Dietary Management of Obesity and Diabetes in Cats

A roundtable discussion
Sponsored by an educational grant from Nestlé Purina

Dr. Dottie Laflamme: We all know fat cats when we see them—and we see them a lot! Of all the nutritional problems in cats and dogs, obesity is the most common. We also know that obesity is a disease of domestication. Just as a sedentary lifestyle and overabundant food supply have led to an obesity epidemic in people, so it is with cats. With little need or opportunity for domestic cats to hunt—and the presence of owners who unknowingly mistake food for love—millions of cats today demonstrate evidence of a marked imbalance between calorie supply and expenditure.

What we don’t know for certain is the degree to which being overweight or obese impairs the health of cats. We know there is a connection between feline obesity and serious health problems, including type 2 diabetes. However, we also know that not every feline diabetic is overweight—nor does every obese cat become diabetic. How, then, do we approach these patients? In what ways are obese and diabetic patients alike and different? What is the optimal feeding program for each patient? Our group of specialists today will focus on feline obesity and diabetes and formulate recommendations for feeding four classes of patients: nonobese diabetics, obese diabetics, nondiabetic obese cats, and normal cats. Let’s begin with a discussion about the significance and prevalence of feline obesity.

The importance and prevalence of feline obesity

Laflamme: Several different sources indicate that the prevalence of obesity in cats ranges from 25% to 50%. In your experience, is the prevalence that high or perhaps higher? What is the significance of this?

Dr. Kathryn E. Michel: I think the prevalence in cats of all ages is about 25%. But it’s important to recognize that if you look at a subset of middle-aged cats between 5 and 11, the prevalence is much higher. So when you take out the very young and very old cats, the prevalence is probably closer to 40% to 50%.[1] The other thing to remember is that the studies cited in those sources are about 10 years old. The prevalence of obesity in housecats today is increasing. So it may be even greater than those studies indicate. Obesity is a real problem for middle-aged cats.

Dr. Margaret Scherk: I think it would be worthwhile to start by defining obesity before addressing prevalence so that we’re all talking about the same thing. Are we saying a cat is obese if it has 25% body fat or is 25% overweight?
Laflamme: That’s an excellent question. The study Dr. Michel referred to earlier considered a body condition score of 3.5 or greater on a five-point scale (6.3 or greater on a nine-point scale) as being overweight or obese.

Dr. Margarethe Hoenig: I don’t think we know the prevalence because in many practices and university hospitals, body condition scoring isn’t routinely done. You can do other things, like measure the girth. You can weigh the cat every time it comes in. But those things are not routinely done. We have to educate the veterinary community to start monitoring cats for obesity.

Scherk: Another simple tool for practitioners is to calculate the percentage weight change. This is done by subtracting the previous weight from the current weight, dividing by the previous weight, and multiplying by 100. This obviously would illustrate developing obesity. However, in cases of obesity, clients often don’t understand that a 7% weight increase from last year’s exam is significant. To help them, I multiply my weight by 7%, then it’s clearer what a huge amount of weight that actually is.

Michel: Unfortunately, we don’t have a prospective study of cats like the Purina study done with Labrador retrievers. In the dog study, we saw that mild obesity indicated by a slightly increased body condition score was associated with deleterious health issues, including osteoarthritis, an increased risk of orthopedic disease, and a shorter lifespan. We don’t have those data in cats, so we can’t say that a cat with a body condition score of 6 on a nine-point scale is not at risk for diseases associated with obesity or that a cat with a body condition score of 8 is in trouble.

Hoenig: One other point: I don’t think we can say that all cats with a certain percent weight increase will necessarily have health issues. However, obesity is certainly a risk factor for a number of health-related problems.

Laflamme: So we know that the prevalence of obesity in cats seems to be increasing or at least is quite high. I would like to pursue the issue of risk factors. Why are so many cats overweight?

Dr. Rebecca Remillard: We encourage owners to keep their cats indoors vs. outdoors, which obviously decreases their activity level. There’s also been a tremendous push to neuter animals. The daily energy requirement drops 25% to 30% within a couple months of neutering. Finally, I think owners are unaware of how little food it takes to maintain a 10-pound or 15-pound animal.

Laflamme: Do you think, then, that neutering is inappropriate, or are you just pointing out its metabolic effects?

Remillard: I am primarily interested in the metabolic effects—I think that neutering increases the lifespan of the animal, and I have no problem with it. I think we practitioners forget to inform the owner about these changes after a cat has been neutered, and we don’t give them instructions on how to change the feeding method by altering diet type, amount fed, or both.

Scherk: I think cats’ sedentary nature contributes to obesity. Cats are small predators with very short intestinal tracts and small stomachs relative to other species. They’re designed to eat about nine or 10 small meals a day. Cats never walk up to a bowl filled with 10 freshly killed mice. In reality, they’d eat them one at a time—plus, they’d have to work for each one.

Hoenig: Also, the amount each cat needs for maintenance varies. One cat may gain weight and another may lose weight consuming the same amount of calories.

Scherk: We routinely aim for 40 to 50 kcal/kg ideal body weight per day to maintain ideal weight. When a cat is obese, we recommend feeding 70% of this number. So for a 4-kg cat, the daily requirement would be figured as 50 multiplied by 4 equals 200 kcal/day. In order to lose weight and get down to 4 kg, we would figure food requirement by multiplying 200 by 70% to equal 140 kcal/day. It’s important to calculate how much the cat has been eating—and gaining weight on—because some cats have such a slow metabolism that even with the few calories they’re eating, they’re still gaining weight. They may already be only getting 140 kcal/day.

We also encourage the owner to keep a diary and include how much the cat is eating and what it’s consuming calorically. From that information, we work with the owner to determine the amount of food necessary to lose weight. You can get the caloric density of most diets by calling the companies or looking on the Internet.

Feline metabolism
Laflamme: Are there unique aspects of feline metabolism that contribute to the prevalence of obesity?

Dr. Tom Schermerhorn: Yes. I think we agree that overweight or obese cats are calorically overfed. Genetic and environmental factors aside, they are probably...
Managing the Obese Cat in a Multicat Household

Client education is an important part of successfully managing obesity in cats. Clients may need extra guidance helping an obese cat lose weight when other cats live in the house. Here are some tips you can pass on to them:

• Put food for thinner cats in places a larger cat can’t get to, for instance on a high surface or behind narrow openings.
• Feed thinner cats behind a closed door while the heavier cat eats elsewhere.
• Give all cats lower calorie, higher-protein, low-fat diets.

HIGHLIGHTS:

• Cats are designed to eat nine or 10 small meals a day. In reality, they would eat one mouse at a time and work for each one.
• Calories must be restricted for a cat to lose weight.
heat released during digestion, is higher for a high-protein vs. low-protein diet. Cats may lose more weight on a high-protein, low-fat diet vs. a low-protein, low-fat diet when consuming equal calories. My preference is to use a low-fat, high-protein diet for weight loss in cats.

**Schermerhorn:** When you say low fat, what percentage are you thinking?

**Remillard:** About 8% to 15% of diet dry matter. When high-protein, high-fat diets became available, some practitioners were using them like an Atkins weight loss diet. It just didn’t make sense to me mathematically because simply changing the diet didn’t reduce caloric intake. In fact, it probably increased caloric intake because of the high fat content of the new diet relative to the diet the cat had been eating. The Atkins diet plan does work for those who have reduced their total caloric intake by consuming fewer carbohydrates and fat. We put some of our staff members’ fat cats, including my own two cats, on one of these high-protein, high-fat diets. We didn’t change anything except the food product—I asked them to feed by the same method and amount. After six months, the cats got heavier. It was an informal study, but simply substituting a higher-protein, lower-carbohydrate diet without taking total calories into account is not going to achieve weight loss.

**Laflamme:** So a high-protein diet will not, by itself, prevent obesity?

**Remillard:** Correct; it’s less efficient to derive calories from protein than fat or carbohydrate, but by itself that inefficiency is not enough to cause weight loss or even to prevent weight gain in cats.

**Client education and food management**

**Laflamme:** Let’s talk about what works for obesity management in terms of client education and feeding management tips. Dr. Scherk, you are in a feline practice. What is your best tip for managing obese feline patients?

**Scherk:** Client management begins with a conversation about how a cat naturally eats. As I suggested before, putting down a bowl of nine or 10 freshly killed mice for cats to nibble on all day is not a natural way of feeding. It is helpful to have portion control, multiple small meals, and food in multiple places rather than in one spot only. We send home a variety of foods and let the cat choose, because, surprisingly, obese cats may still be picky. Then we figure out the caloric requirements.

The only time an obesity management program is successful is with lots of follow up. Instead of making it a one-time discussion, set up a six-month program that clients pay for up front. Then get them back about every two weeks for a weigh-in. As soon as cats hit a plateau, we reevaluate the caloric intake of the cat.

**Laflamme:** Any other tips for managing obesity in patients?

**Schermerhorn:** I agree that it’s important to get the client on board. But it’s also important for veterinarians to be on board. Practitioners have to tell clients that paying for a six-month program is important. I don’t manage a lot of cats for obesity per se. We see them for other medical problems and address it simultaneously. In such cases, I don’t know that veterinarians are prepared to take the half hour to hour to discuss weight loss programs with clients. Yet we routinely put in that time to talk about diabetes, discharge instructions, and other concerns.

**HIGHLIGHTS:**

- For weight loss in cats, a low-fat, high-protein diet is preferred.
- Obesity management programs are most successful when practitioners follow up with clients.

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**Dietary History Questions for the Owner of an Obese Cat**

- What amounts and type of food, including treats, do you feed your cat?
- Does your cat drink milk?
- Does your cat eat human food?
- Does your cat hunt its food?
- Who feeds the cat?
- How frequently is the cat fed?
- Where is the cat fed?
- How is the cat’s food measured?
- Is the cat on any medication?
- How are medications given?
- Are they given in food or with a treat?
- Does the cat nibble its food or gorge itself?
- Are other pets in the home?
- Does the cat have access to other pets’ food?
- Does the cat have any known stress?
- What is the cat’s activity level?
Laflamme: Some veterinarians may not be convinced that feline obesity is a serious health problem. Are there documented risks for obese cats?

Scherk: One study showed increased risk of diabetes, dermatoses, and arthritis. Of course, the risk for hepatic lipidosis is increased in obese cats. And there are more subtle problems, such as immune system effects.

Laflamme: Let’s address the difference between managing overweight dogs and overweight cats.

Remillard: It’s more difficult to manage cats because they appear to adapt more quickly to a lower caloric intake than dogs. They level off much sooner, so you have to reexamine them, do the food calculations again, and restrict them further, probably on a monthly basis. It’s also much more difficult to measure the smaller volume of food. You could be 10 kibbles off when feeding an eighth of a cup per meal and not get weight loss.

Schermerhorn: So when they level off, you then restrict them further?

Remillard: Yes, for continued weight loss. If you are trying to get down to 18 pounds from 22 pounds, you have to continuously feed less because their metabolic rate adapts to the lower level of energy intake and weight loss stops. To achieve weight loss, you must always feed fewer calories than needed to maintain current weight.

Hoenig: It’s difficult for clients, too. If we’re using a maintenance dry food, clients aren’t going to give a little bit of food because they feel bad for the animal. It’s also more difficult for cat owners because they can’t exercise their pet like a dog owner can.

Scherk: I think cats need more behavior management, too. For instance, when the cat comes to the client, is it saying, “I’m hungry. Feed me.” or, “I want attention”? There aren’t as many ways to interact with cats. Plus, dogs are less finicky about treats. You can feed dogs cabbage, which has virtually no calories, and they’re happy.

Schermerhorn: One possibility is that obesity induces insulin resistance in cats. There are also other factors involved in the development of diabetes, in particular, endocrine failure. Some obese cats with marginal pancreatic function eventually become overt diabetics. There is a subset of true type 2 diabetics with adequate function where, at least early on, they have glucose intolerance and insulin resistance.

Hoenig: I agree. Not every obese cat becomes diabetic. We don’t have a good handle on how many do because we don’t know how many cats are truly obese. We did a study published two years ago in which we reviewed obese cats and found that not all of them had abnormal glucose intolerance.

Laflamme: Hepatic lipidosis might be a factor in veterinarians not wanting to deal with obese cats. How real is the concern for inducing lipidosis?

Schermerhorn: I think the incidence of classic, primary hepatic lipidosis has decreased in our practice. Most cats we see now have secondary lipidosis in association with another major medical problem that causes anorexia.

Michel: Based on recent studies, it seems difficult to induce hepatic lipidosis. Researchers reduced cats to 25% or 45% of their normal intake, and there were no liver function or biopsy changes indicating the development of hepatic lipidosis. Inducing lipidosis requires complete fasting. I always tell owners to make sure the cat is eating. If we change the diet and the cat refuses to eat the new food, that could be a dangerous situation.

Increasing prevalence of diabetes

Laflamme: Let’s move on to the prevalence of diabetes in cats, which occurs in between one in 100 and one in 700 patients. I don’t think we have good data on the exact prevalence, but is it your perception that diabetes is becoming more common? If so, why?

Hoenig: When I started practicing almost 30 years ago, the prevalence of diabetes in the dog was 0.2% and much lower in the cat. About four years ago at the University of Georgia, our prevalence was 0.6% in cats. That’s a big increase. I think most clinicians would agree that we see more diabetic cats today.

Scherk: I definitely see more diabetic cats than I used to. I see at least one, if not two, new diabetics a week. But my practice is 100% feline internal medicine.

Schermerhorn: Of those new diabetics, how many of them are overweight or fat?

Scherk: About 60%.

Schermerhorn: Are they symptomatic when they present?

Scherk: I look for clinical signs because I know their histories. For instance, I see a poor coat, muscle wasting, or a decrease in energy. Clients assume the cat is just getting older, or that it has been a heavy cat and is now losing weight. I recently had clients who were thrilled their cats were finally losing weight, but unfortunately, the weight loss was from diabetes.

Laflamme: That brings us to the relationship between obesity and diabetes. Obesity appears to be a risk factor for the development of diabetes. Why is that?

Schermerhorn: One possibility is that obesity induces insulin resistance in cats. There are also other factors involved in the development of diabetes, in particular, endocrine failure. Some obese cats with marginal pancreatic function eventually become overt diabetics. There is a subset of true type 2 diabetics with adequate function where, at least early on, they have glucose intolerance and insulin resistance.

Hoenig: I agree. Not every obese cat becomes diabetic. We don’t have a good handle on how many do because we don’t know how many cats are truly obese.
“I stress to clients that their cats will still be diabetic, but with a high-protein diet they can be well-controlled diabetics.”
—Dr. Tom Schermerhorn

tolerance test results. When we later performed the euglycemic hyperinsulinemic clamp technique in obese cats, they really were insulin resistant.13 In one study, we found a subset of obese cats that truly had abnormal insulin secretion, and those cats already had abnormal insulin secretion in the lean state. About 30% had some abnormality in the insulin secretion pattern.

Michel: So these were lean cats that you made fat?

Hoenig: Correct.

Laflamme: So obesity contributes to insulin resistance. Obviously not all of those cats would go on to become diabetic, but some were already glucose intolerant even before they became obese?

Hoenig: They weren’t really glucose intolerant. They had abnormal insulin secretion. Which comes back to your point that they probably have some intrinsic defect in the beta cells that might not always lead to overt diabetes.

Schermerhorn: The interesting point about glucose tolerance in cats is that they are naturally more glucose intolerant than dogs, people, and rats. Even normal cats have a prolonged glucose tolerance curve compared with other species. Another possible relationship between the obese state and diabetes is pancreatic exhaustion in cats that have marginal function—this may be associated with increased amyloid deposition, which is a type 2 pathology. Amyloid in the pancreas can be damaging to the remaining beta cells.

Hoenig: Yet there are many old cats with amyloid in the pancreas that don’t have diabetes, so there are several factors involved.

Laflamme: What can practitioners do when dealing with cats at higher risk for becoming diabetic? Should they add glucose tolerance tests to their geriatric panel, or is there an assay they can do to help identify which cats are at greater risk?

Hoenig: It’s hardly feasible for researchers to do glucose tolerance tests, so it’s not feasible for practitioners. I think every panel should now include a fructosamine or glycosylated hemoglobin analysis. Both are easy tests and they allow practitioners to watch for changes in the results. Hopefully, we’ll have a proinsulin assay sometime in the future. Proinsulin concentrations change early when the pancreas and beta cells become abnormal, so that’s another easy way to manage at-risk animals.

Scher: Are you suggesting we would change the diet at that point?

Hoenig: Yes, to promote weight loss in obese animals. Then you would recommend a higher-protein diet, and you may want to consider the oral antidiabetic aids used in human medicine, which aren’t currently approved for pets. There may be a point where you recommend fatty acids because they decrease insulin resistance and make the pancreas work less hard.13

Laflamme: So you’re suggesting active management of cats identified as prediabetics? Is that something we have a handle on now or is it in the future?

Hoenig: The future.

Managing Diabetes

Laflamme: What are the current treatment options for managing the diabetic cat?

Schermerhorn: Diabetics that aren’t ketoacidotic or sick and present with typical clinical signs of polydipsia and polyuria are considered uncomplicated diabetics. When cats are obese and have mild hyperglycemia (about 300 mg/dl), some veterinarians might recommend sulfonylureas such as glipizide for these patients. Or you might recommend a high-protein diet without adding insulin to see whether diet alone could control the hyperglycemia. When using this approach, you have to monitor the cat closely since even some mildly affected cats may require insulin to avoid ketosis.

Beware, though, that some diabetic cats with mild hyperglycemia eating a high-protein diet are so borderline that with only a unit or two of insulin, they become hypoglycemic. Cats with severe diabetes—those with a blood glucose of 500 or 600 mg/dl—always need insulin in addition to a high-protein diet. Without insulin, they could become ketoacidotic.

Laflamme: Do you start a high-protein diet at the same time you start the insulin?

Schermerhorn: Yes. It decreases the insulin requirement.

Laflamme: Are you saying that in the past you might have used a sulfonylurea, such as glipizide, in cats with early, mild diabetes, but now you might prefer a dietary change alone?

Schermerhorn: That is my personal viewpoint. I don’t routinely recommend the use of sulfonylureas because I haven’t had good success with them in cats.

Laflamme: Other people recommend their use. Are there any downsides to using the sulfonylureas?

Scher: A 1993 study shows that sulfonylureas increase the production or secretion of amyloid in the pancreas, which interferes with beta cell function.14 Is that correct, Dr. Hoenig?

Hoenig: We had eight cats in a one-and-a-half year study. At the beginning, the cats were made insulin resistant, or type 2 diabetic, through a drug regimen. Half were then treated with insulin and half with sulfonylureas. All of the sulfonylurea-
treated cats developed amyloid in the pancreas, which tells me that even over a short period of time, sulfonylureas increase amyloid production. That makes sense because the pancreas cosecretes amylin with insulin. Therefore, I do not recommend sulfonylureas.

**Scherk:** Neither do I. Practitioners say some clients won’t give their cats insulin, so both practitioners and clients would rather start the patient on a sulfonylurea. The problem is that while waiting for sulfonylureas to kick in, which may take up to six weeks, you could be inducing or prolonging glucose toxicity. Glucose toxicity can exhaust the beta islet cells, making them unable to recover their ability to secrete insulin. Add to this the amyloid deposits induced by sulfonylureas, and you can end up with a patient who might otherwise have been a transient diabetic becoming permanently insulin dependent. So I don’t recommend sulfonylureas.

**Laflamme:** Let’s discuss client resistance to giving insulin. Diabetic cats respond well to higher-protein diets, and the number of transient diabetics, or cats in which insulin can be discontinued, is increasing. Does this more positive outlook make it easier to talk to clients about diabetes management, including insulin therapy?

**Scherk:** I think so. You can help clients understand that they have a better chance of discontinuing insulin therapy by starting with one or two units of insulin early on. You can explain that their cat will also start a new diet, and that diet may be all the cat needs later, as long as the cat is monitored carefully. I think about 20% can discontinue insulin.

**Schermerhorn:** I try to be optimistic about discontinuing insulin therapy. I stress to clients that their cats will still be diabetic, but with a high-protein diet they can be well-controlled diabetics. It’s naïve for us to think that the cat’s pancreatic function is absolutely normal. The fact that it became diabetic in the beginning implies that it doesn’t have the reserve to meet certain glucose challenges.

**Scherk:** They’re diabetics in waiting.

**Laflamme:** The key to managing a diabetic cat is to establish a consistent diet.

—— DR. MARGARET SCHERK

**Schermerhorn:** Exactly. When they’re treated with steroids, for example, they may flare up.

**Hoenig:** I agree. I did glucose tolerance tests in some transient diabetics when they were clinically normal. Their insulin secretion was abnormal—it was just a lot higher than when they were overtly diabetic.

**Laflamme:** It sounds like all of us have used high-protein, low-carbohydrate diets. What is your experience with these diets in cats with diabetes?

**Remillard:** We’ve had very good success with high-protein, low-carbohydrate diets. We start new diabetic cats on the diet while they are still in the hospital. This allows us to stabilize the feeding regimen and insulin dose before they leave.

**Scherk:** It has always been clear to me that high fiber doesn’t work in cats for glycemic control. The key to managing a diabetic cat is to establish a consistent diet. And it’s very beneficial to use a high-protein, low-carbohydrate diet.

**Remillard:** Do you recommend switching a diabetic cat to a high-protein, low-carbohydrate diet?

**Scherk:** Yes. We start the cat on the appropriate diet and teach the client how to give the insulin. When they come in 10 to 14 days later for their blood glucose curve, we teach clients how to do ear pricks before they administer insulin. The next time they come in for a blood glucose curve, we also do a fructosamine test, adjust the insulin dose, and ask clients to start doing the curves at home. This transition period allows clients to change the diet, even from high fiber to high protein.

**Laflamme:** If the cat has been on a high-fiber diet and you recommend a high-protein diet, do you automatically reduce the insulin dosage?

**Scherk:** I’m cautious and decrease the insulin a bit. This is why I want clients to be able to measure blood glucose concentrations with ear pricks at home.

**Summary**

**Laflamme:** I’d like to thank all of you for your participation in this discussion. I’ll try to summarize the key points:

- There is a high prevalence of overweight and obese cats. Risk factors include lack of exercise and excess consumption of high-calorie foods.
- Effective weight loss is achievable in cats but takes time and patience. As patients lose weight, their caloric requirements are likely to diminish and further reductions may be required.
- A discussion of protein, carbohydrates, and fat suggests that high-protein diets may be valuable for weight management, partly because a high-protein diet can stimulate metabolism and preserve lean body mass.
- At the same time, we cannot expect a high-protein diet that is also high in fat and calories to facilitate weight loss. Caloric restriction is necessary.
- Obesity is one of the factors in feline diabetes and contributes to insulin resistance in cats, so weight management is important in terms of prevention and management.
- While insulin is required along with a high-protein diet for the majority of feline diabetics, practitioners may find it useful to discuss with their clients the potentially transient nature of insulin dependency in well-managed feline patients as a means of encouraging appropriate therapy and monitoring.

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**HIGHLIGHTS:**

- Clients should know that some diabetic cats may need insulin initially, but with a high-protein diet they can be well-controlled diabetics without insulin.
- About 20% of diabetic cats can discontinue insulin.
## Dietary Management of Obesity and Diabetes in Cats

### References


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### Feline Dietary Recommendations

<table>
<thead>
<tr>
<th>Cat</th>
<th>Protein*</th>
<th>Fat*</th>
<th>Carbohydrates*</th>
<th>Additional considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonobese diabetic</td>
<td>50% to 60%</td>
<td>15% to 25%</td>
<td>5% to 20%</td>
<td>Control blood glucose concentrations first, then adjust as needed for other conditions.</td>
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<tr>
<td>Obese diabetic</td>
<td>40% to 60%</td>
<td>5% to 20%</td>
<td>20% to 30%</td>
<td>Weight loss takes priority while controlling blood glucose. Monitor changing insulin requirements as cats lose weight.</td>
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<tr>
<td>Obese nondiabetic</td>
<td>35% to 60%</td>
<td>5% to 20%</td>
<td>20% to 50%</td>
<td>Portion control through food measurement is important. Cats with a body condition score of 7 or higher should eat the lowest fat, highest protein food possible. Weigh cats and adjust food every 30 days.</td>
</tr>
<tr>
<td>Normal (indoor, neutered with body condition score of 5 or 6)</td>
<td>30% to 50%</td>
<td>10% to 30%</td>
<td>20% to 55%</td>
<td>Select calorie density appropriate to needs. Maintain weight through portion control. Be sure to reduce intake and caloric density by 20% to 30% after neutering.</td>
</tr>
</tbody>
</table>

* Nutrients expressed as % of dry matter.