Learning Objectives

After completing this module, your basic understanding should include:

- An appreciation for the importance of proper nutritional assessment.
- Your ability, along with your team to conduct a thorough nutritional assessment.
- Realizing how critical regular nutritional assessments are, even for so called healthy pets.
Introduction

The general public is becoming increasingly aware of the growing association of food with conditions such as heart disease, high blood pressure, obesity, diabetes, and cancer. More and more pet owners are realizing that proper pet nutrition is extremely important in maximizing health, performance, longevity, and disease prevention. They also want recommendations about what is best to feed their pet and will appreciate your nutritional assessment.

Hill’s as part of the Practice HealthSM initiative, surveyed over 900 “ideal” clients to determine their wants, needs, and expectations. This study revealed some very interesting insights about how these ideal clients view nutrition for their pets. Of the clients surveyed, 94% felt that nutritional counseling from their veterinarian is important; 53% of this group said nutritional counseling was critically important (Figure 1). Sixty percent of the clients surveyed also believed their veterinarian’s recommendation of a pet food was important (Figure 2). Without question, veterinarians and their health care teams can strongly influence nutrition choices. And they should, with conviction!

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**Client Insights: How Important Is Nutrition Counseling?**

- 42% SOMETHING
- 31% IMPORTANT
- 18% CRITICALLY
- 6% NOT AT ALL
- 3% NOT VERY

**How Important Is a Veterinarian’s Recommendation on the Choice of Pet Food?**

- 53% SOMETHING
- 27% IMPORTANT
- 15% CRITICALLY
- 4% NOT AT ALL
- 6% NOT VERY

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*KEY UNDERSTANDING*

You need to (confidently and competently) be an advocate for the pet’s best interest!
The Two-Step Nutritional Assessment Process

Figure 3 depicts the two-step process of nutritional assessment. The top circle depicts the first step; it involves assessment of the patient, the food, and the feeding method. The bottom circle depicts the second step; it involves development of a feeding plan and includes recommendations for food and feeding methods.

Periodically (the length of which depends on the condition of the patient), the two-step process is repeated to determine the appropriateness or effectiveness of the new feeding plan. Thus, the patient is reassessed and, if its status has changed, a new feeding plan is implemented. The two-step process can be repeated any number of times, depending on the needs of each patient. A critically ill patient may need to be reassessed every few hours, whereas a normal adult dog or cat may be reassessed only 2-4 times a year.

Figure 3. Cats are becoming a more important part of the family.

KEY UNDERSTANDING

The arrows in Figure 3 indicate that nutritional assessment should continue for the life of the pet.
When you consider all the diseases for which proper nutrition helps prevent, aids in recovery or long-term management and all the nutritional risk factors that pets encounter, it’s obvious that all pets need nutritional assessment each time they are seen at your practice. For example, a certain percentage of pets you see are at varying degrees of risk for one or more of these conditions: Anemia, trauma or surgery, cancer, lower urinary tract disease, kidney failure, heart disease and failure (including heartworm disease), poor oral health, dermatological problems, obesity prevention and treatment, skeletal disease especially in puppies, and gastrointestinal disease. Combined, these conditions and their prevention make up much of small animal practice. It is important not to overlook so-called “well” pets though. Just because they appear “healthy” doesn’t mean they wouldn’t benefit being on a better plane of nutrition. Remember, as veterinary health care team members, we’re worried about the inside of the pet, not just outward appearances.

The Two-Step Nutritional Assessment Process

Remember, nutritional deficiencies and excesses usually take a period of time to manifest themselves.
The Two-Step Nutritional Assessment Process

In well pets, the nutritional assessment process identifies pets at risk for conditions such as obesity, renal disease and some forms of oral disease, which may be avoided or minimized with proper nutrition. Puppies, for example, should be evaluated for appropriate nutrition every two to three weeks. The amount of food and the feeding method and how long the food is left with the puppy and may need to be changed based on body condition score (see below). As a pet ages, risk factors increase. Ovariohysterectomy/castration (spaying/neutering), increasing age, decreasing activity level, etc. are risk factors for obesity. Assessing the pet, assessing the food, implementing a plan in which the nutrients and energy in the food are matched to the patient, and monitoring (follow-up) can help avoid obesity, and perhaps other conditions. The cycle described in Figure 3 should be completed each time a well patient is seen. Nutritional assessment of pets with medical conditions helps uncover modifications that need to be made, the effects of medications on nutrients, and vice versa. As you saw in I.2 Feeding Dogs and I.3 Feeding Cats, it is important to take such assessments seriously.

Figure 4. An obese dog and cat, each with a Body Condition Score of 5/5.
Assess The Pet

The goal of patient nutritional assessment is to establish the pet’s nutrient needs and feeding protocol in wellness or disease. The veterinary health care team needs to ensure that a thorough pet history is obtained, along with the veterinarian’s complete physical examination emphasizing body systems. Proper interpretation of these data leads to a logical diagnostic workup by the veterinarian and correct therapeutic and nutritional plans. Figure 5 describes screening protocols for all patients and more in-depth assessment protocols for patients that need a more thorough workup. The elements of assessing the patient include:

- Reviewing the medical records.
- Interviewing the client, including obtaining a dietary history (“What are you currently feeding?” “What treats do you feed?” Who in the family feeds the pet?”).
- Examining the patient, emphasizing a body systems approach and body condition scoring.
- Obtaining anthropometric (zoometric) measurements (See below).
- Reviewing laboratory and other diagnostic data.
- Estimating target levels for the key nutritional factors based on the patient’s medical diagnosis or state of wellness (See below)

Involvement in nutritional assessment should be under the supervision of a veterinarian.
Assess The Pet

Review of the medical record provides objective historical information and documents the pet’s previous health status, health maintenance procedures that were performed, and medications and foods that were prescribed. This information should be evaluated to determine if any of these factors are related to the pet’s current nutritional status. This review permits early nutritional intervention in the treatment of established malnutrition (under- or overnutrition) and in the prevention of malnutrition in individuals at risk.

Medical records provide valuable information about the pet’s weight over time. In general, dogs and cats should weigh no more in later years than they did during their first full year of maturity. Medical records also provide clues about risk factors, such as age, breed, gender, neuter status, environment (exposure to other pets, type of shelter, etc.), and medical/surgical problems (adverse reaction to food/drug reactions), etc.

Figure 6. Veterinary medical records provide valuable information about the chronology of a pet’s weight gain or loss.
Assess The Pet

Taking an accurate history is among the most useful and rewarding data collection procedures. Even when there is no problem or primary complaint, clients should be questioned carefully using a body system approach. A complete history should also include questions about the pet’s weight and medical, surgical and other therapies that may affect appetite, nutrient metabolism, or both. An accurate description of the current feeding plan, including the pet’s food, eating and drinking habits, and feeding methods, should be obtained from the client. Carefully detail all dietary facts, including the type and brand of food, snacks/treats/table food, nutritional supplements, amounts fed each day, feeding method (e.g., free choice, meal feeding, etc.).
A thorough physical examination by the veterinarian can help define a pet’s nutritional status as well as identify diseases that may have a nutritional component. The physical examination should take the same form as the history taking: body system by body system. Table 1 lists some of the more common findings that may indicate a nutritional problem.

### Table 1. Indicators of Good and poor Nutritional Status.*

<table>
<thead>
<tr>
<th>Body Area/System</th>
<th>Good Nutrition</th>
<th>Poor Nutrition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Alert, responsive to environment</td>
<td>Listless, apathetic, cachexia</td>
</tr>
<tr>
<td>Coat</td>
<td>Shiny</td>
<td>Dull, hair easily lost, greasy, scales</td>
</tr>
<tr>
<td>Oral cavity</td>
<td>Pink mucous membranes, no swelling or bleeding, no gum disease</td>
<td>Pale mucous membranes, red mucous membranes, gums that bleed easily, exposed tooth roots, loss of teeth</td>
</tr>
<tr>
<td>Eyes</td>
<td>Clear, pink membranes no discharges, no prominent blood vessels</td>
<td>Pale membranes, dry eyes, discharges, red membranes, prominent blood vessels</td>
</tr>
<tr>
<td>Ears</td>
<td>Clean, no discharge</td>
<td>Discharges, excessive scratching</td>
</tr>
<tr>
<td>Abdomen</td>
<td>Concave</td>
<td>Swollen</td>
</tr>
<tr>
<td>Muscles</td>
<td>Firm</td>
<td>Flaccid, sore</td>
</tr>
<tr>
<td>Skeleton</td>
<td>No abnormalities</td>
<td>Conformation problems, early arthritic changes, lameness</td>
</tr>
<tr>
<td>Gastrointestinal function</td>
<td>Normal appetite, normal stools</td>
<td>Anorexia, vomiting, diarrhea</td>
</tr>
</tbody>
</table>

*Other medical conditions that cause these changes should be ruled out first.
Body condition can be subjectively assessed by a process called Body Condition Scoring (BCS). In general, this process assesses a patient’s fat stores and, to a lesser extent, muscle mass. Fat cover is evaluated over the ribs, down the topline, around the tailhead and ventrally along the abdomen.

*Figure 7. Canine Body Condition Scoring.*

*Figure 8. Feline Body Condition Scoring.*
Here’s how to use body condition (BCS) scoring. For dogs and cats always determine the amount of fat covering the ribs. Feel the areas between ribs to get the most information. Palpate the tailbase in dogs (area in front and to the sides of where the tail attaches to the body) and the areas over the backbone and hipbones in cats for more information. Then, review the profile of the abdomen from the side and top. Dogs and cats, when viewed from the side should have a concave waist (also called tuck). Dogs should have an hourglass figure when viewed from the top. Assess the amount of fat in the abdominal fat pad (also called apron) along the bottom of a cat’s stomach.

The ribs of overweight cats and dogs are difficult to feel because they are covered with fat. Overweight dogs have a smooth-to-thickened tailbase and it’s difficult to palpate bones. The back of obese dogs may be markedly wider than usual and the spine may appear in a depression. Overweight dogs and cats have little or no abdominal waist. Cats with body scores of 4 and 5 have moderate to marked fat deposits along the abdominal wall.

Body condition scoring should be incorporated into the physical examination of each patient each time it is seen. The goal is to determine if a patient needs to gain or lose weight or if it is at ideal weight. A five-point system can be used for dogs and cats.

- Body condition score of 1 = Very thin
- Body condition score of 2 = Underweight
- Body condition score of 3 = Ideal
- Body condition score of 4 = Overweight
- Body condition score of 5 = Obese.
Anthropometry is the science that deals with body measurements, such as height, weight, and proportions. It is used to assess body fat and protein stores. For example, in people, triceps skinfold and arm circumference are measured and recorded. Zoometrics is an equivalent animal term. Body weight is the most common technique used in small animal practice. Weight over time coupled with body scoring techniques (palpation) is very useful for estimating fat and protein stores in pets.

You may apply what you’ve learned about body scoring and zoometrics in weight-loss programs for pets. For example, you might use a tape measure to measure the circumference of a dog’s abdomen (pelvic circumference) immediately in front of its back legs, in the flank area. Because dogs on an effective weight-loss program will lose lumbar (back) fat as they lose weight the circumference should decrease. Like decreasing body weight, a decreasing abdominal circumference measurement helps convince clients they are doing a good job with a weight-loss program for their pet.

Figure 9. Measuring abdominal (pelvic) circumference.
Laboratory and other diagnostic tests may be used as part of the nutritional assessment process, if the history and physical examination suggest a more in-depth workup. No single laboratory test or other diagnostic procedure can accurately assess a patient’s nutritional status. Routine complete blood counts, urinalyses and biochemistry profiles however, can provide insight into the presence of metabolic disorders and other diseases. Low serum protein values (e.g., liver and kidney disease), elevated glucose values (e.g., diabetes), elevated lipid levels (e.g., hyperlipidemia), decreased packed cell volume (e.g., anemia), inability to concentrate urine (e.g., kidney disease), and abnormal radiographs (e.g., skeletal diseases of growing puppies and kittens) are just a few of the disorders for which diagnostic assessment is useful.
Determining the key nutrients of concern and their target levels is fundamental to the practical application of nutrition. The Association of American Feed Control Officials (AAFCO) publishes recommended nutrient profiles for dog and cat foods. These nutrient profiles are the official source for nutrient information for dog and cat foods in the United States.

The values published by AAFCO are deemed adequate to meet the known nutrient needs of healthy dogs and cats. Besides recommendations for lower limits, AAFCO lists upper limits for certain nutrients with the obvious implication that some nutrient excesses can be harmful.

The concept of key nutritional factors greatly simplifies the approach to nutrition because most commercial pet foods sold in the United States provide at least AAFCO allowances of all nutrients. Thus, if a commercial food is fed, veterinarians and their health care teams need to understand and focus on delivering the target levels for a few nutrients (key nutritional factors or nutrients of concern) rather than all nutrients currently recognized for dogs and cats. Minimizing excesses is of primary concern.

The nutrients often of greatest concern are water, protein, fat, carbohydrate, calcium, phosphorus, fiber, and magnesium.
Assess The Pet

Key nutritional factors encompass nutritional risk factors for disease treatment and prevention but also nutrients that are key to optimizing normal body processes such as growth, gestation, lactation, and work. The following points should be considered in determining key nutritional factors and their target levels:

- The patient’s lifestage and physiologic state
- Environmental factors such as temperature, housing, and pet-to-pet competition
- The nature of any disease or injury
- The known losses of nutrients through skin, urine, and intestinal tract
- The interactions of medications and nutrients, if applicable
- The known capacity of the body to store certain nutrients
- The interrelationships of various nutrients.

Besides nutrients, other food characteristics may be important to consider. These characteristics might include such things as the food’s influence on urinary pH, the food’s texture, and the food’s protein sources.

The primary goal of patient nutritional assessment is to establish the patient’s nutrient needs, especially for the key nutritional factors.
Assess the Food

The components to food assessment include:

- Physical evaluation of the food
- Evaluation of the pet food label
- Evaluation of the food’s nutrient content relative to the animal’s nutrient needs (key nutritional factors)
- Determination of the presence or absence of specific food characteristics.

Physical evaluation of the food can provide information about package quality, consistency, and presence or absence of extraneous materials such as hair or bone. Physical evaluation of the food is probably most useful for assessing whether or not the food has spoiled.

The ingredient panel of the pet food label provides general information about which ingredients were used and their relative amounts. The ingredients used in the product are listed in descending order by weight. The ingredient panel can be useful if specific ingredients are contraindicated for certain animals or an owner has an ingredient concern. However, the quality of the ingredients cannot be determined from the label and much misinformation exists regarding pet food ingredients. The nutritional adequacy statement of a pet food label will also reveal whether the food has been fed to animals to substantiate label claims. But the real proof is how the food meets the needs of the individual patient. That’s where monitoring and lifelong, repeated nutritional assessments by the veterinary health care team are critical. (For more information, see the Module I.6: Pet Food Labels.)
Commercial pet foods that have undergone AAFCO-prescribed feeding tests provide reasonable assurance of nutrient availability and sufficient palatability to ensure acceptability (i.e., food intake sufficient to meet nutrient needs). Feeding tests also provide some assurance that a product will adequately support certain functions such as gestation, lactation, and growth. It is probably prudent to change to a more appropriate food if there’s a discrepancy between the levels of key nutritional factors in a food and an animal’s needs. Small Animal Clinical Nutrition, 4th ed. contains nutrient profiles for selected commercial foods and treats sold in the United States and Canada (See Appendices L and M, and individual chapters).

Figure 12. Small Animal Clinical Nutrition, 5th ed. Contains authoritative nutritional information
Assess The Feeding Method

How a client feeds a pet is another critical factor in feeding success. There are at least three things to consider regarding feeding methods:

- Feeding route
- Amount fed
- How the food is offered (when, where, by whom, how often).

Feeding route. Whether or not the feeding route is appropriate depends on the pet’s condition. Although most pets are able to feed themselves, orphans and certain critical care patients may require assisted feeding.
Assess The Feeding Method

**Amount fed.** The nutrient needs of a pet are met by a combination of the nutrient levels in the food and the amount of food fed. Even if a food has the appropriate nutrient profile, if too much or too little is consumed, significant over- or undernutrition could result. Thus, it is important to know if the amount being consumed is appropriate.

Figure 13. Syringe-feeding techniques for cat and dog, using Prescription Diet® Canine/Feline a/d®

The amount of food being fed should be determined when the history of the pet is obtained. If the dog or cat in question has a normal body condition score (3/5) with no history of weight changes, it is likely that the amount fed is appropriate.

Figure 14. Additional feeding recommendations on Science Diet® Adult for dogs.
Assess The Feeding Method

How the food is offered. The amount fed is usually offered in one of three ways:

- Free choice feeding (dogs and cats)
- Food-restricted meal feeding (dogs and cats)
- Time-restricted meal feeding (dogs)

**Free-choice feeding** (also referred to as ad libitum or self feeding) occurs when more food than the dog or cat will consume is always available; therefore, the animal can eat as much as it wants, whenever it chooses. With **food-restricted meal-feeding**, the dog or cat is given a specific, but lesser, amount of food than it would eat if the amount fed were not restricted. **Time-restricted meal-feeding** occurs when the pet is given more food than it will consume within a specified period of time, generally 5-15 minutes. Time restricted meal-feeding is of limited usefulness in dogs and has little if any practical application in cats.

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**Figure 15.** The three most common feeding methods for dogs and cats.
Many dogs can eat an entire meal in less than two to three minutes. Both types of meal-feeding are repeated at a specific frequency such as one or more times a day. Some pet owners combine feeding methods, such as free-choice feeding a dry food and meal-feeding a canned food. Canned foods and moistened dry foods left at room temperature for prolonged periods can spoil and are not appropriate for free-choice feeding.

Most clinically normal adult dogs that are not lactating, working, or stressed will have a sufficient appetite, and the physical capacity to consume all the food needed daily in a single 10-minute period (assuming food of typical nutrient density). Cats are less likely to eat their entire meal in one 10-minute sitting, although once a day feeding is adequate for the majority of healthy adults.

### Table 2. Advantages and disadvantages of various feeding methods.

<table>
<thead>
<tr>
<th>Methods</th>
<th>Advantages</th>
<th>Disadvantages</th>
<th>Food forms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free choice</td>
<td>Convenient</td>
<td>Overconsumption leads to weight gain and/or obesity</td>
<td>Dry, Semi moist</td>
</tr>
<tr>
<td></td>
<td>Ensures adequate food availability</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mimics natural feeding behavior</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quieting effect in a kennel</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Less dominant animals have a better chance to get their share</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meal fed*</td>
<td>Enhances human-animal bond</td>
<td>Large meals may result in vomiting</td>
<td>Dry, Semi moist, Canned</td>
</tr>
<tr>
<td></td>
<td>Facilitates monitoring of appetite and food intake</td>
<td>Less convenient</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Enhances control of food intake</td>
<td>Three or more meals are needed for nursing cats and dogs, kittens and puppies</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Early detection of altered appetite</td>
<td>and debilitated animals</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Better control of body weight</td>
<td>Intermediate labor intensive</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Most knowledge required for food dose calculation</td>
<td></td>
</tr>
<tr>
<td>Time-restricted feeding</td>
<td>Intermediate control of food dose</td>
<td>Inaccurate control of food intake</td>
<td>Dry, Semi moist, Canned</td>
</tr>
<tr>
<td></td>
<td>Some monitoring of appetite possible</td>
<td>Risk of obesity similar to free choice</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Most labor intensive</td>
<td></td>
</tr>
<tr>
<td>Combination**</td>
<td>Enhances human-animal bond (vs. free choice)</td>
<td>Poor monitoring of appetite and food intake</td>
<td>Dry, Semi moist, Canned</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Poor control of food intake</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Less convenient than free choice</td>
<td></td>
</tr>
</tbody>
</table>

Source: Small Animal Clinical Nutrition, 4th ed. *One or more individual feedings per day, one to two hour availability per feeding. **Dry foods available free choice, canned foods meal fed one or more times daily.
Determine A Feeding Plan

After the pet, food, and current feeding method have been assessed, a feeding plan is formulated based on nutritional objectives that are realistic and quantifiable. The feeding plan will guide selection of food and feeding method. There are two steps to formulating the feeding plan:

Determine what food to feed
Determine a feeding method.

Click here for Hill’s Key to Clinical Nutrition
Comparing the food’s key nutritional factors to the pet’s needs determines whether nutrient excesses or deficiencies exist. If the pet’s current food is adequate (key nutritional factors in balance with its needs) then the food currently being fed is probably appropriate. If you and your team believe nutrient excesses and/or deficiencies exist, then a food that better meets the pet’s nutrient requirements should be fed.

Changing foods for most healthy dogs and cats is of minor consequence. However, vomiting, diarrhea, belching, and flatulence may be associated with sudden, rapid switching of foods. It is prudent to recommend that owners change their pet’s food over the course of 5-7 days, as they increase the proportion of new food and decrease the proportion of old food (Figure 16). However, nearly all pets tolerate a seven-day transition period.

Instructions: Click on the days below to see the percentage of old and new food to transition.

Figure 16. Percentage change in a transition schedule.
Determine the Feeding Method

As mentioned above, there are several things to consider regarding feeding methods. They include feeding route, amount to feed, and how the amount fed is provided.

The feeding route will depend on the ability of the pet to self-feed. If it cannot self-feed, it will have to have assistance such as syringe or tube feeding.

An estimate of the amount to feed can be obtained from product information such as feeding guidelines from the product label. The amount fed should be adjusted to assure a normal body condition (3/5).

How the food is provided and how often it is provided depends on the pet’s condition and the lifestyle of the owner. Each situation will dictate what method is most desirable in providing the food (free choice, time-restricted meal feeding, or food restricted meal feeding).
Reassessment/Monitoring

The same steps in the screening protocol for patient assessment should be used in monitoring. The health care team should record clinical signs, body weight, body condition score, client compliance, etc. and make any changes necessary to optimize patient care.

Pets with specific conditions, diabetics for example, need monitoring tests, such as urine and blood glucose and ketone evaluations. Pets with multiple medical conditions often require several pharmaceuticals to help manage their conditions. The effects of drugs on nutrient absorption and metabolism and nutrients on drug availability need to be closely monitored.

The entire veterinary health care team needs to be involved in nutritional assessment including monitoring patient progress and client behavioral changes. Your involvement dramatically improves the likelihood of compliance and improved health for your patients. Repeating the nutritional assessment cycle in Figure 17 each time a pet is seen conveys to clients the importance of nutrition and sends consistent messages that avoid confusion.

Figure 17. The two-step nutritional assessment process.
Everyone on the veterinary health care team can contribute to the understanding of each pet’s nutritional assessment. This can be done in a “teamwork” approach where everyone understands his or her role, and the role of others in providing the best advice to the client, care for the pet, and benefits to the practice.

To continue, you will need to complete the quiz for this module. When you are ready, click on the forward arrow below to take you to the quiz.