  $6.3 \pm 1.06$  in the control group and  $5.9 \pm 0.8$  in the EDU group. The mean  $\pm$  SD changes in BCS (relative to time 0) at 24 months were  $-2.1 \pm 0.96$  in the control group and  $-2.2 \pm 1.0$  in the EDU group. No significant differences in mean BCS or change in BCS between groups were found. Body condition scores were not significantly different between treatment groups at 6 and 24 months, although weight loss varied between groups. No significant effects of treatment group or sex were related to mean BCS. The relationship between BCS and weight was significant ( $r^2 = 0.43$ ;  $P < 0.001$ ).

## Discussion

An obesity treatment program that included owner education intended to result in behavior changes in

owners offered no advantage over a conventional obesity treatment program. Components that were common to both programs (ie, prescribed diet plans for weight loss and weight maintenance, recommendations to increase physical activity, and monthly weight checks) were effective in promoting weight loss and maintaining weight after weight loss.

The relationship between BCS and weight in our study was significant, suggesting that BCS is a reasonable surrogate for weight. In a cross-sectional study, Laflamme<sup>14</sup> found that in dogs, each unit increase in BCS was associated with a mean 5% increase in body fat via dual energy x-ray absorptiometry ( $r^2 = 0.78$ ). The differences in the predictive value of BCS for weight loss between the Laflamme<sup>14</sup> study and our study may have been the result of differences in the study designs and measurements made.

In our study, daily caloric intake was calculated to induce a loss of 1% of initial weight/wk. Laflamme et al<sup>10</sup> used a similar weight loss protocol in 39 obese dogs that resulted in a loss of 1% to 2% of initial weight/wk; however, wide variations in the amount of weight lost per week were observed among dogs. These variations were attributed to breed size differences. The dogs in our study were client owned, whereas the dogs used in the study of Laflamme et al<sup>10</sup> were laboratory research dogs. The difference in environment could partly explain the difference in the rate of weight loss between the 2 study populations; however, caloric restriction was also greater in the study of Laflamme et al.<sup>10</sup>

In our study, dogs in both treatment groups maintained their weight for 18 months after the weight loss period. These results are similar to those of Laflamme and Kuhlman<sup>11</sup> who found that dogs whose food intake was restricted during a 26-week weight maintenance period after weight loss were able to maintain their weight, whereas dogs fed ad libitum gained weight. The percentage weight loss maintained in dogs of our study was higher than that reported in a meta-analysis of 29 long-term human obesity treatment programs.<sup>15</sup> Many reasons may be offered to explain the higher percentage weight loss maintained by our dogs; however, the most plausible is that our study had a highly structured maintenance period that involved monthly weight checks. Only 9 of 29 studies conducted in humans had a structured maintenance period.<sup>15</sup> Anecdotally, owners seemed more willing to follow the diet plans for their dogs once they noticed increases in physical activity and a change in BCS.

The inclusion of owner education did not have the same success that has been reported in human obesity treatment programs.<sup>12</sup> Obesity treatment programs that involved the whole family in intense behavioral interventions were more successful than those that did not; the success of the programs was related to the intensity of the behavior treatment.<sup>16</sup> In our study, the intention of owner education to change the behavior of owners did not provide any additional benefits. It is possible that our attempts to change owner behavior were not as intense as those used in human obesity treatment programs. Enrollment in the EDU group did not affect the ability to lose weight or maintain weight after weight loss, suggesting that an intense behavior change

approach to obesity treatment was not necessary for success.

In our study, 2 approaches to weight loss and maintenance of weight after weight loss were evaluated; however, we were not able to determine whether weight loss resulted in health benefits for the dogs. This study was also limited in that no poststudy weight checks were performed. Continuation of weight checks after the study period may have determined whether owners were able to help their dogs maintain their weight without monthly contact with the investigators.

The results of our study suggest that a decrease in mean BCS of 2 units and mean percentage weight loss of 15% can be achieved and maintained in obese dogs over a 2-year period. A standard obesity treatment program that includes appropriate energy intake, monthly weight checks, and a structured maintenance period was sufficient to achieve these objectives.

<sup>a</sup>Purina Veterinary Diet OM Canine Dry, Nestle Purina PetCare Co, St Louis, Mo.

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