



NUTRITIONAL ASSESSMENT GUIDELINES

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INTRODUCTION

The WSAVA has developed a global initiative to standardize five vital signs as part of the standard physical examination for all small animals. These are:

1. Temperature
2. Pulse
3. Respiration
4. Pain assessment
5. Nutritional assessment

Good nutrition enhances pets' quality and quantity of life. The WSAVA 5th Vital Assessment Group (V5) has utilized the science-based Nutritional Assessment Guidelines from the American Animal Hospital Association (AAHA) to develop global Nutritional Assessment Guidelines as an easy to use tool for veterinarians around the world for optimizing the health and well-being of pets, as an integral part of optimal patient care. Incorporating nutritional assessment into regular patient care is critical for maintaining pets' health, as well as their response to disease and injury. Incorporating the screening evaluation described in these guidelines as the fifth vital sign in the standard physical examination requires little to no additional time or cost. Yet, incorporating nutritional assessment and recommendations into the care of small animals helps to develop a partnership between the owner and veterinary healthcare team, resulting in healthier pets.

The specific goals of this document are to provide:

- Awareness of the importance of nutritional assessment in dogs and cats.
- Guidelines for nutritional evaluation of dogs and cats to promote optimal health and response to disease.
- Evidence and tools to support recommendations.

The positive impact of proper nutrition on health and disease is well established in all animals. Appropriate feeding throughout all life stages can help prevent diet-associated diseases, as well as to assist in the management of other diseases. For example, foods formulated for dogs and cats with chronic kidney disease have been shown to provide significant benefits.¹⁻³

The National Research Council (NRC)⁴ of the US National Academy of Sciences is the leading provider of nutrient recommendations for dogs and cats, and countries have developed nutrient guidelines and regulations for dogs and cats [e.g., Federation of Pet Food Industry (FEDIAF), Association of American Feed Control Officials (AAFCO)].^{5,6} Assurance of proper nutritional health, however, entails more than meeting nutrient profiles; additional factors must be considered. Nutritional assessment considers several factors that are described in detail in this document. An *iterative process*, in which each factor affecting the animal's nutritional status is assessed and reassessed as often as required, provides a thorough nutritional assessment of the small animal patient.⁷⁻⁹ The factors to be evaluated include the animal, the diet, and feeding management and environmental factors, as described below.

Animal-specific factors

Animal-specific factors include the age, physiological status and activity of the pet. Problems related to animal factors are referred to as *nutrient sensitive disorders* (e.g., intolerances, allergies, and organ specific diseases). Diet choice for these patients should be restricted to those formulated to meet the disease-associated nutritional limitations of the specific patient.

Diet-specific factors

Diet-specific factors include the safety and appropriateness of the diet fed to that animal in question. Problems related to diet factors are referred to as *diet-induced disorders* (e.g., nutrient imbalances, spoilage, contamination, adulteration). Patients with these disorders may be treated by feeding a diet known to be appropriate for the patient.

Feeding management and environmental factors

Feeding factors include the frequency, timing, location and method of feeding, while environmental factors include space and quality of the pets' surroundings. Problems related to feeding and environmental factors are referred to as *feeding-related and environment-related disorders* (e.g., over- or underfeeding, excessive use of treats, poor husbandry, competitive eating, or lack of appropriate environmental stimulation). These situations require effective communications to produce the appropriate behavioral changes in the client.

NUTRITIONAL ASSESSMENT

Nutritional assessment is a two-part process (Figure 1).

1. ***Screening Evaluation*** is performed on every patient. Based on this screening, pets that are healthy and without risk factors need no additional nutritional assessment.
2. ***Extended Evaluation*** is performed when one or more nutrition-related risk factors are found or suspected based on the screening evaluation.

The interview portion of evaluation should be performed by a person trained to elicit required information from the caregiver most knowledgeable about the pet(s). A detailed nutritional history should be obtained. A variety of forms are available for recording these findings.^{10,11}

Screening Evaluation

Nutritional screening is part of routine history taking and physical examination of every animal. Information collected should include assessment of factors specific to the animal, the diet, and feeding management/environment.

Certain life factors, by themselves, may not call for an extended evaluation if the animal is otherwise healthy. Low or high activity level, multiple pets in the home, gestation, lactation, or age < 1 year or > 7 years, all create a need for closer scrutiny. Although these factors by themselves may not trigger an extended evaluation, they should cause the veterinarian to scrutinize the pet's situation more closely.

Specific risk factors known to influence nutritional status include those listed in Table 2. When features are identified that raise one's "index of suspicion" for a nutrition-related problem, an extended nutritional evaluation may be indicated.

The importance of an extended nutritional evaluation increases as the number of risk factors and their severity increases. Moreover, sufficient concern about any one parameter may be enough to warrant extended evaluation.

If no concerns are raised by the screening evaluation, then the nutritional assessment is complete.

BCS and MCS

Use a consistent method and scale to measure body weight (BW), body condition score (BCS), and muscle condition score (MCS), to assess current status and changes over time. Although different scoring systems may have situation-specific merits, the panel recommends that practices choose, and all doctors and staff consistently use, one system and record the total points on which it is based (i.e., the denominator).

The **BCS** evaluates body fat (Figures 2A and 2B). A variety of BCS systems are used to evaluate dogs and cats (e.g., scales of 5, 6, 7, or 9).^{7,12-14} However, these guidelines will use a 9-point scale.^{13,14} Although some extremely obese patients exceed the BCS of 9/9, there is presently no validated scoring system that extends beyond that point.

The goal for most pets is a BCS of 4 to 5 of 9. (This may appear ‘too thin’ to some pet owners so client education is important.) These BCS goals are based on a limited number of studies in dogs and cats,¹⁵⁻¹⁸ as well as those from other species.¹⁹ Disease risk associations with higher BCS in adult animals appear to increase above 6 of 9.^{15,16} Similar risk associations for other life stages in client-owned pets have not been reported, but may occur at low BCS in growing puppies based on studies of laboratory-housed animals.¹⁷ Additional research in dogs and cats is needed to more fully evaluate the effects of body condition on disease prevention.

The **MCS** differs from the BCS in that it evaluates muscle mass (Figure 3). Evaluation of muscle mass includes visual examination and palpation over the temporal bones, scapulae, lumbar vertebrae and pelvic bones. Assessing muscle condition is important as muscle loss is greater in patients with most acute and chronic diseases (i.e., stressed starvation) compared to healthy animals deprived of food when primarily fat is lost (i.e., simple starvation). Muscle loss adversely affects strength, immune function, wound healing, and, is independently associated with mortality in humans.^{20,21}

A simple MCS scale is currently undergoing development and validation.^{22,23} The authors' clinical experience suggests that early identification of subtle muscle loss, at the "mild muscle wasting" stage is valuable for successful intervention.

Clinically, BCS and MCS are not directly related. An animal can be overweight but still have significant muscle loss. This can make an MCS of mild to moderate look relatively normal if not carefully evaluated. In these cases, although some of the areas of the body may appear relatively normal or even to have excessive fat stores (especially over the ribs or in the abdominal region), muscle wasting is readily felt over bony prominences. Palpation is required for accurately assessing BCS and MCS, especially in animals with medium to long hair coats.

Extended Evaluation

Extended nutritional evaluation of animal, diet, feeding and environmental factors is indicated for patients identified to be at risk for any nutrition-related problems from the screening evaluation (Table 2). Those items suggest that nutrition may play an important role in development of or management of the animal's underlying disease, or life stage. First, review and summarize the history, medical record, and information obtained during the screening evaluation. Second, obtain additional data as appropriate, as described below. A more detailed list of potentially relevant historical factors may be found in a variety of references.¹⁰

Animal factors

- Changes in food intake or behavior (e.g., amount eaten, chewing, swallowing, nausea, vomiting, regurgitation).
- Condition of the integument. Nutrition-related abnormalities may include variable combinations of dry, easily plucked hair; thin, dry, or scaly skin; and reduced resistance to venipuncture (due to loss of normal skin collagen density).
- Diagnostic work up
 - Minimum database / laboratory testing as appropriate.
 - Specific testing might include a complete blood count (checking for anemia); urinalysis; biochemistry profile (including electrolytes, albumin); fecal culture; or evaluation of other nutrient concentrations that may be low (or high) as a result of an unbalanced diet (e.g., taurine, vitamin B12, iron).
 - Additional workup as indicated (e.g., imaging, endoscopy)

- Current medical conditions and medications.
 - Assess effects of the disease and any treatment plan on pet's nutritional status (e.g., thyroid disease).
 - Some medications (e.g., diuretics) or procedures (e.g., significant intestinal resection, drain placement) can cause a loss or malabsorption of essential nutrients.

Diet factors

- Check the caloric density of current pet food (i.e., the number of calories per gram, can, or cup of food), particularly if pet is below or above desired BCS, or if owner has to feed unusually large or small amounts to maintain desired BCS (May have to contact pet food manufacturer for this information).
- Evaluate other sources of nutrients: Treats, table food, supplements, food used for administering medication, chew toys (e.g., rawhide).
- If disease conditions exist that may be the result of tainted or spoiled food, the diet should be submitted for testing.²⁴ Questions about having food analyzed or tested for potential toxins may be referred to the state feed control official (listed at www.aafco.org).
- Evaluate commercial foods
 - Specific type, formulation, flavor variety, when purchased, where purchased, storage conditions.
 - Requirements for label information vary by country. However, it is important to also be aware of the label's role as advertisement.²⁵
 - In a many countries, the AAFCO adequacy statement provides several important facts:
 - Whether the diet is complete and balanced, and if so, for what life stages. All foods should be complete and balanced. If it says “intermittent or supplemental use only,” it is not complete and balanced. That may be acceptable if it is a veterinary therapeutic diet and is being used for a specific purpose – e.g., severe kidney disease.
 - Labels may include one of two statements regarding nutritional adequacy.
 1. “[Name] is formulated to meet the nutritional levels established by the AAFCO Dog (or Cat) Food Nutrient Profiles for [life stage(s)].” (Chemical analysis of food.)

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2. “Animal feeding tests using AAFCO procedures substantiate [Name] provides complete and balanced nutrition for [life stage(s)].” (Feeding trial analysis of food.)
 - Formulated foods are manufactured so the ingredients meet specified levels, without testing via feeding trials; interpret with caution. However, the use of feeding trials does not guarantee the food provides adequate nutrition under all conditions.
 - AAFCO provides nutrient profiles and regulates pet food labeling for growth, reproduction, and adult maintenance, but not for senior/geriatric pets.
- What is manufacturer’s reputation as a food maker? Have you had positive experiences with their products? What objective (not testimonial) information do they provide about their foods to assist evaluation?
- The other information provided on the label is of little practical value in assisting nutritional assessment. Since pet owners sometimes base their purchasing decisions on the initial ingredients or on unregulated terms such as “holistic,” “human grade,” or “premium,” veterinarians and veterinary technicians must help them make informed decisions.
- Contact the food manufacturer with any questions or concerns. Consider asking the following questions, as appropriate:
 - Do you have a veterinary nutritionist or equivalent on staff in your company? Are they available for consultation or questions?
 - Who formulates your foods and what are their credentials?
 - Which of your diet(s) are tested using AAFCO feeding trials, and which by nutrient analysis?
 - What specific quality control measures do you use to assure the consistency and quality of your product line?
 - Where are your foods produced and manufactured? Can this plant be visited?
 - Will you provide a complete product nutrient analysis for the dog and cat food of interest, including digestibility values?
 - What is the caloric value per gram, can, or cup of your foods?

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- What kind of research on your products has been conducted, and are the results published in peer-reviewed journals?
- Evaluate homemade foods
 - Ask client about the specific recipe, preparation, storage, recipe rotation or substitution.
 - Consider sources and amounts of protein, carbohydrates, fats, vitamins and minerals; digestibility; bioavailability.
 - Consider specific needs of cats (e.g., amino acids, arachidonic acid, etc.).
 - Contact a board certified veterinary nutritionist or equivalent to evaluate or formulate a homemade diet (Table 3).
- Evaluate any unconventional diet, whether commercial or homemade for nutritional imbalances.
 - Evaluate additional risks of raw meat foods (e.g., fresh, frozen, freeze-dried, raw-coated, or other forms).²⁶⁻²⁸ Pathogenic organisms may cause gastroenteritis and other health problems and can be shed in the feces for a prolonged period after ingestion of contaminated raw meat, even if not showing clinical signs. If a patient that has been fed a raw meat diet is hospitalized, evaluate the risk to hospital staff and other hospitalized animals. In addition, raw foods containing bones can be associated with dental damage and esophageal/gastrointestinal obstruction or perforation.
 - Evaluate risks of vegetarian foods, particularly with cats but also with dogs.

Feeding and environmental factors

- Primary feeder of pet.
- Feeding management (e.g., location, frequency).
- Issues with multiple pets (competition for food, threats).
- Other food providers and sources.
- Extent of enrichment (e.g., toys, other pets, housing, food delivery devices).
- Activity of pet at home.
 - Type (e.g., leash walks, backyard, free roaming/spontaneous).
 - Amount (times per day/week).
 - Energy level and amount of activity.¹⁰

- Environmental stressors (e.g., recent changes in the home, uncontrollable outdoor stimuli, conflict over resources such as food or access to the owner, conflict between animals, etc.).²⁹⁻³¹
- Environment has a direct impact on nutrition. For example, both laboratory³² and clinical³³ studies of cats with lower urinary tract syndrome showing that environment plays an important role in presentation of signs regardless of the diet fed.
- In dogs, a range of clinical situations, including competitive eating, coprophagia, and obesity have been associated with environmental as well as with animal and dietary factors.^{34,35} Additionally, provision of food in dispensing toys may improve the welfare of indoor-housed pets,³⁶ so changes in feeding containers also may be more important than is generally perceived.

INTERPRETATION, ANALYSIS AND ACTION

Following the nutritional assessment, interpret and analyze the information that has been gathered in order to devise an action plan. Consider the following:

Animal Factors

1. Evaluate the animal's condition with respect to the current food intake.
2. Estimate current energy needs. For inpatients, resting energy requirements (RER) may be estimated using any of a variety of published formulas.^{4,7} For outpatients, label recommendations or a formula may be used as a starting point for energy allowance since energy requirements can vary by 50% in either direction for cats, and by 30% in either direction for dogs [particularly with the maintenance energy requirement (MER)].⁴ The MER depends upon BCS, sex and neuter status, life stage, activity, and environment variables.
3. Create a monitoring plan. Teach the client to monitor BW, BCS, and/or MCS as appropriate. Adjust intake as needed to match changing needs over time.
4. Adjust or include dietary supplements if necessary, recommending specific types and amounts.
5. A diet change is sometimes necessary. Preferences for and recommendations about diet transition methods vary, with no clear evidence showing any one method is superior. Clinicians should use and recommend techniques based on their individual assessment of client and patient. Some animals tolerate an abrupt change in diet with little problem

although some appear to have fewer gastrointestinal issues if food is gradually changed over a 7-10 day period.

Diet Factors

1. Determine if current amount and type of food is appropriate, based on life stage, lifestyle/activity, disease, body condition, concurrent medications and/or medical procedures.
2. If diet factors are determined to be inadequate, prepare a plan for food and treats that provides appropriate calories and nutrient content for the patient.
3. Consider other food sources in total intake recommendations if necessary.
4. Recommend a specific feeding plan that incorporates pet food, treats, table food, feeding method, frequency, and location.

Feeding management and environment factors

1. Determine any changes in feeding management and any necessary environmental changes.^{33,37,38}
 - a. Whereas some dogs and cats can maintain good body condition when fed free choice, others require meal feeding of appropriate amounts to maintain good body condition.
 - b. Confirm the use of an appropriate food-measuring device (e.g., an 8-oz or 237 ml measuring cup), and provide food in measured amounts (whether feeding free choice or meals).
 - c. Management changes may include provision of feeding toys, and reducing conflict and competition for food.
 - d. Environmental enrichment may include increased opportunities for activity (play, exercise), as well as efforts to decrease perception of threat from other animals (including humans) and reducing the frequency of unpredictable change in the animal's environment.³²
2. Create a plan for hospitalized animals
 - a. Create a monitoring plan and a feeding plan as discussed under animal factors and diet factors (i.e., diet, route, amount, and frequency).
 - b. Offer usual and favorite ("comfort") foods if at all possible to promote food intake. Avoid introduction of novel foods intended for long term feeding in order to avoid the risk of inducing an aversion to the diet. A food aversion is avoidance of a food that the animal associates with an aversive experience.

- c. The optimal route required to achieve nutrient requirements should be reassessed daily, and may include:
 - i. Voluntary oral feeding
 - ii. Coax feeding – small changes, such as warming the food, taking the animal to a quiet area for feeding, having the owner feed the animal, or stroking the animal while eating can enhance food intake.
 - iii. Syringe feeding (be careful in animals with any nausea or who are stressed, as this can induce food aversions)
 - d. Other nutritional support techniques will be required for animals that have not eaten sufficient amounts by the aforementioned routes for 3-5 days (this includes the time of reduced appetite at home before hospitalization), and are not expected to resume reasonable amounts of food intake prior to further compromise of their nutritional status.^{39,40}
 - i. Use a feeding tube with animals that are not eating adequate amounts voluntarily. Use parenteral nutrition with animals that have gastrointestinal dysfunction or in animals where enteral feeding has increased risk of aspiration.
 - ii. Evaluate closely and watch for complications associated with the route of nutrition used, particularly with recumbent or neurologically impaired patients.
3. Create a plan for non-hospitalized animals
- a. Create a monitoring plan and a feeding plan as discussed under animal factors and diet factors (i.e., diet, route, amount, and frequency).
 - b. Clearly inform the client of the recommended feeding management factors to insure success. The client is part of the decision process and implementation of the specific action plan.
 - c. If obesity is present, provide a comprehensive plan to modify the environment (e.g., exercise, behavior modification, and/or prescription weight control medication).
 - d. Create specific schedule for
 - i. Follow up via telephone to elicit questions and verify compliance/adherence to recommended feeding management or environment changes.
 - ii. Repeat examination/assessment

4. Consult with a specialist or refer any time one feels unqualified to take action and monitor a patient (Table 3).

MONITORING

Healthy animals

Adults in good body condition should be reassessed regularly. Decisions regarding specific frequency of visits are made appropriately on an individual basis, based on the age, species, breed, health, and environment of the pet. Healthy pregnant, lactating, senior, and growing animals require more frequent monitoring. Pet owners should monitor their pet at home including:

- Food intake and appetite
- BCS and BW
- Gastrointestinal signs (e.g., fecal consistency and volume; vomiting)
- Overall appearance and activity

Animals with disease conditions and/or recommended nutritional changes

Non-hospitalized animals for which extended nutritional evaluation was indicated may require more frequent monitoring of nutritional assessment parameters. Monitoring should include the items in Table 2.

Frequent monitoring of BCS and MCS is important, as many diseases are associated with suboptimal scores. Also, animals with medical conditions are more likely to receive dietary supplements and to have medications administered with food, so specific attention to and review of these issues, with an update of the dietary plan, are important at each visit to ensure that the overall nutritional plan is optimized. Animals that are not in optimal body condition require frequent monitoring and adjustment of intake in order to achieve and maintain optimal body condition.

Hospitalized patients

Daily monitoring of hospitalized patients includes the items in Table 2, also evaluating these additional items:

- Specific feeding orders which should include diet, route, amount, and frequency.
- Fluid balance. Assessment of clinical signs (e.g., body weight changes, pulmonary crackles) or diagnostic tests (e.g., central venous pressure).

- Addressing optimal route of intake. The optimal route required to achieve nutrient requirements could change during hospitalization and should be reassessed daily (see above)
- Quantifying and documenting nutrient intake (via all routes).

Many hospitalized patients are discharged prior to complete resolution of their underlying disease. Document and communicate to the client the feeding method, caloric intake, diet, frequency and specific monitoring parameters, and the schedule for rechecks and re-assessment.

Discuss with the client any issues that may limit adherence to dietary recommendations (e.g., feeding schedule issues, complex instructions, financial restrictions) and address appropriately (e.g., offer over-the-counter options for appropriate foods if financial restrictions will prevent the owner from consistently feeding the prescribed diet). Create a specific schedule for follow up via telephone to elicit questions and verify compliance/adherence.

Provide choices in foods that meet nutrient goals. Create a plan with the client about what to do if calorie/nutrient goals are not achieved.

When abnormal parameters have returned to normal or stabilized, the patient may continue on a therapeutic diet or be transitioned to a non-therapeutic diet. If a new diet is necessary, it may be introduced gradually, as previously described.

CLIENT EDUCATION

Client communication and rapport is important for achieving desired outcomes.⁴¹⁻⁴³ Technicians should be involved in the nutrition evaluation process when they have knowledge and skills in both nutritional concepts and in communication.

Engage the client in decision making and defining expectations. Recommendations may be modified by the client's time, lifestyle, and financial limitations. Use communication techniques that include a variety of forms based on client preferences. Use a variety of educational approaches and tools.

Demonstrating and teaching the client to evaluate the BCS and MCS is effective in engaging the client in their pet's care. Expectations and goals should be specific, achievable, and include specific follow-up in order to monitor progress and compliance and to adjust recommendations.

Inform clients about specific foods, and potential advantages, risks and concerns. Include recommendations on amount and frequency of diet fed, accounting for snacks, treats, table food, foods used for medication

administration, and dietary supplements. Clients may enrich their pet’s nutritional experience by interacting with them at feeding, providing food toys and playing and exercising with their pet.

SUMMARY

Nutritional assessment is an important aspect of optimal patient care. This document provides guidance for appropriate, effective assessment, evaluation, action monitoring and education. With little practice, this approach can be efficiently incorporated into daily practice without additional time or expense. Stay tuned for further developments and expanding knowledge.

Table 1: Definitions and acronyms
Screening evaluation: Initial evaluation performed on all patients.
Extended evaluation: In-depth information gathering based on issues of concern identified during initial screening.
Iterative process: Each factor is assessed and reassessed as often as required.
Life stage: Life stages of dogs and cats refer to periods of life that may influence nutritional needs, for example growth, reproduction, and adult, for which AAFCO provides nutrient profiles. ^{5,44,45}
Satisfactory diet: Complete (all nutrients present), balanced (nutrients present in proper proportions), digestible (nutrients in the diet are available to the animal), palatable (eats willingly), sufficient (amount, see text), and safe.
MER: Maintenance energy requirements
RER: Resting energy requirements
BW: Body weight
BCS: Body condition score. An evaluation of body fat.
MCS: Muscle condition score. An evaluation of muscle condition.

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Table 2: Nutritional Screening: Risk Factors.

Nutritional Screening Risk Factor	Check (✓) if present
History	
Altered gastrointestinal function (e.g., vomiting, diarrhea, nausea, flatulence, constipation)	
Previous or ongoing medical conditions / disease	
Currently receiving medications and/or dietary supplements	
Unconventional diet (e.g., raw, homemade, vegetarian, unfamiliar)	
Snacks, treats, table food > 10% of total calories	
Inadequate or inappropriate housing	
Physical Examination	
Body condition score	
9-pt scale: any score less than 4 or greater than 5	
Muscle condition score: Mild, moderate, or marked muscle wasting	
Unexplained weight change	
Dental abnormalities or disease	
Poor skin or hair coat	
New medical conditions / disease	

Figure 1: An illustration of the two-part nutritional assessment process. A *Screening Evaluation* is performed on every patient. Based on this screening, pets that are healthy and without risk factors need no additional nutritional assessment. An ***Extended Evaluation*** is performed when one or more nutrition-related risk factors are found or suspected based on the screening evaluation.

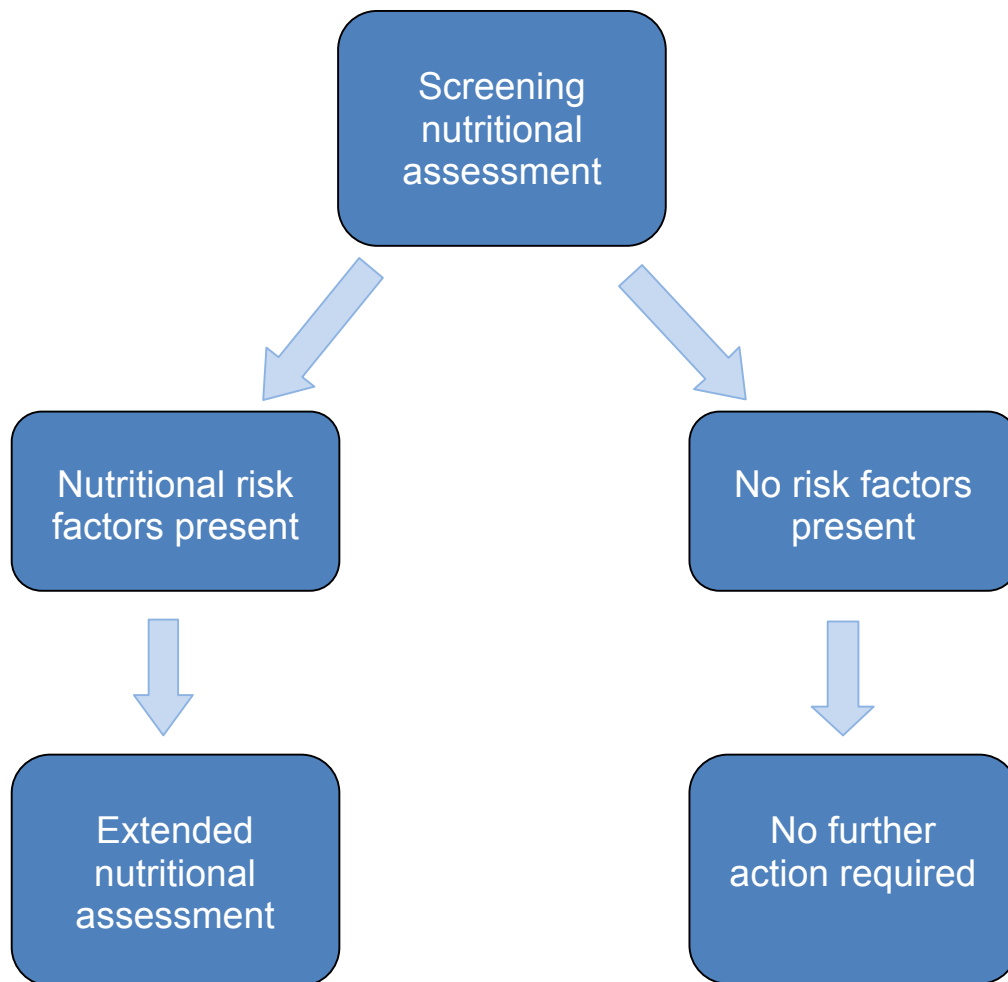
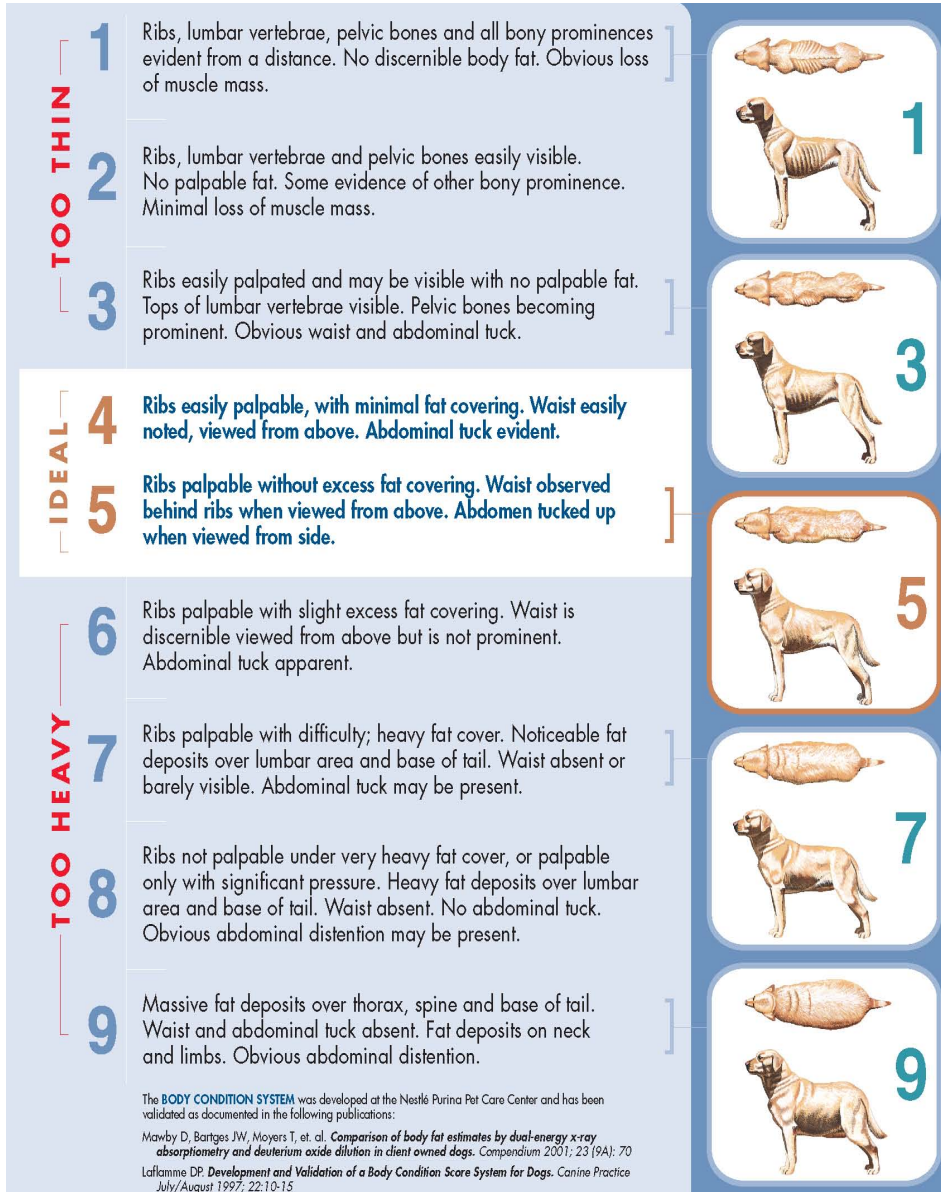


Figure 2: Body Condition Scoring (BCS) System for dogs (A)¹³ and cats (B)¹⁴
A



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B









TOO THIN	1	Ribs visible on shorthaired cats; no palpable fat; severe abdominal tuck; lumbar vertebrae and wings of ilia easily palpated.	
	2	Ribs easily visible on shorthaired cats; lumbar vertebrae obvious with minimal muscle mass; pronounced abdominal tuck; no palpable fat.	
	3	Ribs easily palpable with minimal fat covering; lumbar vertebrae obvious; obvious waist behind ribs; minimal abdominal fat.	
	4	Ribs palpable with minimal fat covering; noticeable waist behind ribs; slight abdominal tuck; abdominal fat pad absent.	
IDEAL	5	Well-proportioned; observe waist behind ribs; ribs palpable with slight fat covering; abdominal fat pad minimal.	
TOO HEAVY	6	Ribs palpable with slight excess fat covering; waist and abdominal fat pad distinguishable but not obvious; abdominal tuck absent.	
	7	Ribs not easily palpated with moderate fat covering; waist poorly discernible; obvious rounding of abdomen; moderate abdominal fat pad.	
	8	Ribs not palpable with excess fat covering; waist absent; obvious rounding of abdomen with prominent abdominal fat pad; fat deposits present over lumbar area.	
	9	Ribs not palpable under heavy fat cover; heavy fat deposits over lumbar area, face and limbs; distention of abdomen with no waist; extensive abdominal fat deposits.	

Figure 3: A muscle condition scoring (MCS) system. Evaluation of muscle mass includes visual examination and palpation over the temporal bones, scapulae, ribs, lumbar vertebrae and pelvic bones. [Provided courtesy of Dr. Tony Buffington] This system currently is under development and validation.^{22,23}

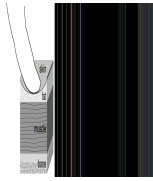
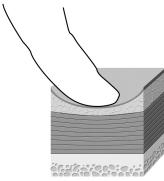
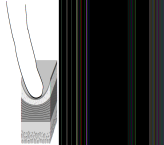

Description	Figure
<p>No Muscle Wasting Normal Muscle Mass</p>	
<p>Mild Muscle Wasting</p>	
<p>Moderate Muscle Wasting</p>	
<p>Marked Muscle Wasting</p>	

Table 3. Useful web sites for client and staff education

1. AAFCO Association of American Feed Control Officials (Nutrient profiles, feeding, trials, ingredients)	http://www.aafco.org
2. AAHA American Animal Hospital Association	http://www.aahanet.org
3. AAVN American Academy of Veterinary Nutrition	www.aavn.org
4. ACVN American College of Veterinary Nutrition (Specialty college for board certification; list of institutions that provide consultation; continual updates of links to resources for diet formulation and analysis)	http://www.acvn.org
5. AVNT Academy of Veterinary Nutritional Technicians	http://nutritiontechs.org
6. European College of Veterinary Clinical Nutrition	http://www.esvcn.com
7. FDA Center for Food Safety and Applied Nutrition (regulatory and safety issues, adverse event reporting, meetings, industry information)	http://vm.cfsan.fda.gov/~dms/supplmnt.html
8. FDA Pet Food Site (information, links, food safety issues, recalls, pet food labels, selecting nutritious foods, handling raw foods)	http://www.fda.gov/AnimalVeterinary/Products/AnimalFoodFeeds/PetFood/default.htm and http://www.fda.gov/AnimalVeterinary/NewsEvents/CVMUpdates/ucm048030.htm
9. FEDIAF European Federation of Pet Food Industry (Nutritional guidelines, guide to good food practice)	http://www.fediaf.org
10. Indoor Pet Initiative (Comprehensive recommendations for environmental enrichment for dogs and cats.)	http://indoorpet.osu.edu http://vet.osu.edu/indoorcat.htm

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11. NRC National Research Council (Nutrient Requirements of Dogs and Cats)	http://www.nap.edu/catalog.php?record_id=10668#toc
12. NRC Downloadable booklets. Your Cat's Nutritional Needs and Your Dog's Nutritional Needs. Versions for pet owners: BANR Board on Agriculture and Natural Resources Petdoor Nutrient Requirements of Dogs and Cats.	http://dels.nas.edu/dels/rpt_briefs/cat_nutrition_final.pdf http://dels.nas.edu/dels/rpt_briefs/dog_nutrition_final.pdf http://dels.nas.edu/banr/petdoor.html
13. NIH Office of Dietary Supplements (Evaluating supplements, internet health info, and more)	http://dietary-supplements.info.nih.gov/Health_Information/Health_Information.aspx
14. University of California Davis Nutritional History Form (Downloadable Word document)	http://www.vetmed.ucdavis.edu/vmth/small_animal/nutrition/newsletters.cfm
15. Pet Food Institute (Information on ingredient definitions, labeling regulations, etc.)	http://www.petfoodinstitute.org/Index.cfm?Page=Consumers
16. United States Pharmacopeia Dietary Supplement Verification Program (voluntary program)	www.usp-dsvp.org
17. USDA Food and Nutrition Information Center (General supplement and nutrition information, links to a variety of dietary supplement websites)	http://www.nal.usda.gov/fnic/etext/000015.html
18. USDA Nutrient Database (full nutrient profiles on thousands of human foods)	http://www.nal.usda.gov/fnic/foodcomp/search

REFERENCES

1. International Renal Interest Society Guidelines. http://www.iris-kidney.com/guidelines/en/treatment_recommendations.shtml Accessed September 21, 2010
2. Elliott J, Rawlings J, Markwell PJ, et al. Survival of cats with naturally occurring chronic renal failure: Effect of dietary management. *J Small Anim Pract* 2000; 41: 235-242.
3. Ross RJ, Osborne CA, Kirk, et al. Clinical evaluation of dietary modification for treatment of spontaneous chronic kidney disease in cats. *J Am Vet Med Assoc* 2006; 229: 949-957.
4. National Research Council. Nutrient requirements of dogs and cats. Washington, D.C.: National Academies Press, 2006.
5. Association of American Feed Control Officials. Official Publication. Oxford, IN: Association of Feed Control Officials, 2010.
6. European Pet Food Industry Federation (FEDIAF). Nutritional guidelines for cats and dogs. <http://www.fediaf.org/self-regulation/nutrition> Accessed September 21, 2010
7. Thatcher CD, Hand MS, Remillard RL. Small animal clinical nutrition: An iterative process. In: Hand MS, Thatcher CD, Remillard RL, et al. *Small animal clinical nutrition*, 5th ed. Marceline, Missouri: Walsworth Publishing Company, 2010: 3-21.
8. Bauer JE, Olson WG. Development of a modular curriculum for education in nutrition. *J Am Vet Med Assoc* 1994; 205: 681-684.
9. Bauer JE, Buffington CA, Olson WG. ACVN highlights common principles of nutrition. *Vet Forum* 1995;12: 55-58.
10. Michel KE. Using a diet history to improve adherence to dietary recommendations. *Comp Cont Educ Vet* 2009; 31: 22-26.
11. University of California Davis Nutrition Support Services Diet History Form. Available online at http://www.vetmed.ucdavis.edu/vmth/small_animal/nutrition/newsletters.cfm. Accessed September 21, 2010
12. German AJ, Holden S, Moxham GL et al, Simple, reliable tool for owners to assess the body condition of their dog or cat. *J Nutr* 2006; 136: 2031S–2033S.
13. Laflamme D. Development and validation of a body condition score system for dogs. *Canine Pract* 1997; 22: 10-15.

14. Laflamme D. Development and validation of a body condition score system for cats: A clinical tool. *Feline Pract* 1997; 25: 13-18.
15. Lund EM, Armstrong PJ, Kirk CA, et al. Prevalence and risk factors for obesity in adult dogs from private US veterinary practices. *Intern J Appl Res Vet Med* 2005; 4: 177-186.
16. Lund EM, Armstrong PJ, Kirk CA, et al. Prevalence and risk factors for obesity in adult cats from private US veterinary practices. *Intern J Appl Res Vet Med* 2005; 3: 88-96.
17. Kealy RD, Olsson SE, Monti KL, et al. Effects of limited food consumption on the incidence of hip dysplasia in growing dogs. *J Am Vet Med Assoc* 1992; 201: 857–863.
18. Scarlett JM, Donoghue S. Associations between body condition and disease in cats. *J Am Vet Med Assoc* 1998; 212: 1725-1731.
19. Gulsvik AK, Thelle DS, Mowe M, et al. Increased mortality in the slim elderly: A 42 year follow-up study in a general population. *Eur J Epid* 2009; 24: 683-690.
20. von Haehling S, Lainscak M, Springer J, Anker SD. Cardiac cachexia: A systematic overview. *Pharm Ther* 2009; 121: 227-252.
21. Evans WJ, Morley JE, Argiles J, et al. Cachexia: A new definition. *Clin Nutr* 2008; 27: 793-799.
22. Michel KE, Anderson W, Cupp C, Laflamme D. Validation of a subjective muscle mass scoring system for cats. *J Anim Physiol Anim Nutr* 2009; 93: 806 (abstract).
23. Michel KE, Anderson W, Cupp C, Laflamme D. Correlation of a feline muscle mass score with body composition determined by DEXA. *Proceedings of the WALTHAM International Nutritional Sciences Symposium, Sept 16-18, 2010, Cambridge England: 47 (abstract).*
24. Stenske K, Smith J, Newman S, et al. Aflatoxicosis in dogs and dealing with suspected contaminated commercial foods. *J Am Vet Med Assoc* 2006; 228: 1686-1691. (available online at www.avmajournals.avma.org)
25. Bren L. Pet food: The lowdown on labels. *FDA Veterinarian Newsletter* 2001; XVI (No IV). Available Online at <http://www.fda.gov/animalveterinary/newsevents/fdaveterinariannewsletter/ucm130726.htm> Accessed September 21, 2010.
26. Finley R, Ribble C, Aramini J, et al. The risk of Salmonellae shedding by dogs fed Salmonella-contaminated commercial raw food diets. *Can Vet J* 2007; 48: 69-75.

27. Weese JS, Rousseau J. Survival of Salmonella Copenhagen in food bowls following contamination with experimentally inoculated raw meat: Effects of time, cleaning, and disinfection. *Can Vet J* 2006; 47: 887–889.
28. Finley R, Reid-Smith R, Ribble C, et. al. The occurrence and antimicrobial susceptibility of Salmonellae isolated from commercially available canine raw food diets in three Canadian cities. *Zoonoses Public Health* 2008; 55: 462-469.
29. Wojciechowska JI, Hewson CJ, Stryhn H, et. al. Development of a discriminative questionnaire To assess nonphysical aspects of quality of life of dogs. *Am J Vet Res* 2005; 66: 1453-1460.
30. Buffington CA. External and internal influences on disease risk in cats. *J Am Vet Med Assoc* 2002; 220: 994-1002.
31. Yeates J, Main D. Assessment of companion animal quality of life in veterinary practice and research. *J Small Anim Pract* 2009; 50: 274-281.
32. Stella JL, Lord LK, Buffington CAT. Sickness behaviors in domestic cats. *J Am Vet Med Assoc* (In Press, 2010).
33. Buffington CA, Westropp JL, Chew DJ, Bolus RR. Clinical evaluation of multimodal environmental modification (MEMO) in the management of cats with idiopathic cystitis. *J Fel Med Surg* 2006; 8: 261-268.
34. Landsberg GM, Hunthausen W, Ackerman L. Handbook of behavior problems of the dog and cat. Philadelphia: Elsevier, 2003: 554.
35. Overall K. Clinical behavioral medicine for small animals. St. Louis: Mosby, 1997: 60-194.
36. Taylor J. Puzzling petfood. *Pet Food Industry Magazine* 2010; 52: 34-39.
[Http://Www.Petfoodindustry-Digital.Com/Petfoodindustry/201002/#Pg36](http://www.petfoodindustry-digital.com/petfoodindustry/201002/#Pg36)
Accessed September 21, 2010.
37. Milgram NW, Siwak-Tapp CT, Araujo J, Head E. Neuroprotective effects of cognitive enrichment. *Ageing Res Rev* 2006; 5: 354-369.
38. Overall KL, Dyer D. Enrichment strategies for laboratory animals from the viewpoint of clinical veterinary behavioral medicine: Emphasis on cats and dogs. *ILAR J* 2005; 46: 202-215.
39. Chan D, Freeman LM. Nutrition in critical illness. *Vet Clin North Am Small Anim Pract*, 2006; 36: 1225-1241.
40. Eirmann L, Michel KE. Enteral nutrition. In: Silverstein DC, Hopper K (eds). *Small animal critical care medicine*, St Louis: Saunders Elsevier, 2008: 53-62.
41. Frankel RM. Pets, vets, and frets: What relationship-centered care research has to offer veterinary medicine. *J Vet Med Educ* 2006; 33: 20-27.

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42. Cornell K, Brandt JC, Bonvicini K. Effective communication in veterinary practice. *Vet Clin North Am Small Anim Pract* 2007; 37: 1-198. Additional Information is Available at The Bayer Animal Health Communication Project [Http://www.healthcarecomm.org/bahcp/homepage.php](http://www.healthcarecomm.org/bahcp/homepage.php)
43. Vogt AH, Rodan I, Brown M et al. AAFP-AAHA feline life stage guidelines. *J Fel Med Surg* 2010; 12: 43–54.
44. Epstein M, Kuehn N, Landsberg G. AAHA senior care guidelines for dogs and cats. Available at: http://www.aahanet.org/PublicDocuments/Senior_Care_final.pdf