

**WEIGHT WATCHERS**

Therapeutic weight loss is achieved with appropriate caloric restriction, diet selection, exercise, and strategies that provide patient-specific approaches.

NUTRITION NOTES

Caloric Restriction Without Malnutrition

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As of 2018, an estimated 55.8% of dogs and 59.5% of cats in the United States were overweight or obese.¹ These numbers, which are virtually unchanged from those reported in 2017, translate into approximately 1 out of every 2 dogs and cats presenting to veterinarians for wellness examinations, making obesity

the most common nutritional disorder encountered in small animal practice in the United States.

Obesity and health risks associated with it (**BOX 1**) have become so prevalent that as of June 2019, 25 veterinary organizations worldwide had endorsed the Global Pet Obesity Initiative Position Statement officially classifying canine obesity as a disease.⁹ Nonetheless, the veterinary profession, just like the human medical profession, continues to struggle with adequately addressing the epidemic of obesity in its patients. One key to successfully addressing this problem—effective communication with clients—is the subject of a previous *Today's Veterinary Practice* article.¹⁰

One concern with weight-loss programs is that use of inappropriate diets and/or levels of caloric restriction can lead to inadequate nutrient intake, resulting in nutritional deficiencies. Severe caloric restriction can also have adverse metabolic effects that work against achieving successful, safe weight loss.^{11,12} This article provides guidance for calculating caloric requirements for an obesity management plan to avoid the adverse effects of severe caloric restriction, as well as for choosing an appropriate diet for weight-loss programs to avoid nutritional deficiencies.

BOX 1 Health Risks Associated With Overweight and Obesity in Dogs and Cats

Dogs and Cats

- Adverse effects on life span and quality of life^{2,3}
- Lameness and osteoarthritis^{2,4}
- Skin disorders⁴

Cats

- Diabetes mellitus⁴

Dogs

- Pancreatitis⁵
- Anesthetic complications⁶
- Cancer^{7,8}

CALCULATING CALORIC REQUIREMENTS FOR WEIGHT LOSS

When calculating a patient's caloric requirements for a weight-loss program, veterinarians have the choice of using the patient's current body weight (CBW) or ideal body weight (IBW). Both methods can be successful; however, there are more and more reasons to consider using CBW in most patients (**BOX 2**). (Morbidly obese patients with a high ratio of fat mass to lean mass may require a modified formula.)

Avoid Lowering Metabolic Rate

Two studies used IBW in the calculations for maintenance energy requirements (MERs) for overweight or obese dogs.^{11,12} In one study, when groups of dogs were fed at 50%, 60%, 75% and 100% of their calculated MERs during a weight loss program, mean serum triiodothyronine (T_3) concentrations decreased in all dogs, with greater decreases in the more calorically restricted groups. In addition, energy requirements apparently decreased in dogs restricted to 50% or 60% of their calculated MER.¹¹ The second study found a similar effect on T_3 production associated with feeding overweight dogs 63% of their MER.¹² Similar effects of caloric restriction on energy expenditure have been documented in overweight and obese cats fed a moderate-protein diet as part of a weight-loss program.¹³

Thyroxine (T_4) and T_3 are major regulators of energy metabolism; therefore, a decrease in energy requirements would be consistent with a reduction in serum levels of T_3 . This is referred to as the low T_3 state of undernutrition, and it is believed to protect the organism during periods of fasting or caloric restriction by lowering the metabolic rate. However, lowering metabolic rate is highly undesirable during a weight-loss program.

An additional reason for using CBW for caloric requirements during weight-loss programs is that fat is now understood to have some metabolically active tissue, and IBW underestimates the nutrient needs for fat mass that is metabolically active.¹⁴

Monitor and Adjust as Needed

Patients vary tremendously in the level of caloric restriction needed to achieve weight loss, so any initial calculation of caloric requirements may need to be modified based on how the patient responds. One

option is to feed 80% of the patient's current caloric intake; however, this risks starting the weight loss program at a level of caloric restriction that already adversely affects T_3 production and metabolic rate. Use of CBW to calculate caloric restriction decreases this risk and provides a more patient-specific approach.

Patients should be weighed every 2 weeks to assess progress. If CBW is being used to determine caloric restriction and the client is adhering to the weight-loss plan, yet the patient is not losing weight, adjustment options include recalculating caloric requirements using the patient's new, leaner body weight; decreasing caloric intake by 10%; increasing exercise; or a combination of reduced caloric intake and exercise.

Celebrate Success

Any deliberate weight loss is good weight loss. Although the goal is to see approximately 1% body weight loss per week, if a patient is losing only 0.05% body weight per week, yet everything else is going well with the program, the patient is doing well, and the owner is satisfied, celebrate the weight loss. This will help keep the owner motivated. Wait until the patient's weight loss plateaus before modifying caloric intake.

One study in dogs showed that the extent of weight rebound strongly correlated with the rate and amount of previous weight loss.¹⁵ Slow and steady weight loss may decrease the chances of weight rebound once the weight-loss program is completed.

CHOOSING DIETS FOR WEIGHT-LOSS PROGRAMS

Over-the-counter (OTC) maintenance diets and weight management diets should not be used for weight-loss programs. Maintenance diets are formulated to meet the nutritional needs of pets that have an IBW and are consuming a reasonable quantity of the diet based on the labeled feeding guidelines. However, the feeding guidelines on maintenance diet labels are based on CBW rather than estimated IBW. The nutrient:calorie ratio of these diets is such that if they are used to restrict calories, every other nutrient is also restricted, and nutritional deficiencies may result. Therapeutic weight-loss diets are formulated to be restricted in calories while providing adequate levels of all nutrients (detailed nutrient comparisons of dry and canned therapeutic weight-loss diets for dogs and cats are available at todaysveterinarypractice.com).



BOX 2 Obesity Management Calculation Sheet

1. Calculate resting energy requirement (RER) using current body weight (CBW).

$$\text{RER} = 70(\text{BW}_{\text{kg}}^{0.75}) \quad 70(\text{ ______ kg}^{0.75}) = \text{kcal/day}$$

2. Calculate obesity management energy requirement (OM).

Adult dogs: $\text{OM} = 1.0(\text{RER}) = \text{ ______ kcal/day}$

Adult cats: $\text{OM} = 0.8(\text{RER}) = \text{ ______ kcal/day}$

Note: These are starting levels for kcal intake and may require modification throughout the weight loss program. Some pets may require fewer kcals than calculated here.

3. Choose a weight loss diet.

Name of dry diet _____ = _____ kcal/cup = _____ cup(s) **twice** a day

Name of can diet _____ = _____ kcal/can = _____ can(s) **twice** a day

Note: Cats may do better if food is left out for them to nibble on throughout the day rather than meal feeding. A specified quantity of food still needs to be offered daily, but grazing throughout the day is a more natural feeding behavior for some cats than meal feeding.

4. Calculate treat allowance.

Maximum treat kcals = 10% of RER = $0.1(\text{RER}) = \text{ ______ kcal}$

Name of treat _____ = _____ kcal/treat

Treats per day = Maximum treat kcals _____ / _____ kcal/treat = _____ treats

Note: Treats should be limited to <10% of total kcal intake/day.

5. Calculate rate of weight loss.

Rate = $0.01(\text{CBW}) = \text{ ______ pounds lost per week}$

Note: The preferred rate of weight loss is 1% of body weight per week. Please weigh the pet once every 2 weeks. If patient is not losing weight, decrease caloric intake by 10%.

Exercise is strongly encouraged! The most successful weight-loss programs combine caloric restriction with exercise. Start any exercise program slowly.

How can you tell when a pet has achieved an optimal weight? When the pet has reached an ideal body condition score. Pet owners can be taught an abbreviated version of how to perform a body condition score:

- They should be able to feel ribs but not see them when the pet is standing.
- The pet should have an hourglass figure when viewed from top. If the pet has a thick hair coat, it is important to rely on hands-on assessment, not visual assessment.

Note: This sheet is intended to be a quick guide when creating a weight loss plan for patients. If reproducing this sheet to give to the owner, modify as desired.

A recent study evaluated whether nutrient deficiencies may exist when veterinarians use top-selling commercial OTC adult maintenance diets or weight management diets at progressive levels of caloric restriction in dogs.¹⁶ This study showed that when MER calculations are done using CBW with a MER formula recommended by the National Research Council for dogs with low energy intakes, 2 of 31 commercial dry diets were at risk of nutrient deficiencies when fed at 100% MER. The risk of deficiencies increased with the level of caloric restriction. When diets were fed at 60% MER, 1 diet had 3 nutrients at risk of deficiency, while the remaining 30 diets had more than 3 nutrients at risk of deficiency. The nutrients most commonly at risk of deficiency were choline, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), methionine, cysteine, riboflavin, pantothenic acid, cobalamin, selenium, cholecalciferol, vitamin A, folic acid, thiamin, and tryptophan. Had the authors used IBW when calculating MER instead of CBW, more potential nutritional deficiencies would no doubt have been seen.

KEY NUTRIENTS IN THERAPEUTIC WEIGHT-LOSS DIETS

Using a therapeutic weight-loss diet during a weight-loss program reduces the risks of nutritional deficiencies because the levels of key nutrients in these diets have been adjusted to be adequate despite low caloric density (the levels of key nutrients in various therapeutic weight-loss diets are available at todaysveterinarypractice.com). Some diets also contain additional nutrients that are beneficial during weight-loss programs. There is enough variation among therapeutic weight-loss diets that if one is not effective, it may be worth trying a different one.

Protein

Several studies have suggested that a higher protein:calorie ratio than that found in many OTC maintenance diets is necessary for preservation of lean body mass during weight loss.^{13,17} Maintenance of lean body mass is an important component of successful weight loss, and it may help maintain energy expenditure and lessen the risk of weight rebound.

Preservation of lean body mass may also help maintain the patient's protein turnover rate, which facilitates rapid redistribution of amino acids to support immediate synthesis of proteins essential for life.

Reduced protein turnover from inadequate protein intake can lead to decreased immune competence and increased susceptibility to stresses such as infection and injury.¹⁸ It is also very important that patients receive adequate amounts of essential amino acids during a weight-loss program.

Higher dietary protein intake may also have an effect on satiety.¹⁹ The enhanced feelings of satiety associated with ingestion of dietary proteins may be related to induced thermogenesis, hormonal regulation, slower passage rate from the stomach as a result of release of cholecystokinin (CCK), and sensorial experience during food consumption. In dogs, higher protein intake in combination with higher fiber intake has a greater impact on satiety than either high protein intake or high fiber intake alone.¹⁷ In cats, the situation is more complex. A high protein:calorie ratio promotes loss of body fat while helping to maintain lean body mass;²⁰ however, satiety in cats is best induced when dietary protein and fiber are moderately rather than markedly supplemented.²¹

Fat

Dietary fat also causes the release of CCK; however, most therapeutic weight-loss diets are restricted in fat to reduce the energy content. Fat has more than twice the energy density of protein or carbohydrates (9.0 kcal/g versus 4.0 kcal/g). However, as with protein intake, the intake of fat must ensure that adequate levels of essential fatty acids are being provided.

Total Dietary Fiber

Total dietary fiber (TDF) is different than percentage of crude fiber (%CF), which is required to be listed on the guaranteed analysis on pet food labels. Crude fiber percentage is an estimate for only insoluble fiber content and underestimates the true fiber content of the diet, whereas TDF accounts for both insoluble and soluble fiber content. Having soluble fibers in the diet is important because many soluble fibers are also moderately fermentable fibers, which provide nutrients for the beneficial bacteria in the gastrointestinal tract, and fermentation of moderately fermentable fibers by beneficial bacteria produces short-chain fatty acids, which are a major fuel source for colonocytes.

A higher fiber content also allows a larger volume of food to be fed to the patient without adding significant calories to the diet.



Anti-inflammatory Nutrients

Obesity is a chronic inflammatory disease and has been shown to be a risk factor for developing osteoarthritis (OA) in dogs.²² Therefore, diets that contain nutrients that help reduce inflammation and clinical signs associated with OA, such as EPA and DHA, may be desirable to feed during a weight-loss program.²³ Not all dogs or cats with OA show obvious radiographic evidence of it, and OA in cats is more likely to go underdiagnosed than in dogs.²⁴ Therefore, providing nutrients in the diet to reduce inflammation and address possible OA may be an important component in therapeutic weight-loss diets.

L-Carnitine

L-carnitine facilitates the transport of fatty acids from the cytoplasm into the mitochondria, where they help to generate energy. Dietary L-carnitine supplementation has been shown to aid in preserving lean body mass during weight loss in dogs.²⁵ In overweight cats, dietary supplementation with L-carnitine during weight loss resulted in a higher resting energy expenditure-to-lean body mass ratio than in cats not receiving the supplementation.²⁶ In another study evaluating rapid weight loss in obese pet cats, the group that received a diet supplemented with L-carnitine lost weight more rapidly than the group consuming a diet not supplemented with L-carnitine,²⁷ while another study showed cats fed diets supplemented with L-carnitine lost more weight than cats not receiving supplemental L-carnitine.²⁸

The levels of supplemental L-carnitine used in weight-loss studies in dogs have varied, but most published studies have used a 300 mg/kg diet on a dry matter basis. The levels of supplemental L-carnitine used in studies in cats have also varied, with levels of 250 mg per day per cat being most common. However, a recommendation of at least 500 mg/kg diet on a dry matter basis has also been suggested for cats.²⁹

Additional Beneficial Nutrients

Some diets contain additional nutrients that have been shown to be beneficial for weight-loss programs in dogs and cats (visit todaysveterinarypractice.com). Hill's Pet Nutrition has a proprietary blend of synergistically effective nutrients in some of its therapeutic weight-loss diets for dogs and cats that works at the cellular level to change gene expression affecting metabolism.³⁰⁻³² Nestle Purina PetCare has added isoflavones to some of its canine

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therapeutic weight-loss diets. These soy germ isoflavones have been shown to enhance energy metabolism in dogs while reducing body fat accumulations and to help reduce the risk of weight rebound.³³

THE ROLE OF TREATS IN WEIGHT LOSS PROGRAMS

It is common practice for veterinarians to eliminate treats as part of a pet's weight-loss program.¹⁶ However, if giving treats is an important part of the daily interaction between the owner and pet, it is important not to disrupt the human-animal bond. Successful weight-loss programs rely on owner motivation and actions, and if the owner feels guilty that the pet is not allowed to have treats, they may be less likely to stick with the program, or may still give treats but not admit to doing so.

Any weight-loss program should have both short-term and long-term goals. The short-term goal is to attain an appropriate amount of weight loss during the weight-loss program to achieve an ideal body condition. The long-term goal is to have the pet keep the weight off after the program is completed. Therefore, it is important for any weight-loss program to instill habits in owners that they will follow long-term. Owners who like to give treats to their pet should be allowed to do so, but should be given options of low-calorie treats to use and cautioned to limit the amount of treats to less than 10% of the pet's total caloric intake.

KEY POINTS

- Nutrient deficiencies can develop in patients undergoing a weight-loss program because of use of inappropriate diets and/or levels of caloric restriction that result in inadequate nutrient intake.
- Over-the-counter maintenance diets and weight

management diets should not be used for weight-loss programs.

- Therapeutic weight loss diets are formulated to be restricted in calories while providing adequate levels of all nutrients.
- Treats can be given during a weight-loss program, but providing low-calorie options and limiting quantities are important. **TVP**

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