

Feeding Principles and Pet Food Assessment

ASSIGNMENT 3: FEEDING METHODS AND LIFE-STAGE NUTRITION

Read this assignment. Then, read pages 317–329 in your textbook, *McCurnin’s Clinical Textbook for Veterinary Technicians*.

Nutritional Counseling

Clients look to the veterinary team for pet food recommendations. It’s the veterinary technician that usually educates pet owners on the features and benefits of a recommended food. This is your opportunity to build a bond with the client and provide the knowledge he or she needs. The American Animal Hospital Association completed a study in 2003 showing that 85% of pet owners wanted a recommendation from the veterinarian as to what to feed to their pets. However, it was also found that only 15% felt they received a recommendation. We must ensure we’re giving pet owners counsel on what to feed their pets—or they’ll look elsewhere!

Client counseling is one of the best ways to increase your value in the clinic and justify a salary increase. If your veterinarian will allow you to spend five minutes with each client, you have an opportunity to educate the client on what to feed. Most clients don’t understand the differences in pet foods. By educating the client, you’ll give the client an opportunity to feed a better food, the practice will be successful, and your value within the practice should increase.

Feeding Methods

There are three different ways to feed a companion animal. The client should understand these three feeding methods, and the healthcare team should make a recommendation

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based on the pet, the client, and the type of food. The three methods include portion-controlled (or meal) feeding, time-restricted feeding, and ad-lib (or free) feeding.

Portion-Controlled (Meal) Feeding

Portion-controlled (or meal) feeding requires the owner to measure out a specific amount of food and give it to the pet in a “meal” or a portion at a specified time of day. The pet should consume the food within a few minutes but isn’t required to finish it. The food amount is typically divided into a morning and evening feeding. This method is recommended because it’s aimed at the pet not overeating. This method also is preferred because the client always knows how well the pet is eating each day.

Time-Restricted Feeding

Time-restricted feeding allows the client to feed as much food as the pet will eat in five minutes. How well the pet eats is critical to the pet’s eating enough food to meet its needs. It’s also possible for the pet to overconsume. This method keeps clients informed on how well their pets are eating. Small-breed dogs may not eat enough in the time provided, and large-breed dogs might eat too much. This method is quite variable and isn’t typically the best recommendation for the pet.

Ad-lib (Free) Feeding

Ad-lib (or free) feeding is common as little effort is required and owners like this due to their busy schedules. This method allows the client to place unlimited food in front of the animal, allowing it to eat at its leisure. The pet owner is much less aware of how much their pet consumes. Frequently, large bowls of food are offered to the animal, enabling the pet to eat over the entire day. When being fed with this method, many pets will often consume 15 to 20% more calories than they should and subsequently have difficulty maintaining their weight. Feline owners are known for using this method—more so than canine owners. Ad-lib feeding makes it difficult to

know if and how much the pet is eating. And if the client is feeding multiple cats, then monitoring food intake is even more difficult. This method isn't recommended often—but is implemented too often.

Life-Stage Nutrition

The goals of nutrition are to feed for optimal health, performance, and length of life. *Life-stage nutrition* is feeding a formulated food designed to meet the nutritional needs of the animal depending on its age, lifestyle, and health. It isn't possible to feed a single food that will meet the nutritional needs of an animal for its entire lifetime. Life-stage products are formulated to provide adequate nutrition based on pet age or life stage. These life stages can be classified as follows:

1. Growth or puppy/kitten foods
2. Adult or maintenance foods
3. Senior or geriatric foods

The goal is to provide optimal nutrition and a diet without nutritional excesses that's formulated with the animal's specific life stage in mind. Thus, an animal shouldn't be fed a food designed for a different life stage (don't feed puppies adult foods, for example). In the late 1960s, Dr. Mark Morris, Jr. was the first to formulate canine and feline life-stage wellness foods. For specific nutritional formulation questions, refer to the following.

Wellness Nutrition

Potential Nutritional Risk Factors for Dogs and Cats

Nutrient	Disease
Excessive fat and energy intake	Obesity and developmental orthopedic disease
Excessive calcium intake	Developmental orthopedic disease
Excessive phosphorus intake	Progression of renal disease and hypertension
Excessive protein intake	Progression of renal disease
Excessive magnesium intake	Feline struvite urolithiasis

Canines

Gestation and Lactation

Only healthy dogs in good body condition should be bred. Neither overweight nor underweight female dogs are good candidates for gestation or lactation.

Poor nutrition can negatively affect reproductive performance in bitches. Females undergo large extremes in the need for nutrients when considering the entire reproductive cycle. Pregnancy and lactation need specific nutrients and levels of nutrients. Malnutrition, due to too much or too little nutrients, can affect pregnancy and lactation. Obesity at the end of pregnancy may result in a difficult delivery and may prolong labor thus resulting in low oxygen or low blood sugar to the puppies or kittens.

Body condition before breeding and good nutrition throughout gestation and lactation play a large role in a successful nursing outcome between the bitch and her litter. Throughout the nursing period, nutrient requirements are linked to milk production. Production of milk is dependent upon the number in the litter. The nursing stage has the highest nutrient requirement of any adult life stage and in some instances may be equal to or higher than nutrient requirements for growth.

We need to remind pet owners about the importance of water—in all stages of pregnancy and puppyhood. Water is the first nutrient needed for lactation. Water is needed in large quantities to produce milk. Water requirements in ml are roughly equal to energy requirements in kcal. It's important to put this into perspective—a 35-kg bitch nursing a large litter may require five to six liters of water per day during the nursing stage. Thus, it's important that clean, fresh water be available at all times throughout pregnancy and nursing.

Pregnant dogs have an increased need for energy and other nutrients. During the first two trimesters, portion-controlled feeding is recommended. Ad-lib feeding of a growth food is recommended for the third trimester. The bitch will be unable to consume enough food due to the pressure of the puppies on her gastrointestinal tract (the increasing uterus size limits

the extent of stomach distention); she can't consume enough calories in one sitting to meet her nutritional needs. Pregnant dogs may not be able to eat sufficient food to meet energy requirements if fed once or twice a day. An extra meal per day will help distribute the day's food into manageable portions. Ad-lib feeding is the most appropriate feeding method and should continue through lactation and weaning. The puppies will create a peak in the demand for milk at approximately four weeks of age. The bitch's caloric requirement skyrockets, and food must be available at all times to prevent weight loss and decreased milk production. A pregnant dog's energy intake should increase by approximately 30 to 60% depending on breed, size, number of puppies, and stage of gestation around the fifth week of pregnancy. Overfeeding should be avoided because obese dogs can have trouble with the reproductive process.

We must also remember that giant breeds may find it difficult to eat enough food and maintain their body weight even earlier than the last week of gestation. Enough energy should be provided to the bitch during the early weeks of pregnancy. Pregnancy isn't an ideal time to lose body condition; thus the food should be high in energy density. After whelping, the bitch's energy requirement progressively increases with the highest point being between three and five weeks. This point requires two to four times the energy for non-nursing adults. The energy requirement returns to maintenance levels about eight weeks after whelping.

Most dogs stop eating or reduce their intake approximately 24 hours before whelping. They usually don't start eating again until all puppies have been delivered and cleaned, and are settled down and nursing. This is an important reason to make sure that food intake is appropriate during late gestation, because dogs will be using stored energy for the whelping process and initial lactation. After weaning, the bitch should be transitioned back to an adult maintenance food.

Feeding a carbohydrate-free food to pregnant bitches isn't recommended as it potentially may result in weight loss, decreased food intake, reduced puppy birth weight, and stillbirth. Additionally, feeding a carbohydrate-free food to pregnant bitches increases the risk of hypoglycemia and

ketosis during late pregnancy. It's recommended that foods for lactation provide at least 10 to 20% of the energy intake in the form of digestible carbohydrate to support normal lactose production and at least 23% DM digestible carbohydrate.

The nutritional requirements for lactating dogs depend on the age of the puppies and the size of the litter. For adequate milk production, an increase in dietary energy, protein, fat, and minerals is necessary (similar to late gestation and growth). However, nursing a large litter causes extreme physiologic stress, and large quantities of energy-dense diets are appropriate. Although carbohydrate deficiency in general hasn't been reported in canine diets, during reproduction and lactation, carbohydrates are considered conditionally essential. Dry or canned diets formulated for growth or reproduction (or for all life stages) may be offered. To ensure adequate intake, free-choice feeding is best in most cases, or a minimum of three meals per day. Nursing mothers can be nervous, especially if this is the first litter, and may refuse to eat if stress, noise, or human activities surround the puppies. Malnutrition before and during gestation may cause an increase in neonatal mortality. Use body condition scoring to determine whether the bitch is receiving enough calories or if the amount should be increased.

The first week after delivery, the daily energy intake should be 25 to 50% higher than maintenance, and by week four or five of lactation, energy needs may be 100 to 200% higher. Estimating meal size and appropriate daily amounts is difficult at this time, which is why free-choice (ad libitum) feeding is ideal. Weight loss is common in lactating dogs, especially those with large litters. To prevent adverse health effects of loss of weight and lean body mass during lactation, recommendations should be given to owners concerning types of foods and the need to increase intake as puppies gain weight. Weaning should begin when puppies are three to four weeks of age and should be completed around six to eight weeks of age. Transition should begin by making gruel (one part dry growth/lactation food and two parts water). Mash the gruel to a semisolid consistency, and place it in a shallow bowl. The puppies will learn to eat the gruel and be less dependent on the bitch for food. Offering solid food to puppies at an early age provides the benefit of reducing stress on the mother by reducing milk demand.

Remember, the pet needs nutrients in foods that are highly available because of the high nutritional demands during late gestation and lactation. Late in the bitch's/queen's pregnancy, the ability to ingest adequate amounts of food may surpass food intake capacity, especially if the food isn't highly digestible. It's important to recommend foods with above average digestibility during the reproductive process.

Growing Puppies

The requirements for all nutrients are increased during growth. Most nutrients supplied in excess of that needed for growth cause little to no harm. However, excess energy and calcium are of special concern; these concerns include energy for puppies of small and medium breeds (for obesity prevention) and energy and calcium for puppies of large and giant breeds (for skeletal health). Also, essential fatty acids can affect neural development and trainability of puppies.

Energy requirements for growing puppies consist of energy needed for maintenance and growth. During the first weeks after weaning, body weight is relatively small and the growth rate is high; puppies use about 50% of their total energy intake for maintenance and 50% for growth. Gradually, the growth curves reach a plateau, as puppies become young adults. The proportion of energy needed for maintenance increases progressively, whereas the part for growth decreases. Energy needed for growth decreases to about 8 to 10% of the total energy requirement when puppies reach 80% or more of adult body weight. A puppy's daily energy requirement (DER) should be about 3 × its resting energy requirement (RER) until it reaches about 50% of its adult body weight. Thereafter, energy intake should be about 2.5 × RER and can be reduced progressively to 2 × RER. When approximately 80% of adult size is reached, 1.8 to 2 × RER is usually sufficient.

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

These factors are general recommendations or starting points to estimate energy needs. Body condition scoring should be used to adjust these energy estimates to individual puppies. Prevention of obesity is essential and should begin at weaning. Too much food intake during growth may contribute to skeletal disorders in large- and giant-breed puppies. If too much

weight is carried into adulthood, the risk for several important diseases is increased. These include hypertension, heart disease, diabetes mellitus, osteoarthritis, and exercise intolerance. Feeding a food with a very low energy density and low digestibility may not supply enough energy and nutrients to support optimal growth. This can lead to intake of large quantities of the food, which can overload the gastrointestinal (GI) tract resulting in vomiting and diarrhea. Therefore we should monitor energy and food intake and body condition at an early age.

Protein requirements of growing dogs differ quantitatively and qualitatively from those of adults. Quantitatively, during puppyhood, protein requirements are highest at weaning and decrease progressively. For example, the level of crude protein in bitch's milk is 33% dry matter (DM). Bitch's milk is a highly digestible food with an energy density of 6.4 kcal/g DM. This level is equivalent to 21% highly digestible protein in a commercial food with 4 kcal/g DM. For puppies 14 weeks and older, the minimum recommended allowance for crude protein is 17.5% DM. The recommended protein range in foods intended for growth in all puppies (small, medium, and large breeds) is 22 to 32% DM. Most dry commercial foods marketed for puppy growth provide protein levels within this range.

Protein levels above the upper end of this range haven't been shown to be detrimental but are well above the level in bitch's milk. Protein requirements of growing dogs differ from those of adults. An important difference is that arginine is an essential amino acid for puppies, whereas it's only conditionally essential for adult dogs. Foods formulated for adult dogs shouldn't be fed to puppies. Although protein levels may be adequate, energy levels and other nutrients may not be balanced for growth.

Dietary fat serves three primary functions:

1. A source of essential fatty acids
2. A carrier for fat-soluble vitamins
3. A concentrated source of energy

Growing dogs have an estimated daily requirement for essential fatty acids (linoleic acid) of about 250 mg/kg body weight, which can be provided by a food containing between 5 to 10% DM fat. The fat source must be carefully chosen when low-fat foods (<10% DM fat) are fed to ensure that sufficient

amounts of linoleic acid are provided. Studies indicate that *docosahexaenoic acid (DHA)* is essential for normal neural, retinal and auditory development in puppies. Inclusion of fish oil as a source of DHA in puppy foods improves trainability. Thus, adding a source of DHA should be considered essential for growth. The minimum recommended allowance for DHA plus eicosapentaenoic acid (EPA) is 0.05% DM; EPA shouldn't exceed 60% of the total. Thus, DHA needs to be at least 40% of the total DHA plus EPA, or 0.02% DM. Fat contributes greatly to the energy density of a food; however, excessive energy intake can cause overweight/obesity and developmental orthopedic disease, as discussed above. The minimum recommended allowance of dietary fat for growth (8.5% DM) is much less than that needed for nursing, but more than is needed for adult maintenance (5.5% DM). To provide a DM energy density between 3.5 and 4.5 kcal/g, between 10 and 25% DM fat is required. This range of dietary fat is recommended from postweaning to adulthood.

Although growing dogs need more calcium and phosphorus than adult dogs, the minimum requirements are relatively low. Puppies have been successfully raised when fed foods containing 0.37 to 0.6% DM calcium and 0.33% DM phosphorus. Foods for large- and giant-breed puppies should contain 0.7 to 1.2% DM calcium (0.6 to 1.1% phosphorus). Foods with a calcium content of 1.1% DM provide more calcium to puppies just after weaning than if bitch's milk is fed exclusively. Because small- to medium-sized breeds are less sensitive to slightly overfeeding or underfeeding calcium, the level of calcium in foods for these puppies can range from 0.7 to 1.7% DM, (0.6 to 1.3% phosphorus) without risk. The phosphorus intake is less critical than the calcium intake, provided the minimum requirements of 0.35% DM are met and the calcium-phosphorus ratio is between 1:1 and 1.8:1. For large- and giant-breed dogs, the calcium/phosphorus ratio should be between 1:1 and 1.5:1.

The ability of 11-week-old puppies to digest foods was less than at 60 weeks of age. If puppies are fed foods low in energy density and digestibility, they'll need to eat larger quantities of food to achieve growth. This will increase the risk of flatulence, vomiting, diarrhea, and the development of a "pot-bellied" appearance. Therefore, foods recommended for puppies

should be more digestible than typical adult foods. An indirect indicator of digestibility is energy density. Foods with a higher energy density are likely to be more digestible. The level of digestible (soluble) carbohydrates for growing puppies is recommended to be approximately 20% (DMB). This level is believed to optimize the health of the puppy.

Feeding the growing puppy can be challenging but rewarding. Remember, the most common error made by the pet owner is overfeeding the puppy. Overfeeding can result in an overweight or obese puppy. Puppies that are overweight early in life will develop more fat cells and may be predisposed to obesity as adults. Puppies should receive body-condition scoring analysis during routine veterinary visits along with body weights to help prevent obesity. Overfeeding also may create nutritional imbalances. Feeding ad-lib to puppies isn't recommended. The preferred feeding method for puppies is portion-controlled feeding. If possible, feed the puppy three times per day (or more) until it reaches three months of age. Twice-a-day feeding is recommended thereafter. This may also help in house-breaking the puppy, but be sure to divide the total amount into two feedings.

If a client is unsure if the pet has reached skeletal maturity, it's suggested to radiograph the long bones; the growth plates should be closed. For large-breed puppies, a pet food formulated specifically for large/giant-breed puppies is recommended. Many companies produce specialized diets that differ in composition and nutrients from regular puppy or small-breed diets. Large-breed puppy diets are lower in energy density, which means that there are fewer kcal per cup or can compared with other growth diets. This helps owners avoid overfeeding of large breed puppies. Ca and P levels of large-breed diets are controlled to avoid excessive amounts even if owners overfeed. The crude protein and fat content may be similar or somewhat different. Kibble shape, size, and texture may be modified for large-breed compared with small-breed puppies. In general, it's safe and appropriate to feed any high-quality growth diet from a reputable company to large-breed puppies.

Adult Dogs

The goal of feeding the adult dog is to meet its nutritional needs and maintain body condition. Evaluating the canine dental pattern suggests dogs are omnivores, not carnivores. In the wild, the canine would kill a herbivore and consume the intestinal contents, organ tissue, and flesh. A dog doesn't have the same nutrient requirements as strict carnivores. Most normal adult dogs may be fed using the portion-controlled method to limit overconsumption. Some smaller-breed dogs may nibble on their meal throughout the day. Ad-lib feeding is less labor-intensive but, depending on the animal, may contribute to obesity. Multiple-pet households should use the portion-controlled method to better evaluate the pets' food consumption. Chronic overconsumption of calories and lowering of the metabolic rate may cause the dog to gain weight. The metabolic rate and calorie requirement of most dogs will decrease if they were neutered or spayed at six months of age.

Water accounts for approximately 56% of an adult dog's body weight (73% of lean body mass). Water deprivation will result in death more quickly than withholding any other nutrient and should be considered the most important nutrient for dogs. Total water intake is dependent upon factors such as environment, physiologic state, activity, disease processes, and food composition. Dogs usually self-regulate water intake according to physiologic need. Healthy adult dogs need approximately the equivalent of their energy requirement in kcal metabolizable energy (ME)/day, expressed in ml/day. Dogs should be offered free access to clean, fresh water.

Fats are an excellent source of energy, but the real requirement for fat is to supply essential fatty acids (EFAs). In addition, fat serves as a carrier for the absorption of fat-soluble vitamins. Fat also is a palatability enhancer. The minimum recommended allowance for dietary fat in foods for normal, healthy adult dogs is 8.5%, with at least 1% of the food as linoleic acid (DM). Depending on the type/source of fat, increasing the amount of fat in foods increases palatability and EFA levels; however, energy content also increases. The recommended range of fat for foods intended for young adult dogs is 10 to 20% (DM). Lower levels of dietary fat are recommended for obese-prone adult dogs (7 to 10% DM).

Dietary fat and fiber levels in pet foods indicate the food's energy density. Fats provide more than two times the energy versus carbohydrate or protein. High-fat foods have increased energy density; on the other hand, low-fat foods have decreased energy density. Fiber isn't a good source of energy for dogs, so as the fiber content of foods increases, energy density decreases. Dietary fiber does help promote satiety. In pet foods, fiber is listed as crude fiber, which is an imprecise measure because most soluble fiber is omitted. A better measure would be total dietary fiber. Up to 5% fiber DMB seems appropriate for adult dogs and cats. Obese-prone dogs may benefit from higher levels—around 10% DM crude fiber with fat between 7 to 10%.

The level of protein in adult dog foods varies widely—anywhere from 15 to 60% protein DMB. More protein isn't necessarily better for dogs. Dogs need to meet their amino acid requirements. After these are met, adding more protein to the diet provides no known physiologic benefit. However, owners believe that dogs are carnivores and need more protein. This is untrue—dogs are omnivores. Excess dietary protein, above the amino acid requirement, isn't stored as protein, but rather is deaminated (broken down) by the liver. Therefore the kidneys excrete the excess, which in turn is causing an increased workload on the kidneys. The minimum crude protein content of food depends on digestibility and quality. The recommendation of DM crude protein for foods for adult dogs is between 15 to 30%.

Performance

Nutrition can play a major role in the success and long-term health of performance dogs. The typical working or active dog may be a hunting dog, service dog, police dog, or even that toy-breed dog that never seems to stop long enough to eat. The animal's lifestyle will dictate its energy needs. In general, all working dogs have increased energy requirements over those of an adult dog during time of normal activity. The type of work being done and the intensity of work may require modifications in the nutrient composition of the food and the feeding schedule. Exercise requires transfer of chemical energy into physical work. ATP is the sole source of energy for muscle contraction.

The two primary fuels used by the body for working muscles are muscle glycogen and free fatty acids. Dogs rely more heavily on free fatty acids for energy generation when exercising, regardless of the level of exercise. Therefore, feeding a higher fat diet to endurance and intermediate trained athletes prepares the muscles to efficiently mobilize and use free fatty acids for energy. It also exerts a glycogen sparing effect that can help prolong glycogen use during work. In canine athletes, no dietary requirements for carbohydrates truly exist, with the exception of pregnancy. Carbohydrates fed to canine athletes should be highly digestible to decrease fecal bulk in the colon.

Amino acids provide ~5–15% of the energy used during exercise. The majority of this energy comes from the branched-chain amino acids (leucine, isoleucine, and valine). Remember, these are essential amino acids and can't be synthesized from other amino acids; therefore, they must be included in the diet. Muscle and organ meat based proteins have the highest level of essential amino acids, and are also the most digestible and most bioavailable. Amino acids aren't stored as proteins in the body but are deaminated to ketoacids. These ketoacids are either oxidized for energy or converted to fatty acids and/or glucose and stored as adipose tissue (fat) or glycogen.

Water is the most important nutrient in the body. This is especially true of performance athletes as it acts as a transport medium for nutrients, wastes, and heat; absorbs physical shock; and lubricates various internal and external surfaces. Heat is the primary by-product of muscle contraction, and the respiratory tract through panting is responsible for dissipation of this heat. Because evaporative heat loss is the primary way dogs dissipate heat, ensuring adequate hydration is crucial for the maintenance of normal body temperature. Depending on the type of work done and environmental conditions, water losses can increase by 10–20 times normal during exercise.

A diet needs to be highly digestible to limit the total volume of food consumed at each meal. An ideal diet would provide increased levels of high quality protein to meet anabolic requirements and enough non-protein energy nutrients (fats and carbohydrates) to meet energy requirements. The food needs to be calorically dense and palatable, highly digestible and practical, so that the dog can physically consume enough to meet its caloric requirements.

Timing of meals is important to allow the most availability of nutrients to the athlete. Ideally, the timing of feeding the canine athlete is one meal at least four hours before exercise, one meal within two hours after exercise, and if necessary small amounts during exercise. The largest meal should be given post exercise. It's also very important to allow access to plenty of fresh clean water to prevent dehydration.

The recommended caloric distribution for canine athletes is as follows:

- Calories from protein: 30–35% ME
- Calories from fat: 50–65% ME
- Calories from carbohydrate: 10–15% ME

Senior Dogs

The senior, or geriatric, dog is approximately 7 years of age in an animal with an average life expectancy of approximately 13.5 years. This range varies widely, however; the figure given here is for medium-sized dogs. Smaller breeds tend to have longer life spans; larger-breed dogs tend to have shorter life spans. The nutritional goals for the senior dog are similar to those for the adult dog—optimize quality of life, increase longevity, and minimize disease. As the animal reaches the age of a senior pet, bodily changes occur. The senior dog has a diminished ability to hear, see, smell, and taste. The animal may not be able to readily adapt to stress, and its organs may not function at a normal level. As animals age, their organs lose the ability to compensate. Many older dogs and cats face chronic renal disease as they age. As the disease progresses, it affects the animal's ability to eliminate waste products. It's important not to feed a food that will create additional work for the kidneys or liver. The kidneys must work harder to excrete phosphorus, urea, and other metabolic waste by-products. The goals of feeding the senior patient are to decrease protein, phosphorus, and sodium. Every animal is an individual; the feeding regimen should take into account each animal's specific needs. Some senior dogs have difficulty maintaining body weight, while others gain weight easily. It's important not to make general recommendations for a subset of animals.

Nutritional management of mature adult dogs is focused upon

- Maintenance of optimal nutrition
- Risk factor management
- Disease management (i.e., slowing progression of certain chronic diseases)
- Improvement in the quality and length of life.

Older dogs and cats are more susceptible to dehydration especially if they're prescribed diuretics or have chronic renal disease. Access to fresh, clean water must be discussed with pet owners, and water intake should be routinely monitored.

As dogs age, they become slower and less active. Thus, it may be appropriate to feed a more energy-dense food to very old dogs. Because of the potential for mature dogs to have different energy needs, energy densities in foods recommended for this age group may vary from 3.0 to 4.0 kcal/g dry matter (DM). Fat levels for the majority of mature dogs should fall between 7 and 15% DMB.

Constipation is a common finding in mature dogs due to reduced water intake, limited activity, and reduced motility in the colon. Fiber helps to combat these findings and normalize the GI tract. Also, fiber added to foods for obese-prone mature dogs dilutes calories. The recommended levels of crude fiber in foods to be fed to mature dogs are at least 2% (DM).

Healthy mature dogs should receive enough protein to ensure that protein-energy malnutrition doesn't occur. Older pets may begin to lose muscle mass; therefore, increasing protein in the diet may be warranted. However, older pets are also at increased risk for renal disease in which case higher levels of protein aren't recommended. Improving protein quality, rather than increasing the amount eaten, can provide sufficient protein for the older pet. Dietary protein shouldn't be restricted in healthy mature adult cats. Adequate protein and energy intake are needed to sustain lean body mass, protein synthesis, and immune function. For healthy mature dogs the protein percentage is recommended to be 15 to 23% protein DMB.

Treats

Feeding treats to the pet is perceived positively by the client, but offering too many or the wrong products may lead to other problems and exacerbate existing disease conditions. Treats may be table scraps or commercially prepared products.

Treats shouldn't be given in excess. If more than 10% of the pet's food is treats, nutrition may be affected, and the risk of obesity may increase. Depending on the formulation or type of treat, it may increase the pet's chance for gastrointestinal upset. Owners want to treat their pets and they'll treat their pets. This is a great opportunity for the healthcare team to discuss appropriate treats and amounts and let the owner know that treats are acceptable—if provided in moderation! Remember to ask open-ended questions regarding treating pets during your nutritional history. This will lead to more open responses from the pet owner. Asking a closed-ended question, such as “how many treats do you give to your dog,” may put owners on the defensive and they may be fearful to tell the truth because they infer from the question that giving treats is bad. Remember, almost every owner will give their pet treats—we need to educate them on proper amounts!

Obesity-Prone Dogs

There are several possible reasons that dogs may be prone to obesity. They may have been overfed as puppies; the fat cells are present for life and they don't shrink in size. Specific lineages have been shown to have a decreased metabolic rate and a decreased need for calories. As the animal ages, its metabolic rate decreases, it loses lean body mass, and its activity level declines. Overconsumption is caused by pet owners who overfeed their animals. Multiple-pet households, where pets compete for calories or are fed as a group, can lead to obesity. Neutering and spaying of animals does alter the metabolic rate.

Attention needs to be given to the animal and its lifestyle to prevent obesity. Portion-controlled feeding and body condition scoring are recommended. Feeding reduced calorie and high-fiber foods may increase the animal's satiety. Animals that are satisfied with the volume and type of food they're being fed are less likely to be destructive in the search for calories.

Environmental Factors

It's important not to forget the influence the environment may have on nutritional needs. Temperature, humidity, stress level, and type of housing are factors to be considered when evaluating an animal's energy and nutritional needs. Animals housed outdoors in cold weather may need 10 to 90% more energy than those housed in optimal temperatures. Animals generally don't expend a great deal of energy keeping cool when temperatures exceed their *thermoneutral zone*, yet their need for water escalates at a high rate. Since the dog is unable to sweat all over its body, it must pant to lower its body temperature. The dog cools its body through respiration, panting, and sweating. If the dog's conditions are desert-like temperatures and its water consumption requirements aren't met, it could be dangerously dehydrated in as little as two and a half hours. Therefore it's imperative that the animal's water consumption needs be met.

Felines

Kittens

Kittens have high energy requirements to meet the needs of a rapid growth rate, thermoregulation, and maintenance. It's not unusual for kittens to grow at rates from 14 to 30 g/day during the rapid growth phase. As with other species, excessive energy intake may lead to obesity. Remember, an overweight kitten has an increased chance to be an overweight adult cat.

Following neutering, it's recommended to limit food intake and/or feed a food with a lower energy density to help prevent excessive weight gain. The energy density of the food fed to rapidly growing kittens should be between 4.0 to 5.0 kcal metabolizable energy (ME)/g (16.7 to 20.9 kJ ME/g). A higher energy density allows smaller volumes of food intake to satisfy caloric needs. It's also recommended that foods with energy densities toward the lower end of this range should be fed to neutered kittens, especially those with a *body condition score (BCS)* of 4/5 or greater. The prevalence of obesity increases dramatically after one year of age.

Protein requirements of kittens reflect their essential amino acid requirements and minimal nitrogen needs. Protein also provides sulfur-containing amino acids, which are required in greater amounts in kittens than in other species. Protein requirements are high at weaning and then decrease gradually to adult levels as the kitten's growth slows. In kittens, the recommended range of crude protein for foods for healthy kitten growth is 35 to 50% DMB.

As we discussed with puppies, dietary fat serves three primary functions in growing kittens: (1) it supplies essential fatty acids, (2) it acts as a carrier for fat-soluble vitamins, and (3) it provides a concentrated source of energy in food. Remember, too much fat and calories may predispose young kittens to obesity. Kittens and adult cats require linoleic and arachidonic acid, and they also require omega-3 (n-3) fatty acids (docosahexaenoic acid [DHA], 20:6n-3). DHA has been shown to be necessary for normal neural, retinal, and auditory development in kittens. The percentage of fat in kitten foods should be in the range of 18 to 35% fat. This will aid in enhancing palatability, meeting essential fatty acid needs, and maintaining the energy density of the food. DHA levels should be at least 40% of the total (DHA plus EPA), or 0.004% DMB. Kittens should be fed a growth formulation until around 10–12 months of age, as adulthood in cats isn't reached until this timeframe.

Cats

More than one-third of all households own a cat. As lifestyles change, more individuals prefer cats as companions over dogs. Domestic cats are thought to have descended from a desert-dwelling cat and have adapted to a dry environment. A cat has a much lower stimulus for thirst than a dog. Cats are able to form more concentrated urine in response to decreased intake. Unfortunately, this might increase the risk for lower urinary tract diseases. Cats consume 1.5 to 2 milliliters of water per gram of dry matter. It's important to keep fresh water available to the cat at all times. As we discussed with dogs, depriving cats of water will result in death more quickly than withholding any other nutrient and should be considered the most important nutrient for cats. Total water intake is dependent

upon factors such as environment, physiologic state, activity, disease processes, and food composition. Healthy adult cats need approximately the equivalent of their energy requirement in kcal metabolizable energy (ME)/day, expressed in ml/day. Cats should be offered free access to clean, fresh water.

Cats are also able to digest higher-fat foods than dogs. They require an essential fatty acid, arachidonic acid, found in meat and organ tissues. Cats also require pre-formed vitamin A and, unlike omnivores and herbivores, can convert vitamin A to beta-carotene. Both niacin and pyridoxine are needed at four times the level required by dogs. Therefore, *feeding dog food to a cat is never advised.*

Fats are an excellent source of energy, but the real requirement for fat is to supply *essential fatty acids (EFAs)*. In addition, fat serves as a carrier for the absorption of fat-soluble vitamins. Fat also is a palatability enhancer. The minimum recommendation of fat in adult cat foods is 9% DMB. However, fat levels above 9.0% DMB are recommended for most cats. It has been shown that cats prefer foods with fat levels near 25% DM fat versus foods containing 10 or 50% DM fat. We need to remember the correlation between high-fat foods and an increased incidence of obesity in cats. The majority of domestic cats today do well when fed foods containing 10 to 30% fat DMB. Cats prone to obesity, however, should be fed foods with lower levels of dietary fat (9 to 17% DM).

Dietary fat and fiber levels in pet foods indicate the food's energy density. As mentioned earlier, fat provides two times the energy than carbohydrate or protein. High-fat foods have increased energy density; whereas, low-fat foods have decreased energy density. Fiber isn't a good source of energy for cats so it's important to remember that as the fiber content of foods increases, energy density decreases. Dietary fiber does help promote satiety. In pet foods, fiber is listed as crude fiber, which is an imprecise measure because most soluble fiber is omitted. A better measure would be total dietary fiber. Up to 5% fiber DMB seems appropriate for adult cats. Increased levels of dietary fiber in cat foods reduce energy density and can induce satiety. Therefore, the recommendation for obese-prone cats is 5 to 15% DMB crude fiber. Also, adding fiber to the cat's diet has shown a benefit in cats that are susceptible to hairballs.

Meeting the minimum protein needs of cats is critical because they have minimal capacity to adapt to low levels of dietary protein. Cats require approximately twice as much protein as dogs and also require an essential amino acid called *taurine*. Dogs are able to make taurine in sufficient quantities, but cats must obtain taurine from a meat source in their diet. Feeding cats a food deficient in taurine may result in retinal detachment and *cardiomyopathy* (weakening of the heart muscle). Protein in excess of the requirement is rapidly catabolized and used to provide energy and maintain blood glucose levels. Any excess energy will be stored as fat; therefore, there appears to be little benefit to feeding large excesses of protein to cats. Cats shouldn't be fed vegetarian diets. Cats are obligate carnivores and need to ingest animal protein for proper nutrients and overall nutrition and health. The recommended amount of protein for both normal weight and inactive/obese-prone adult cats is 30 to 45% DMB.

Cats respond differently to changes in food. They may initially like the new food because of its newness but often may not eat it days later. It's necessary to transition gradually from the old food to the new food. A gradual transition of five to seven days is typical. Sometimes greater lengths of time are required. Cats are sensitive to the temperature of foods—especially canned food. Cats prefer food warmed to nearly body temperature and won't eat food that's too cold or too hot. Cats may refuse canned food if they've experienced only dry food. Cats also form affinities toward shapes, tastes, and textures. Understanding this may help in transitioning the cat from one food to another. After a cat consumes a meal, its urine undergoes a temporary rise in pH (it becomes alkaline). Ingestion of food stimulates gastric acid secretion and a temporary net acid loss from the body. This is called the *post-prandial alkaline tide*.

Senior or Mature Adult Cats

Cats are considered senior at 10 to 12 years of age. Once a cat turns 7, there's an increased risk of age-related diseases. At 7, the cat's nutritional needs are changing. As cats age, they become less active and may lose muscle mass or lean body mass. It's important to feed the older cat to maintain

body composition and weight. Remember to discuss fresh water with senior cat owners. Make yourself aware of the risks older cats may experience and provide food and an environment to decrease those risks, if possible. Many older cats face chronic renal disease as they age. The kidneys must work harder to excrete phosphorus, urea, and other metabolic waste by-products. Senior cats have an increased requirement for potassium during renal disease. Feeding a food lower in protein and phosphorus but higher in potassium will help meet the nutritional needs of the feline senior renal patient. Always have fresh water available to the pet.

Nutritional management of mature adult cats should be focused on

- Maintenance of optimal nutrition
- Risk factor management
- Disease management (i.e., slowing progression of certain chronic diseases)
- Improvement in the quality and length of life

Older cats are more susceptible to dehydration, especially if they're prescribed diuretics or have chronic renal disease. In cats, aging impairs thirst sensitivity even further than previously known for cats. Access to fresh, clean water must be discussed with pet owners, and water intake should be routinely monitored.

Older pets begin to slow down and are less active. Thus, it may be appropriate to feed a more energy-dense food to senior pets. In mature cats, the energy density of foods should range from 3.5 to 4.5 kcal/g DMB.

Fat levels for the majority of mature cats should range between 10 and 25% fat on a DMB. Essential fatty acid requirements should also be met as previously discussed with adult cats.

Constipation is more common in senior pets due to reduced water intake, limited activity, and reduced motility in the colon. Fiber helps to combat these findings and normalize the GI tract. Also, fiber added to foods for obese-prone mature cats dilutes calories. The recommended levels of crude fiber in foods to be fed to mature cats $\leq 5\%$ DMB.

Healthy mature adult cats should receive enough protein to ensure protein-energy malnutrition doesn't occur. Older pets may begin to lose muscle mass and therefore increasing protein in the diet may be warranted. However, older pets are also at increased risk for renal disease in which case higher levels of protein aren't recommended. Improving protein quality, rather than increasing the amount eaten, can provide sufficient protein for the older pet. Dietary protein shouldn't be restricted in healthy mature adult cats. Adequate protein and energy intake is needed to sustain lean body mass, protein synthesis, and immune function. For healthy mature cats, moderate levels of dietary protein—30 to 45% DMB—are recommended.

Treats for Cats

Many clients give treats to their cats. In fact, 40 to 60% regularly feed table scraps. Feeding treats or table scraps allows for greater interaction with the cat. If more than 10% of the total volume of food is treats, however, the daily food intake may be unbalanced. Feeding calorie-rich treats may also contribute to obesity.



Self-Check 3

1. *True or False?* Dogs should be offered a variety of foods on a frequent basis.
2. *True or False?* All animals should be fed using the ad-lib method.
3. A dog is considered a/an _____, while a cat is considered a carnivore.
4. A puppy should be transitioned from a growth food to an adult food at _____ months of age.
5. *True or False?* Constipation is more common in senior pets due to reduced water intake, limited activity, and reduced motility in the colon.
6. *True or False?* Cats and dogs have the same nutritional requirements.

Check your answers with those on page 131.

ASSIGNMENT 4: PET FOOD

Read this assignment. Then read pages 304–317 in your textbook, *McCurnin’s Clinical Textbook for Veterinary Technicians*.

Pet Food Regulation

The pet food label is more than simply packaging—it’s a legal document. The pet food label is the primary way in which product information is communicated from the manufacturer or distributor to pet owners, veterinarians, health care team members, and regulatory officials. Reading and interpreting pet food labels is one method for finding information about pet foods. However, the pet food label doesn’t necessarily provide information about food quality (e.g., digestibility and biological value). One of the best recommendations to learning more about pet foods is to contact individual pet food manufacturers or nutrition experts for additional information that can be used to evaluate quality of various pet foods.

Pet food labels communicate information about the product as well as serve as a legal document. A number of agencies and organizations regulate production, marketing, and sales of pet foods in different countries. Each agency has different responsibilities with varying degrees of authority. Some of these agencies are responsible for regulating information found on pet food labels, whereas others influence the regulatory process. Pet foods are regulated at their point of sale. For example, pet foods manufactured in the United States but sold outside the United States must meet labeling requirements of the country in which the food is sold. Pet foods sold in the United States must comply with the U.S. Food and Drug Administration (FDA), Association of American Feed Control Officials (AAFCO), and state pet food labeling requirements.

The Association of American Feed Control Officials (AAFCO) is an elected body of officials who are the recognized source for pet food labeling, ingredient definitions, and standardized food-testing methods. AAFCO defines what can be placed on the label and what's prohibited. AAFCO guidelines help to ensure that manufactured pet foods are formulated or test-fed to be complete and balanced and that they meet the animal's needs during growth and maintenance.

The *Food and Drug Administration (FDA)* is responsible for certain pet-food-labeling regulations. It also specifies certain ingredients, drugs, or additives and enforces regulations on pet food contamination (chemical or microbiologic). If a pet food manufacturer makes a health claim with a product, the FDA will investigate and could require the manufacturer to alter the label if the claim can't be proven.

The *United States Department of Agriculture (USDA)* is responsible for making sure pet foods are labeled correctly and aren't mistaken for human foods. All pet food labels must specify the intended species, such as "cat food" or "dog food." The USDA also inspects the animal ingredients used in pet foods.

Pet Food Assessment

There are literally thousands of pet foods that come in various types, shapes, flavors, and sizes. How do you choose a pet food? Do you look down the pet food aisle for an appealing

label or advertisement? Do you ask friends what they feed their pets? Do you ask your veterinary team for their recommendation? After you decide what food to feed, is your decision based on data or emotion? Time and again, a client will see an advertisement about a pet food that might create interest in that brand. That might cause him or her to ask you for your opinion. We'll discuss different types of food, labeling requirements, and methods for evaluating potential pet foods. We'll also address homemade foods. However, our focus will be on commercially prepared pet foods.

Remember, thousands of pet foods are available. Your goal is to educate the client on the best food for the pet. But how do you ensure that the food you recommend is a good food? There are some basic labeling guidelines and definitions that will help you. First, a food should be "complete and balanced." *Complete and balanced* means the food will meet the nutritional requirements of the animal.

There are two other types of foods: all-purpose and special-purpose. *All-purpose foods* are formulated to meet pets' nutritional needs from birth through the senior years. Generally, these foods are sold as off-brand or generic foods. The concept of all-purpose feeding is based on the premise that one product meets all nutritional requirements during all stages of life. Therefore, these products must contain adequate nutrients to support the most demanding life stages—growth and lactation. All-purpose foods or all life stage foods provide nutrients in excess of allowances for adult maintenance and geriatric diets. *Special-purpose foods* are formulated for animals with a special need or to meet the requirements of a specific life stage. The obesity-prone pet and the working dog are examples of animals that might need a special purpose food. The obesity-prone pet requires fewer calories, whereas the working dog requires many more calories.

A pet food may be in compliance and ensure nutritional adequacy if it either has been formulated to meet the nutritional needs of a pet or has been test-fed. However, the feeding-trial method is much more effective than the formulation method in determining if a food will provide adequate nutrition. Foods formulated to meet nutritional standards based on a computer program are never test-fed to ensure that they maintain adequate nutrition. AAFCO feeding trials are completed for the

growing puppy, the gestating and lactating dog, and the adult dog. There's no AAFCO feeding-trial protocol for the senior animal.

Types of Pet Foods

There are three types of pet foods generally fed to client-owned animals: canned foods, dry foods, and semi-moist foods. Each type of food has its advantages and disadvantages. *Canned food* is very palatable but is more expensive than dry food. Water, protein, and fat all contribute to a more palatable product. Canned food contains approximately 78 to 82% moisture, which increases the food's palatability and also its cost. Canned foods are more profitable for the manufacturer due to the water content. The canned food may appear as a loaf, an all-meat product, or a combination of meats and flours bound together with gums and guar. If a client wants to feed a preservative-free food, a canned food would be recommended. The food is sterilized during the canning process and doesn't require additional preservatives. The can seals out bacteria and contaminants. Once the can is opened, it must be refrigerated and can be safely fed for only three to five days.

Semi-moist foods also are very palatable and may appeal to the picky eater or to a pet owner trying to provide variety. The food contains approximately 25 to 30% moisture. The popularity of semi-moist foods was much higher years ago; however, due to the level of preservatives and development of other product choices, the current demand for this product type is much lower. Semi-moist foods have higher levels of preservatives to maintain shelf life. They're also formulated to be higher in soluble sugars and simple carbohydrates, which may not be beneficial for diabetic patients.

The most common food type is *dry food*, which has approximately 7 to 12% moisture. Dry foods aren't found to be as palatable as canned foods overall, but they're much more affordable. Dry foods are also the most convenient food type to feed. Dry foods can be made through an extrusion process or a baking process. During the *extrusion process*, the dry ingredients are mixed together, moisture is added, and the dough is pushed through an extruder. The extruder uses

pressure and heat to cook the dough. The product emerges from the extruder and is sliced off to make the kibbles. Palatability enhancers then are applied to the outside of the kibble. The baking process is less common. The dry ingredients are combined with moisture, and the dough is rolled flat onto a large cooking surface. Once the dough has been cooked, the product is broken into many pieces.

Homemade foods are also quite popular with some pet owners. There are a number of quality recipes that are believed to be nutritionally adequate. However, many homemade foods are unbalanced or may become unbalanced if the directions aren't understood and followed exactly. It's very important to understand that formal testing hasn't occurred with any home recipe. Also, the pet owner must follow the recipe completely. No ingredient substitutions can be made. With homemade diets the potential is high that the pet could receive a food that isn't nutritionally adequate.

There are a few factors that may affect the pet's desire to eat. Canned food is generally more palatable than dry food. Adding warm water to dry food or warming the food to slightly above room temperature will increase its palatability. Adding a small amount of broth from boiling chicken to canned or dry food also may increase its appeal. It's not recommended to add garlic powder, onion powder, or salt to the diet as this can be dangerous to the pet.

Giving a pet a treat is commonplace in many households. Treats may be a snack from the kitchen or a product purchased by the pet owner. It's important to understand that treats don't fall under the same regulations as pet foods. There are no AAFCO guidelines for treats. Many treats have higher-than-recommended levels of sodium, phosphorus, protein, and fat. Feeding more than 10% of the diet in treats could alter the pet's nutritional intake.

Understanding Feeding Costs

Most pet owners don't understand how to calculate the cost of feeding their pet. The perceived cost of food is the price that's paid at the grocery store, pet store, or veterinary clinic. It's important for the client to understand that pet foods aren't alike and that the cost of the purchased food isn't the

real cost. The pet owner should be advised to write down the date the product was purchased and the purchase price. The feeding guidelines or amount to be fed should also be written on the bag. Cost of feeding on a daily basis now can be calculated more accurately.

Understanding Pet Food Labels

What does that pet food label really mean? The pet food label has two parts: the principal display panel and the information panel. (See pages 310 and 311 in your textbook.) The *principal display panel* is the front of the bag or the can; it's what most pet owners will initially see. The principal display panel must have the product name, net weight of the food, and statement of intent. The *product name* might be "beef dinner." The *statement of intent* or *product designator* states who can eat the food. "Dog food" or "cat food" is the designator or statement of intent.

The *information panel* provides more detailed product information. The *ingredient statement*, which is required by law, states the ingredients in the product from greatest amount to least. In a canned food, water should be either first or second on the ingredient list. The *guaranteed analysis*, which is required by law, states nutrient levels in maximum and minimum amounts on the pet food label. A *nutritional adequacy statement* must appear on the label as well. "Complete and balanced for adult maintenance based on AAFCO feeding studies" is a nutritional adequacy statement. All pet foods must state feeding guidelines on the label. The name of the manufacturer or distributor also must be printed on the label. A *product vignette* is the graphic or picture of the food in the bag or can. The picture of the product shouldn't look better than what's in the bag or can.

Not all pet foods contain the same amount of ingredients. Specific ingredient statements must provide specific levels of the nutrients in the food. When a product says "beef," at least 70% of the total product is required to be beef. If the terms "beef dinner" or "beef entrée" or "beef platter" are used, at least 10% of the total product must be beef. If the product says "with beef," at least 3% of the total product must be beef.

If the product says “beef flavor,” it must contain enough beef to be recognized by the pet. This amount is approximately 1% of the total product. Understanding the terminology will help you better educate your clients on the right product to feed (Figure 2).



FIGURE 2—Dry Cat Food Label

What's Required on a Pet Food Label?	
Principal Display Panel	Information Panel
Designator (statement of intent)	Guaranteed analysis
Feeding guidelines	Ingredient statement
Manufacturer or distributor	Nutritional adequacy statement
Net weight	
Product name	

A nutrition statement may be provided on the display panel; it's usually brief and may include such terms as "complete and nutritious," "100% nutritious," or "100% complete nutrition." The use of these terms suggests that the product contains ingredients in amounts sufficient to provide the estimated nutrient requirements of a dog or cat or the product contains a combination of ingredients that when fed to a normal animal as the only source of nourishment will provide satisfactory results.

Information Panel

The information panel is adjacent to the principal display panel and includes product information. The ingredient statement must be shown on the label and includes a list of ingredients (which must conform to AAFCO names), in descending order by weight. Ingredients are listed on an "as is" basis, which makes interpretation of ingredient lists difficult since many key ingredients are added with different moisture contents. Since meats contain more moisture, they may be listed first on the ingredient list, although the primary component of the food is a mixture of grains. This is often misleading to pet owners. We know many pet owners think they want a meat first food for their pet. The perception is that the food is made up mostly of meat. A pet food that lists several related ingredients or different forms of the same ingredient separately (e.g., brown rice, rice bran, rice gluten) could make rice-based ingredients appear to be a lower portion of the food than is the fact. However, as discussed above, this is misleading as to appear that the food is a meat heavy food. Also, the ingredient statement doesn't provide information about the quality of ingredients. Likewise, because an ingredient's position on the list includes its water content, this allows dry ingredients to appear lower on the list than ingredients that are naturally high in moisture.

One limitation of the ingredient statement is that terms such as "meat by-products" are difficult to evaluate. Many owners are under the impression that by-products aren't healthy and may be even harmful to their pets. However, the nutritive value of various meat by-products varies widely. It's often misinterpreted that foods containing meat by-products are

inferior to foods containing whole meat. AAFCO defines meat on an ingredient label as any combination of skeletal, striated muscle, or muscle found in the tongue, diaphragm, heart, and esophagus with or without the overlying fat and the portions of the skin, sinew, nerves, and blood vessels which normally accompany muscle. Meat must be suitable for use in animal foods and therefore excludes feathers, the head, feet, and entrails. Meat by-products don't include hair, horns, teeth, or hooves. Nutritive values in meat by-products also vary greatly. Meat by-products such as liver, kidney, and lungs have excellent nutritive value.

By-products are simply secondary products produced in addition to the principal product. Many human foods contain by-products, and the majority of pet foods contain by-products. For example, by-products of human milk production would be ice cream, cheese, and butter. Many by-products are excellent sources of nutrients for pets as well as people.

Guaranteed Analysis

The guaranteed analysis includes crude protein (minimum), crude fat (minimum), crude fiber (maximum), and moisture (maximum). Additional guarantees are optional and may be included by the manufacturer. The guaranteed analysis is a general idea of the nutrient content of a food but is of little value in comparing foods because specific nutrient contents aren't given and values are listed on an "as is" basis. While crude protein is an accurate index of protein quantity, it doesn't indicate protein quality. Crude fat may be used to estimate energy density of the food. Crude fiber is an estimate of the indigestible portion of the food; it usually underestimates the true level of fiber in the product. Foods that contain higher levels of fiber are generally lower in calories. The moisture content represents the water content in the food; it can't exceed a maximum of 78% in the United States. Foods that are >78% moisture must use a different name such as "in gravy," "in sauce," or "in aspic." The dry matter contains all nutrients (except water), and subtle changes in moisture content may result in marked differences in dry matter, which subsequently affects amounts of nutrients in a food.

Nutrient Content of Pet Foods

Pet food manufacturers in the United States are required to include minimum percentages for crude protein and crude fat and maximum percentages for crude fiber and moisture. Guarantees for other nutrients may follow moisture, but don't need to be listed unless its presence is highlighted elsewhere on the label (e.g., "contains taurine," "calcium enriched"). Guarantees for substances not listed in the AAFCO Dog or Cat Nutrient Profiles (e.g., vitamin C, L-carnitine, glucosamine, chondroitin sulfate) should immediately follow the listing of recognized nutrients and be accompanied by an asterisk referring to the disclaimer "Not recognized as an essential nutrient by the AAFCO Dog (or Cat) Food Nutrient Profiles." It's important to recognize that these percentages generally indicate the worst case levels for these nutrients in the food. They don't reveal the exact or typical amounts of these nutrients.

Crude protein refers to a specific analytical procedure that estimates protein content by measuring nitrogen. Crude protein is an index of protein quantity but doesn't indicate protein quality (amino acid profile) or digestibility. Crude fat refers to a specific analytical procedure that estimates the lipid content of food obtained through ether extraction or acid hydrolysis. Remember, fats have more than twice the energy density of proteins and carbohydrates, and can be used to estimate the energy density of the food. If the moisture and crude fiber content of two foods is somewhat similar, the food with the higher crude fat guarantee will usually have the higher energy density. Crude fiber represents the organic residue that remains after plant material has been treated with dilute acid and alkali solutions. Crude fiber is used to report the fiber content of commercial pet foods but typically underestimates the true level of fiber in the product. Crude fiber is an estimate of the indigestible portion of the food for dogs and cats. The crude fiber method typically recovers a large percentage of cellulose and lignin in a sample, and a variable percentage of hemicellulose and even ash.

Moisture is determined by drying a sample of the product to a constant weight. The drying procedure measures water in the product as a whole. Subtle differences in moisture content of moist products can result in marked differences in dry

matter content and therefore the financial side of feeding a given pet food. Remember, the dry matter content of the food contains all of the nutrients except water.

Consider this example. Compare the dry matter content of three different moist cat foods:

1. Food A contains 72% moisture.
2. Food B contains 78% moisture.
3. Food C contains 82% moisture.

Food A 100 – 72% water = 28% dry matter

Food B* 100 – 78% water = 22% dry matter

Food C** 100 – 82% water = 18% dry matter

* $28 - 22 \div 22 \times 100 = 27\%$ more dry matter in Food A (72% moisture) versus Food B (78% moisture)

** $28 - 18 \div 18 \times 100 = 55\%$ more dry matter in Food A (72% moisture) versus Food C (82% moisture)

So we can see that a small difference in water content of a food makes a big difference in dry matter content. Guarantees are expressed on an “as is” or “as fed” basis. To ensure looking at pet foods equally, we must remember to convert these guarantees to a dry matter basis when comparing foods with differing moisture content (e.g., moist versus dry foods).

Although not required, many pet food manufacturers in the United States will include maximum ash content on their food label. “Low ash” claims aren’t allowed because “ash” per se doesn’t truly mean anything. What’s of more significance is the level of certain minerals. Ash has historically been tied to urinary tract health of cats, whereas it’s the specific minerals that should be reviewed by the pet owner. “Low magnesium” claims on cat food labels are allowed if the food meets certain FDA criteria. In such cases, a maximum magnesium guarantee is required. To be labeled as a “low magnesium” food, the product must contain less than 0.12% magnesium, on a dry matter basis, and less than 25 mg per 100 kcal metabolizable energy. The estimation of magnesium content based on calculation from the guaranteed analyses must meet these criteria as well. The only exception occurs when the label bears an AAFCO calorie content statement that’s higher than would be

estimated from the guaranteed analysis. Ash consists of all noncombustible materials in the food, usually salt and other minerals. “High ash” content in dry and soft-moist foods generally indicates a high magnesium content. However, the ash content of moist cat foods usually correlates poorly with the magnesium content. Excessive magnesium intake may be one risk factor for feline struvite urolithiasis.

Nutritional Adequacy Statement

The *nutritional adequacy statement* on the information panel is often more detailed than the brief statements found on the principal display. Examples include “Complete and balanced nutrition for growth of kittens” and “meets . . . requirements for the entire life cycle of all dogs.” The nutrition statement will help you determine if the manufacturer is making claims for a specific purpose food versus an all-purpose food. Pet foods with no statement of adequacy include snacks, treats, and some therapeutic foods. The basis of the nutrition claim is documented on the pet food label by one of two methods: the formulation method or the feeding trial method. The *formulation method* is simply a laboratory nutrient profile analysis and doesn’t require any feeding or digestibility trials to prove availability of the nutrients in the profile analysis. This method is recognized on a label by a statement such as “Meets or exceeds the minimal nutritional levels established by AAFCO” or “Formulated to meet the AAFCO dog nutrient profile for” AAFCO nutrient profiles are published for two categories or life stages: (1) growth and reproduction and (2) adult maintenance.

The *feeding trial method* is the preferred method for substantiating a claim. This method is considered to be the gold standard. Feeding trials can result in adequacy claims for four categories including (1) gestation and lactation, (2) growth, (3) maintenance, and (4) complete for all life stages. A food that has successfully completed a sequential growth and gestation/lactation trial can make a claim for all life stages. The required wording for labels that have passed these tests is “Animal feeding tests using AAFCO procedures substantiate that (brand) provides complete and balanced nutrition for (life stage).” Pet foods that don’t meet AAFCO requirements by either of the

standard methods will have a nutritional statement as follows: “This product is intended for intermittent or supplemental feeding only.”

An important point to make to owners is that those foods that make a claim for “all life stages” have met the growth, gestation, and lactation nutritional profile. These life stages are higher in nutrient requirements. If these are met and the claim is for “all life stages,” the food being fed is in essence, a puppy/kitten formula. Care must be taken when discussing nutrition with owners of adult or older pets, as some of the nutrients in an all life stage formulation may be too high in certain nutrients for adult or older pets.

Dog and cat foods labeled as complete and balanced for any or all life stages must list feeding directions on the product label. At a minimum, feeding directions should include the instructions “feed (weight/unit) per (weight) of dog or cat” and frequency of feeding. These feeding directions are general guidelines and should serve as a starting point; adjustments may be needed to maintain optimal body condition. It’s important to talk with owners about how much to feed their pets and to ensure that owners know that these are guidelines. Exact amounts to feed should be discussed with their veterinary healthcare team. If a pug is 40 pounds, this doesn’t necessarily mean it should be fed the amount on the bag for a 40-pound dog. Also, an important reminder to discuss with owners is the size of a cup. A cup is intended to be an 8-ounce measuring cup—not a 56-ounce convenience store beverage container!

Digestibility

Digestibility can be defined as the amount of nutrients in a food that’s available for absorption by an animal’s body. It’s those nutrients that are used by the body. Factors that can negatively affect a food’s digestibility include the inclusion of poor quality ingredients and high levels of fiber, ash, and phytate. Inadequate processing and extreme heat treatment will also harmfully affect digestibility. In contrast, pet food digestibility is increased by the inclusion of high-quality ingredients and the use of proper processing techniques.

Therefore, in low digestible foods, the body won't be able to utilize the nutrients and thus create more waste. So a lower quality, lower digestible food may cost less money up front, but given the poor digestibility the pet will need to eat a larger quantity of food to truly gain the nutrients the body needs.

Evaluating and Recommending a Pet Food

Ask a few of the following questions, and the answers may help you recommend the right product for the pet:

- Is the product test-fed to animals, or is it formulated?
- How long has the manufacturer been in business?
- Does the manufacturer employ veterinarians, technicians, and such other professionals?
- Does the manufacturer employ veterinary nutritionists, scientists, and other such professionals?
- Is there a toll-free customer-service phone number listed on the product?
- Does the manufacturer provide product information to the consumer and the veterinary hospital?
- How does the manufacturer stand behind its products?
- Does it offer a satisfaction guarantee?
- Does the manufacturer do nutritional research to support its products?
- What's the manufacturer's commitment to the veterinary profession?

Adverse Reactions to Food

Many clients are convinced their pet is allergic to ingredients like chicken or wheat. How are they making this assumption? Did the pet begin to scratch when a particular food was fed? It's difficult for the veterinarian to diagnose a food allergy.

There are different conditions that range from food intolerance to a food allergy. An *elimination food trial* is the gold standard to prove a pet is allergic to a specific protein source. If the veterinarian chooses an elimination diet, the suspected allergen must be removed. Often, elimination diets are unbalanced and shouldn't be fed long-term.

Years ago, veterinarians recommended feeding a food with a novel protein source. With the number and variety of pet foods available, it's becoming more difficult to find foods that are novel proteins and restricted in protein levels. Feeding a food not restricted in protein may increase the pet's risk of becoming allergic to that particular protein later in life. Occasionally, blood tests are recommended to diagnose food allergies. Unfortunately, routine laboratory analysis can't differentiate food-allergic patients and non-food-allergic patients.

If the protein level in the food is too high—or if the protein is partially digested in the gastrointestinal tract—the protein can be absorbed intact across the gastrointestinal mucosa and then released into the systemic lymphoid tissue. If the pet is allergic to this protein source, it may have a reaction.

To manage the food-allergic patient, you must restrict the amount of protein in the food and make the protein source “invisible” to the body. To accomplish this, a process called *protein hydrolyzation* is utilized. The process takes an intact protein and uses enzymes to break the protein down into very small pieces. The protein is undamaged and is still biologically available and of good quality. The protein is broken down to pieces smaller than 10,000 daltons. It's believed that proteins larger than 10,000 daltons can bridge the gap on the IgE receptor, which would elicit an inflammatory reaction from the pet. If the protein size is smaller than 10,000 daltons, the pet is unlikely to have an allergic response to the protein. Feeding a hydrolyzed protein food is now considered far more effective in nutritionally managing the food-allergic patient than using the novel-protein approach.



Self-Check 4

1. What type of food is considered to be more palatable—canned or dry? _____
2. *True or False?* AAFCO is the regulatory body that creates standards for ingredients and pet foods.
3. *True or False?* The USDA is a group of appointed officials who are responsible for inspecting all pet food manufacturing plants.
4. What percentage of moisture does dry food contain? _____
5. What percentage of moisture does canned food contain? _____

Check your answers with those on page 131.
