



# Multimodal Management of Feline Obesity

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## KEY POINTS

- A feeding program that supports typical feline behavioral ingestion patterns maximizes the cat's welfare and creates opportunities to expend energy and minimize excessive caloric consumption.
- For preventing and managing obesity, it's more important to focus on calories than carbohydrates.
- Free-choice feeding increases the risk of obesity and is not appropriate for most cats.
- Because low-carbohydrate dry foods are very caloric-dense, they are not ideal for managing obesity.

Managing obesity involves decreased caloric intake and increased energy expenditure via play or exercise (**Figure 1**). While this recommendation is scientifically valid and seems simple, in reality it is difficult for cat owners to implement in the home setting. Even compliant owners may abandon the treatment plan when cats on calorically restricted diets awaken them at 3 a.m. for a snack. And exercising a cat is fundamentally different than a person or a dog, which mostly involves endurance, making it difficult for cat owners to implement. This article focuses on a multimodal approach, including an individually tailored enrichment program that is simple for owners to implement, along with practical feeding guidelines to minimize excessive caloric consumption.

## LIFESTYLE FACTORS THAT CONTRIBUTE TO OBESITY

Highly palatable commercial foods, especially dry foods with relatively increased carbohydrate intake, have been suggested as the cause for the current epidemic of feline obesity; however, it is likely that a combination of factors is responsible, including changes in the lifestyles of people and their pets (**Figure 2**). In contrast to intact, free roaming and "working" cats of the past, most cats today are family pets that live indoors and are spayed or neutered, less physically active and are fed commercial food. Human occupants of cats' homes also have different lifestyles, resulting in selection of foods that are convenient for the owner. Most people prefer to feed dry food and often it is fed free choice. Free-choice feeding (whether canned or dry) is associated with excessive caloric intake and increased



**Figure 1** – Increased physical activity can improve the welfare of cats and help burn calories. As preferred associates (e.g., related individuals or littermates), these cats are more likely to engage in behaviors (allogrooming, allorubbing and play) that increase activity level.



**Figure 2** – Most cats today are physically inactive, and their primary function is to keep a small square of carpet (or furniture) warm while waiting for their human to return home. This sedentary lifestyle, along with other factors, has contributed to the epidemic of feline obesity.

body weight/fat in cats.<sup>1-12</sup> In addition, changes that occur after spaying or neutering of cats (i.e., decreased metabolic rate and physical activity, increased food intake) contribute to weight gain and increased body fat. In one study, caloric intake increased by 25% within four weeks of gonadectomy and by 50% within three months.<sup>1</sup>

## FEEDING ENRICHMENT

At first glance this may seem contradictory — why enrich feeding in overweight cats? The answer is that by creating a feeding program that recognizes and embraces typical feline behavioral ingestion patterns, we will maximize the cat’s welfare, create opportunities to expend energy, and minimize excessive caloric consumption.

### Normal Feeding Patterns in Feral Cats

Feral cats eat 10 to 20 small meals throughout the day and night. These meals consist of small prey (rodents/birds/reptiles and insects) that require active hunting to secure the prey. Cats tend to avoid hunting and eating near other cats; it is a solitary endeavor. Not all hunting excursions are successful, and while gender, prey size, prey density and weather can all play a role in hunting “success,” it is estimated that less than 50% of hunting expeditions are successful. So, a wild cat will capture and consume multiple small meals alone throughout the day and night.<sup>13</sup>

### Feeding Patterns in House Cats

In contrast to the wild cat, our household cats tend to be fed a commercial dry pet food either ad libitum (free choice) or in two to three meals daily. About two-thirds of owners supplement the dry food diet with some moist (canned) food; however, very few owners feed moist (canned) food exclusively. Some cats that are fed on a meal basis consume the food rapidly. It is hypothesized that food palatability and the presence of other cats influences this consumption pattern. Some cats that are meal-fed do not consume the food immediately and instead snack throughout the day, mimicking the more normal feline feeding patterns. Cats fed ad libitum tend to eat multiple small meals throughout the day and night, mimicking the feeding patterns of wild cats. But since these cats are not required to hunt to acquire the food and the food is often highly palatable, they are likely to consume more calories than they expend.

### Feeding Enrichment Interventions

Creating feeding enrichment that is attractive to the owner and the pet is critical. If either party finds it too cumbersome or unpleasant, the protocol will fail. There is no single solution for every cat or household; feeding enrichment needs to be custom tailored to each situation. We know that many people and cats don’t fare well in the

all-you-can-eat buffet line. Case in point: the average weight gain for passengers on a weeklong cruise with seemingly endless buffet options is eight pounds. In the face of a highly palatable food, cats are likely to indulge in more calories than is necessary, setting them up for weight gain. So the options include portion control or making the energy expenditure to get the food counter the calories consumed, or both. The following suggestions for feeding enrichment should be considered.

### “Will Work for Food”

For cats, It has been established that prey capture, killing, and consumption are independent of each other and the first two activities are not necessarily related to hunger.<sup>14</sup> So cats are compelled to hunt, even when they are not hungry (**Figure 3**). Just watch a cat in a room with a moth and one can appreciate their instinctual predatory patterns. We can capitalize on this natural tendency to hunt in our feeding regimens, both to expend calories and mitigate rapid food consumption.



**Figure 3** – *This cat has just caught and killed a mouse but is not consuming it. Cats are compelled to hunt, even when they are not hungry. We can capitalize on this natural tendency to hunt by using puzzle toys to have cats “hunt” for their food.*

There are several food puzzle toys (premier.com, multivet.net) designed for delivery of dry food; varying styles may appeal to cats with different personalities and hunting preferences (**Video 1**). A study that examined willingness to engage in manipulation of a food puzzle toy when food was offered, both in the puzzle toy and a bowl, found that cats first finished the food in the bowl and only when that food was consumed would some of the cats manipulate the puzzle toy to gain additional food.<sup>15</sup> So, if incorporating

food puzzle toys, it should be the only delivery method for dry food. Every kitten owner should be encouraged to deliver dry food via food puzzle toys. Many toys allow for adjustments to accommodate different kibble sizes and increasing proficiency by the cat. In cats that are maintaining a desirable body weight, these can be ad libitum delivery methods — fill up the puzzle toys a couple of times a day. For cats that need caloric restriction; however, the amount of cat food can be measured. For owners who do not want to use puzzle toys, consider a food treasure hunt (hide little allocations of food throughout the home, including on elevated perches), a food toss (toss kibble across the room) or use of a timed automatic feeder.

### “A Table For One, Please”

The impact of social interactions, between household cats, on food intake has not been rigorously studied. We know that cats do not appear to experience the same social facilitation that occurs with dogs or other group hunters/eaters. For cats, the stress of having other cats within sight when they are eating may be an issue (**Figure 4**). Keep in mind that lack of overt aggression does not equal comfort/happiness. While exceptions have been noted, primarily with related cats, most cats hunt and eat alone. Setting up a food delivery scenario that allows for privacy when eating may be beneficial for house cats. If using puzzle toys to deliver dry kibble, this can be achieved by placing multiple puzzle toys throughout the home environment. If feeding a moist or dry meal, use varying vertical perches, visual barriers or segregation to achieve privacy.



**Figure 4** - These cats are fed *ad libitum*, which increases the risk of obesity. Another potential problem with this feeding scenario is that all the available food is clustered in one location. Suggestions for improvement included using puzzle toys for feeding and creating multiple feeding stations throughout the home.



#### Play Video

**Video 1** – These cats enjoy playing with puzzle food toys (Egg-Cercizer® and Funkitty Twist n’ Treat Teaser®, Premier Pet Products®). This is a great way to enrich feeding and allow cats to express their natural preferences.

## ACTIVITY ENRICHMENT

### Normal Activity Patterns in Cats

Providing all requirements without any physical or emotional challenge to the cat is not ideal. Instead, the goal should be a combination of security, complexity, the ability to control (achieve objectives), and novelty to help achieve an enriched and active environment.<sup>16</sup>

### Play Periods

Playtime should be scheduled daily when the cat is active and alert. Since cats tend to be most active at dawn and dusk, and since most owners are home at those hours, these may make good play periods for the majority of cats. Cats tend to expend energy in short bursts, with high levels of activity. Therefore, when engaging with a cat, think sprinter, not marathoner. The timing of play and the rotation of toys may impact interest in the games. One study found that rotating toys during a play session sparked a renewed interest in play.<sup>17</sup> Short breaks (5 minutes) between toys seemed to enhance play with a second item, while prolonged intervals (25-45 minutes) resulted in decreased interest in a second toy. A good model for a cat play period may be commercial breaks during an evening television show. Every 5-7 minutes there is a 2-3 minute commercial break — so recommend tossing a new toy during every commercial break!

## Toys

Games and toys should capitalize on the cat's innate predatory drive. As solitary hunters, cats have developed acute sensory abilities to detect prey, avoid danger, and capture/consume their prey. These abilities extend into every sense. Cats have great visual ability in low light settings that allow them to hunt effectively, auditory abilities that allow them to hear high frequency sounds emitted by their target prey, a superior sense of smell and an incredible tactile system that includes guard hairs and whiskers. Activities and toys that target multiple senses may be the most successful. Consider a piece of paper that is sprayed with commercial catnip (olfactory), then is scrunched (auditory), and tossed across the room over pillows on the sofa (visual); the cat gets to dart after it (musculoskeletal) and make the "catch" (tactile) (**Video 2**).

## Three-Dimensional Space

It has been documented in several species that increasing housing space alone did not change levels of activity.<sup>18,19</sup> Making the space variable, entertaining and multi-dimensional, however, increases the quality of the space and activity levels. Cats in laboratory settings tend to select elevated perches over the bottom of the kennel and cats prefer upholstered perches over slick surfaced perches, regardless of their height. Other studies show that they prefer resting places that are warm, dry, protected on two sides and situated in the corner or edge of an enclosure where they can watch without the possibility of being approached from behind.<sup>20,21</sup> Every household should provide plenty of cat-friendly perches (**Figure 5**).

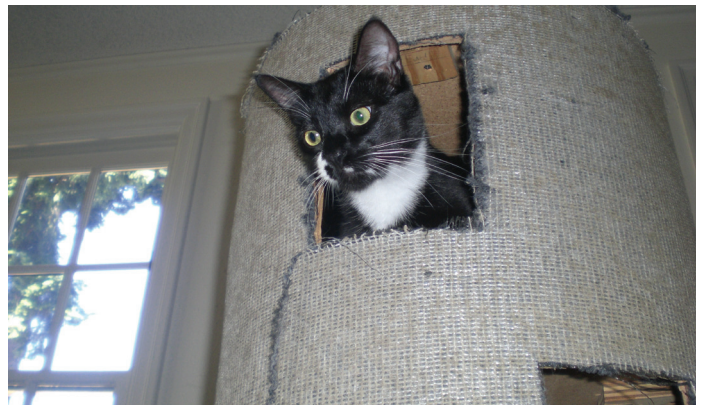
## Outdoor Enclosures/Leashed Walks

There are ways to provide the outdoor world to an indoor cat — namely, secure enclosures or leashed walks. There are specialty products to cat-proof yards (catfencein.com, purrfectfence.com) or owners can build enclosures using chicken wire or other fencing materials. If leash walking, the cat should first be acclimated to a well-fitting harness and leash indoors, before venturing outside.



**Play Video**

**Video 2** – *Toys don't have to be expensive, this cat enjoys playing with a paper ball ... until the dog ends the game!*



**Figure 5** – *Providing three-dimensional spaces, like this elevated perch, has been shown to enhance activity levels in cats. Energy expended accessing three dimensional spaces helps burn calories.*

## NUTRITIONAL MANAGEMENT OF OBESITY

In addition to feeding and activity enrichment, the other half of managing obesity involves making specific nutritional recommendations for every pet at every visit. These should begin at the first kitten visit and be consistently reinforced at every wellness examination. Maintaining ideal body condition is a challenge for many cats (and their owners) and it can be greatly facilitated by the help and encouragement of the entire healthcare team.

## Preventing Obesity

When it comes to obesity, an ounce of prevention is worth several pounds (or kilograms) of cure. Along with implementing feeding and activity enrichment, consider the following nutritional recommendations:

- Caloric intake should be decreased by 25-30% after a cat is spayed or neutered. This may need to be adjusted based on the cat's age and whether adult body size has been achieved (i.e., cat is no longer growing).
- Recommend against free-choice feeding dry food. This will be a challenge for many owners, so be prepared to offer alternative solutions. One option is to meal-feed dry food by dividing the daily amount into three meals and offering it in the morning, early evening (when returning home), and immediately before bedtime (to avoid being awakened at 3 a.m. by a "hungry" cat).
- Do not feed high protein/low carbohydrate dry foods free choice; they are calorie-dense (500-600 kcal/cup) and only a small amount is needed per day (< ½ cup per day for a lean 10-lb. or 4.5-kg cat). Most owners will find it extremely difficult to feed such a small amount of food to their cat.
- If owners insist on feeding dry food free choice, consider a food that contains relatively fewer calories per cup (**Table 1**). This will not be appropriate for many cats, as they will simply eat a larger amount of food. For these cats, consider alternatives like moist food, feeding enrichment (e.g., puzzle toys) (**Figure 6**), and activity enrichment.



**Figure 6** – A cardboard egg carton can be turned into a food puzzle toy by cutting off the top and putting food into the pockets (left hand side) or make it more challenging by keeping the lid on and cutting out access openings to the food inside (right hand side).

A pilot study of obese cats revealed that environmental enrichment resulted in significantly more activity compared with cats in a control group, and owners of cats with the enriched environment expressed greater satisfaction with obesity therapy.<sup>22</sup>

- If acceptable to owners, recommend moist food to help prevent weight gain. Advantages of moist food are that it is typically meal-fed and begging behavior may be decreased in some cats. It's unknown if decreased begging is due to differences in nutrients (fat, water, carbohydrates, protein), mouth feel, degree of interaction with owners, some other

**Table 1.** Nutrient Information for Selected Dry Cat Foods

Company/Brand/Product	Kcal/kg*	Kcal/cup**	Protein (g/100 kcal)	Carbs (g/100 kcal)
EVO® Turkey and Chicken Formula	4420	602	11.4	1.5
Purina® Veterinary Diets® DM Dietetic Management®	4118	592	12.9	3.4
Hill's® Prescription Diet® m/d® Feline Weight Loss-Low Carbohydrate-Diabetic	3960	495	12.2	3.5
Purina® Pro Plan® Weight Management Formula	3979	445	11.8	6.6
Purina® Cat Chow® Complete Formula	3873	412	9	8.9
Purina® Veterinary Diets® OM Overweight Management®	3240	321	16.6	6.5
Hill's® Science Diet® Adult Light	3206	316	10	12
Hill's® Science Diet® Adult Hairball Control Light	3248	283	10.2	11.6
Hill's® Prescription Diet® w/d® Feline Low Fat-Diabetic-Gastrointestinal	3187	281	11.5	10.2
Hill's® Prescription Diet® r/d® Weight Loss-Low Calorie with Chicken	3054	266	11.2	9.6

\*Caloric density in kcal/kg of food (as fed)

\*\*8 oz (250 ml) cup

reason, or a combination of factors. While moist food may be helpful for weight maintenance, keep in mind that it may increase risk of other diseases (e.g., dental plaque, hyperthyroidism).

- When changing from dry to moist food, it's very important to recommend gradual transition. This means a minimum of four weeks; some cats need longer (several months). Most cats are accustomed to eating dry food and often will refuse moist food, particularly when it is offered suddenly. One option is to gradually offer more of the new food and less of the old food over a four-week period. Alternately, consider using a two-pan approach when transitioning cats to a new food. Place the new food and the old food in side-by-side dishes and gradually decrease the amount of old food while increasing the amount of new food over time. This technique assists with gradual transition and also allows cats to express their preferences. For more information see The Indoor Pet Initiative website ([indoorpet.osu.edu](http://indoorpet.osu.edu)).
- Do not assume that different weight management foods contain similar amounts of calories – they do not. To accurately determine how much to feed, consult product information guides from pet food companies, or call the company to ask for the amount of calories (per cup or can) in the foods you recommend. Remember also that pet food companies recommend a range of amounts to feed as a starting point; however, individual cats may require more or less.
- Regardless of which recommendations you make, it's important to tailor a protocol to each individual cat with consideration of their environment and preferences, as well as the preferences and abilities of the humans taking care of them.

## Selecting Foods for Overweight/Obese Cats

Nutritional management of overweight or obese cats most often involves feeding either a low-fat/high-fiber food or a low-carbohydrate/high-protein food. Both approaches result in successful weight loss and selection of a weight management food often is based on personal preference and individual patient factors.<sup>23-30</sup> In a study of overweight cats with similar energy intake, they lost weight at the same rate whether they were fed a high protein (13 g/100 kcal)/low carbohydrate (3.4 g/100 kcal) food or a high-carbohydrate (11.8 g /100 kcal) food with less protein (10.4 g/100 kcal).<sup>6</sup> In another study, cats offered dry food free choice after neutering had significantly greater food intake and body weight gain when fed high-protein (11 g/100 kcal) vs. lower protein (7.8 g/100 kcal).<sup>11</sup> And a recent study confirmed that while energy expenditure was greater in overweight cats fed a high protein food (47% calories as protein) free choice, their energy consumption was significantly greater than cats eating a moderate protein food (27% calories as protein).<sup>31</sup> As mentioned previously, one disadvantage of high protein/low carbohydrate foods is that they are calorie-dense and the volume of dry food needed is significantly less than other dry foods.

It's been suggested that overweight or obese cats be fed > 45% protein as calories (or 11.2 g/100 kcal);<sup>32</sup> however, a range of dietary protein amounts (7.7 to 13.6 g/100 kcal) has been associated with successful weight loss and maintenance of lean body mass in cats.<sup>24-26, 28, 33</sup> The bottom line is that a single cut-off for dietary protein amount is not supported by currently published evidence and treatment should be individualized for each patient to ensure effective weight loss and maintenance of lean body mass regardless of the food chosen (**Table 2**). Other helpful strategies include feeding high-quality protein and including L-carnitine to help burn fat and maintain lean muscle during weight loss in cats.



**Table 2.** Nutrients (per 100 kcal) in Selected Therapeutic Feline Weight Management Foods

Company/Brand/Product	Form	Kcal*	Pro g	Carb g	Fat g	Fiber** g	Carn mg
Hill's® Prescription Diet® m/d® Feline Weight Loss-Low Carbohydrate-Diabetic	can	156	13.1	3.9	4.8	1.5	13
Hill's® Prescription Diet® m/d® Feline Weight Loss-Low Carbohydrate Diabetic	dry	495	12.2	3.5	5.2	1.4	13.1
Hill's® Prescription Diet® r/d® Feline Weight Loss-Low Calorie with Liver & Chicken	can	114	12.3	10.2	3	5	16.8
Hill's® Prescription Diet® r/d® Feline Weight Loss-Low Calorie with Chicken	dry	266	11.2	9.6	2.9	4.1	16.6
Hill's® Prescription Diet® w/d® Feline Low Fat-Diabetic-Gastrointestinal with Chicken	can	127	11.5	7.6	4.8	3.1	15
Hill's® Prescription Diet® w/d® Feline Low Fat-Diabetic-Gastrointestinal with Chicken	dry	278	11.5	10.2	2.9	2.2	14.4
Purina® Veterinary Diets® DM Dietetic Management®	can	188	9.8	1.4	7.1	0.7	NR
Purina® Veterinary Diets® DM Dietetic Management®	dry	592	12.9	3.4	4	0.3	NR
Purina® Veterinary Diets® OM Overweight Management®	can	118	13	4.1	4.7	3.9	NR
Purina® Veterinary Diets® OM Overweight Management®	dry	321	16.6	6.5	2.5	1.8	NR
Royal Canin Veterinary Diet® Calorie Control CC™ High Protein	can 6 oz	114	12.9	3	4.6	0.8	NR
Royal Canin Veterinary Diet® Calorie Control CC™ High Protein	can 3 oz	53	12.8	7.2	2.8	0.7	NR
Royal Canin Veterinary Diet® Calorie Control CC™ High Protein	dry	235	11.6	8.4	2.7	1.1	NR
Royal Canin Veterinary Diet® Calorie Control CC™ High Fiber	can	141	9	8.2	4.7	2	NR
Royal Canin Veterinary Diet® Calorie Control CC™ High Fiber	dry	251	10.4	10.6	3.1	4.3	NR
Iams® Veterinary Formula Weight Loss <i>Restricted-Calorie</i> ™ Feline	can	172	10.2	7.5	2.5	0.4	1
Iams® Veterinary Formula Weight Loss <i>Restricted-Calorie</i> ™ Feline	dry	268	9.5	12	3	0.7	2.3
Iams® Veterinary Formula Weight Control D <i>Optimum Weight Control</i>	dry	252	10.2	10.9	3.2	0.4	2.3

Pro = protein; Carb = carbohydrates; Carn = L-carnitine; NR = not reported

\*Per can or 8 oz. (250 ml) cup of dry food.

\*\*Crude Fiber

## SUMMARY

To increase the chance of a successful outcome, prevention and management of obesity in cats should include a multimodal approach. Implementing feeding enrichment activities allows cats to express their natural preferences, which may be associated with decreased caloric intake. Activity enrichment also helps by providing opportunities to burn calories. When making nutritional recommendations, consider lifestyle factors that contribute to obesity. Recommend against free-choice feeding, especially in cats that are spayed or neutered. Advantages of moist food include decreased caloric density (because of dilution of calories by water), less likely to be fed free choice, increased interaction between the cat and owner, and possibly less begging behavior from cats. Once obesity occurs, a variety of approaches (e.g., high fiber/low fat, high protein/low carbohydrate) may result in effective weight loss with maintenance of lean body mass. Some cats may respond better to one approach vs. another so weight management programs should be tailored to the individual with consideration of both owner and patient factors.



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