

Role of Dietary Protein in Weight Management

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Protein plays vital structural and functional roles in dogs and cats involving growth, tissue and cellular repair, enzymes, hormones, antibodies, transport proteins, and energy. Severe protein deficiency results in signs including poor food intake, growth retardation or weight loss, subnormal concentrations of blood proteins, muscle wasting, emaciation, and death. Protein requirements are ultimately dictated by physiologic state. Growth, pregnancy, lactation, and geriatric age represent some physiologic states that require increased protein intake compared to maintenance levels. Weight loss represents a physiologic state for which less is known regarding protein requirements.

Obesity is the most common nutritional disorder affecting companion animals. One study reports that approximately 25% of all dogs and cats seen at private primary care veterinary practices in the United States were judged to be above an optimal weight.¹ A nutrient profile optimized for successful weight loss in dogs and cats may be defined as a profile that promotes safe, efficient, and effective long-term reduction of body weight consisting of maximum body fat loss and minimal reduction in lean body mass.

The proper protein level for weight reduction diets should take into account any impact that protein may have on achieving successful weight loss. The reported benefits of increased dietary protein in weight loss diets include maintenance of lean body mass in humans,¹⁵ promotion of satiety,³ stimulation of resting energy metabolism,⁹ and prevention of hepatic lipidosis in cats.⁴

Maintenance of lean body mass during weight loss represents an important component of successful weight loss. Lean body mass is the primary driver of basal energy metabolism. Loss of this tissue during weight loss may contribute to weight regain. Additionally, preservation of this tissue during weight loss may help the animal maintain pro-

tein turnover rates, which allow rapid redistribution of amino

acids to support immediate synthesis of proteins essential for life. A reduction in protein turnover can lead to decreased immune competence and increased susceptibility to stresses such as infection and injury.¹⁶

When obese humans were fed very low energy diets, increased dietary protein helped maintain lean body mass.¹⁵ Increased dietary protein appears to have similar effects in cats. In a study conducted in our laboratory, 16 obese cats were energy restricted to achieve a loss of 1% body weight per week for a period of up to 6 months using two dry diets differing only in protein level. Using dual energy X-ray absorptiometry (DEXA) to estimate body composition, we found that feeding protein at 35% of metabolizable energy resulted in weight loss composed of 79% fat and 20% lean tissue. Feeding protein at 45% of metabolizable energy resulted in weight loss composed of 88% fat and 11% lean tissue.¹¹ These results were nearly identical to those reported in a similar study involving a canned food also containing protein at 45% of energy.⁵ On average, over 90% of the weight lost was from fat while only 8% was from lean tissue.

Additional work in our laboratory examined the hypothesis that increased dietary protein will spare lean body mass in dogs fed for weight loss. Forty-two overweight dogs were stratified into three dietary treatment groups and fed to achieve a rate of 1% body weight loss per week until each dog reached ideal body condition (body condition score = 5 using a 9 point system). Test diets were similar except for protein content (20%, 30%, or 39% of calories). Increased dietary protein spared lean body mass and facilitated greater body fat loss compared to lower protein diets in dogs during weight loss (Table 1).¹⁰

Many variables have been shown to impact the likelihood of successful weight loss. In dogs a rapid rate of weight loss can increase the likelihood of weight rebound

TABLE 1
Effect of Dietary Protein on Body
Composition During Weight Loss in Dogs

Effect	Dietary Protein (% of calories)		
	20%	30%	39%
Tissue loss			
Lean (g)	1700 ^a	900 ^{a,b}	700 ^b
Fat (g)	3350	3420	3800
Composition of loss			
Lean (%)	33.5 ^a	20.8 ^{a,b}	13.5 ^b
Fat (%)	65.7 ^a	78.5 ^{a,b}	85.3 ^b

Different superscripts indicate statistical significance $P \leq .05$.

compared to a slower rate of weight loss.¹² The rate of weight loss has been suggested to affect the composition of weight lost in cats.⁶ Since lean body mass has a much higher metabolic rate compared to adipose tissue, if rapid weight loss promotes excessive loss of lean body mass, then an increased likelihood of weight rebound would be expected. Interactions between dietary fat, carbohydrate, and protein appear to affect several components of weight loss including satiety, safety, composition, and efficiency of weight loss.^{3,4,9,13,14} In all cases dietary protein appears to provide positive contributions to the goal of successful weight loss.

The Association of American Feed Control Officials (Official Publication 1998)² recommends a minimal level of dietary protein that must be present in companion animal diets. For adult maintenance, canine diets must contain a minimum of 5.14 g of protein per 100 kcal metabolizable energy while feline diets must contain 6.5 g of protein per 100

kcal metabolizable energy. These minimums are presumed to assure that any dog or cat will consume adequate protein if fed to its individual energy needs. However, dogs and cats fed for weight reduction are, in fact, energy restricted. Applying the adult maintenance ratios of protein to energy in weight reduction diets may put the animals at risk of protein deficiency. Dog and cat foods designed to be fed for weight loss should contain protein levels sufficient to deliver an animal's daily requirement for protein within the amount of food offered as well as an optimal amount of protein to maximize the likelihood of successful weight loss.

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