

# The Fountain of Age: Feeding Strategies for Senior Pets

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## Abstract

As the pet population ages and life spans increase, elder pets are becoming an increasing proportion of the population. The veterinary health care team must take a proactive approach to provide nutritional assessments and individual recommendations to pets throughout their life, especially in the senior years. Nutritional needs change in healthy elder pets compared to the young adult life stage. Advancing age also is a time of higher risk for developing medical conditions. Early detection of medical problems can lead to earlier nutritional intervention to support recovery, health and quality of life. With the increased risk of health problems, some comorbidities present a nutritional conundrum. This discussion, using dogs as the primary emphasis, will outline a clinical approach of assessing each patient and prioritizing problems for nutritional care.

## Aging Is Not a Disease

Senior pets increasingly present to veterinarians for primary care and represent approximately one-third of the pet dog population.<sup>1</sup> Life spans are increasing and thus both the percentage and the age of elder dogs may be increasing.<sup>2</sup> The point at which a dog progresses from adult to a senior or geriatric life stage is variable and subjective. Dogs' life expectancies vary widely depending on breed and body size, and aging changes also are variable. Physiologic changes associated with aging may include loss of senses (hearing or vision), reduced energy requirements and lean body mass,<sup>3,4</sup> as well as a decline in various organ functions. The American Animal Hospital Association Senior Care Guidelines suggest that, with the exception of large-breed dogs, most dog breeds reach middle age by 7 to 8 years of age and should be considered seniors when they reach the last 25% of the predicted life span for their breed.<sup>5</sup> Despite this arbitrary categorization, physiologic changes may develop in middle-aged and senior dogs making them less tolerant of nutritional deficiencies or

## Glossary of Abbreviations

**AA:** Arachidonic Acid  
**AAFCO:** American Association of Feed Control Officials  
**BCS:** Body Condition Score  
**BW:** Body Weight  
**DHA:** Docosahexaenoic Acid  
**EPA:** Eicosapentaenoic Acid  
**GI:** Gastrointestinal  
**LBM:** Lean Body Mass  
**MCS:** Muscle Condition Score  
**MCT:** Medium-Chain Triglycerides  
**MER:** Maintenance Energy Requirement  
**OA:** Osteoarthritis

excesses. Middle-aged dogs are more vulnerable or “at risk” for age-related health problems. Middle age may bring an increasing incidence of chronic diseases, many of which can be influenced by nutritional management.<sup>6</sup> Thus, a vital component of preventive medical care should include a “senior” screen or health-risk assessment for early detection of health problems and adjustments to care to preventing or slowing the onset of age-related diseases. Every senior health screen should include a thorough nutritional assessment

followed by an individualized nutritional recommendation.

## What Is a Senior Pet Food?

Pet owners perceive that most pets, including senior dogs, are healthy and do not require a therapeutic food,<sup>7</sup> but they still have hundreds of pet foods to choose from. Advice and information recommending the best food is available almost anywhere, from trainers to pet food retailers and from magazines and internet sources to social media. In a survey of pet owners' opinions about nutritional requirements of senior dogs, most responded that senior dogs have different nutritional needs than adults with seniors needing lower calories, fat, sodium, protein, and carbohydrates.<sup>8</sup> However, it is important to remember that there is no established American Association of Feed Control Officials (AAFCO) nutrient profile for a “senior” life stage, thus the nutrient content of products marketed for senior pets varies widely. There is a wide discrepancy between perceived needs of senior pets and actual diet composition of products marketed for senior pets. This makes it even more critical for the veterinary health care team to play an active role in providing credible nutritional advice, especially for senior dogs that have unique nutritional concerns.

## Performing a Nutritional Assessment

Before any diet changes are recommended, a nutritional evaluation should be performed. Each nutritional assessment and recommendation should include three components: the

patient, the diet and feeding management factors.<sup>9</sup> An accurate diet history is invaluable when assessing the nutritional health of the patient and will be vital to formulating an individualized diet plan. Understanding the nutritional changes that occur with aging and identifying any changes in the individual patient can help the clinician better match the appropriate food with the patient's unique needs. The patient, the food and the pet owner's feeding practices are interrelated and require reassessment. Health and nutritional status are not static especially in senior pets but rather a dynamic process worthy of continued reevaluation and treatment modifications to match the changing needs of the pet.

### Patient Assessment

An initial assessment of the patient can be done quickly and uses information collected as part of a health assessment: a complete medical and diet history and a thorough physical examination and appropriate lab work (e.g., complete blood count, serum biochemical profile, urinalysis, and thyroid function [feline]). The nutritional screening process (Table 1) can quickly identify patients with "nutritional" risks. Healthy seniors, or those without identified risks, that are eating a nutritionally balanced diet, have a healthy body weight, including healthy body condition score (BCS) and muscle condition score (MCS), and are free of significant physical or laboratory abnormalities need no further evaluation at this time. A pet-specific nutrition assessment and recommendation for healthy seniors can be done quickly. Nutritional recommendations should include: the specific food that matches the pet's current nutritional needs, the amount and frequency for feeding and a monitoring plan. In many of these patients, the feeding recommendation involves little or potentially no change but should include a verification and validation for the owner that

Table 1. Initial Screen: Assessing for Nutritional Risk Factors	
Nutritional Screen for Risk Factors	Require extended evaluation if (✓)
<b>HISTORY OF:</b> Treats/snacks/human foods >10% intake Inadequate information/inappropriate feeding/food Consuming unconventional diets Previous/ongoing medical problems Gastrointestinal signs	
<b>PHYSICAL EXAMINATION:</b> Any abnormal BCS (≠ 5/9 or 3/5) Any MCS <3 Unintentional weight loss or gain New medical condition Poor skin hair coat Dental disease	
Adapted from Table 2, AAHA Nutrition Assessment Guidelines. The more risk factors identified, the greater the need for an in-depth nutritional evaluation and recommendation.	

Table 2. Extended Screening: Assessing senior dogs for nutritionally relevant age-related factors	
Extended evaluation: Age-related diseases to evaluate in senior dogs	
Abnormal Body Condition — Is this pet overweight or underweight?	
Diet — Is the pet eating appropriate amounts of balanced diet?	<ul style="list-style-type: none"> <li>Assess appetite and intake</li> <li>Assess ability to eat; prehension, mastication swallowing for those underweight &amp;/or poor intake</li> <li>Perform oral exam — include periodontal, tonsils or any oral abnormalities</li> <li>Assess sensory input; smell, vision, palatability of food. Consider palatability enhancer if necessary</li> </ul>
Mobility and access to food and water	<ul style="list-style-type: none"> <li>Is the pet able to walk, access food provided? Able to stand to eat?</li> <li>Other pets or physical limitations impairing access?</li> <li>Mobility and exercise — Is the pet's MCS normal (3/3)?</li> <li>Presence of osteoarthritis, lameness, pain? Do these play a role in maintenance of comfort, fitness and healthy BCS?</li> <li>Activity minimizes sarcopenia</li> <li>Exercise and activity provide mental stimulation and environmental enrichment</li> </ul>
Assess cognitive function	<ul style="list-style-type: none"> <li>Disorientation/confusion — becomes lost or confused, fails to recognize familiar people?</li> <li>Changed interactions with family members? Isolates or seeks attention less often?</li> <li>Change in sleep/activity cycles? Wander or pace, sleep more in day, less at night?</li> <li>Loss of house training (nonmedical reasons)</li> </ul>
An extended evaluation is performed if more than one risk factor is identified in the nutritional screening process. This evaluation should include eating; both appetite and intake and oral exam, aspects of activity and mobility, sleep cognitive function, and behavior.	

the current food and feeding plan meets the pet's needs and a documentation of the current feeding plan in the medical record.

If nutritional risk factors or age-related problems are identified, an extended evaluation and management plan is indicated. This in-depth evaluation should address some common age-related diseases that may be influenced by nutritional management (Table 2):

- Weight management — achieve or maintain a healthy body weight
- Osteoarthritis
- Cognitive dysfunction
- Organ dysfunction(s)

## Diet Assessment

A complete diet history is important for evaluating the pet's current nutritional status. Ideally you would like enough information to reproduce the animal's exact diet (brand and amounts eaten). The diet history should identify all snacks, treats and nutritional supplements by type and amount. The drug/supplement history should include questions about the use of food to administer medication, as it may comprise a significant portion of the pet's intake. Diet history information combined with the patient assessment provide information about the patient's daily caloric requirements and specific nutrient intake. This nutrient intake should be compared to the patient's individual needs. For example, an overweight pet with a robust appetite should not be fed a calorie-dense product. Reducing the amount of a high-calorie product to limit calorie intake could lead to deficiencies of other essential nutrients and increase hunger or undesirable food-seeking behaviors.

## Feeding Management Assessment

Feeding practices and preferences influence a pet's intake. Determine whether other pets present competition or limit access to food. Determine whether food is accurately measured, how much/how often food is offered, and how much is eaten. Determine if there have been recent changes to the feeding plan and why, as well as how the pet adapted to those changes. This information will allow the veterinary team to determine the nutritional adequacy of the current diet as well as help to identify factors that could contribute potential success or problems with adherence to a new recommendation.

## Reassessment and Modification of Treatment Plan

Nutritional assessment of geriatric pets is an ongoing process. Dogs experience a variable and wide variety of metabolic changes as they age. It is important to communicate and engage pet owners to create the expectation of continued reassessment and treatment modifications that accommodate the specific changes observed in each individual dog rather than adopting a "geriatric" protocol. A vigilant monitoring plan allows early detection of problems if they arise and a better opportunity to intervene or modify the pet's individualized nutritional plan to improve its health. Partner with clients to help ensure success and maintain adherence to the feeding and monitoring goals.

## Effects of Aging on Nutritional Needs

### Energy

Aging can result in both structural and functional changes of the gastrointestinal (GI) tract. However, no studies report clinically relevant differences in nutrient absorption between young adult and geriatric dogs.<sup>10-11</sup> Maintenance energy requirement (MER) is defined as the energy required to keep an animal in a "maintenance state" or maintaining a normal activity. MER varies depending on factors such as breed,

health, neuter status, and age. As dogs age, MER decreases ~25%, with the greatest decrease at middle age (7 years).<sup>12</sup> Loss of lean body muscle (LBM) appears to be the primary factor influencing the reduction in energy requirements.<sup>3</sup> LBM accounts for about 96% of an animal's basal energy expenditure.<sup>13</sup> Aging dogs are often less active than young adults, which contributes to reduced LBM and MER. If no adjustments are made to the pet's energy intake to account for the reduction in LBM, activity and MER, then the senior pet will gain unhealthy weight and increase the risk for obesity. BCS should be closely monitored in elder dogs to prevent obesity. Unhealthy weight gain exacerbates many age-related conditions. A higher protein-to-calorie ratio diet would be beneficial to promote ideal weight maintenance in senior pets identified at risk for obesity and associated comorbidities.<sup>14</sup> Results from a lifetime study performed in dogs revealed lower disease incidence, later onset of disease and increased life span in calorically restricted animals. Dogs fed a 25% reduction compared to controls lived an average of 13.0 years compared with 11.2 years in the control group.<sup>15</sup> Thus, maintaining energy balance and avoiding unhealthy weight gain should be one of the most important health goals for senior dogs.

### Water

Elder humans exhibit decreased thirst and drinking when challenged by fluid deprivation. Although unknown in dogs, a similar response is expected.<sup>6</sup> Thus, water intake should be monitored or ensured when elder dogs are exercising or exposed to hot environments. Senior dogs also may be at risk of dehydration if they have subclinical renal insufficiency. When a senior pet has a good appetite but water intake is suspect, add water to the food to ensure adequate intake and hydration.

### Protein

Protein requirements increase with age due to increased protein turnover and reduced protein synthesis.<sup>16,17</sup> Healthy senior dogs do not benefit from protein restriction<sup>18</sup> and may be harmed by limiting dietary protein.<sup>19</sup> Protein restriction of seniors could be more detrimental than protein deficiency in younger animals.<sup>20</sup> As a general guideline for estimating daily protein needs, provide 2.55 gms protein/kg body weight (BW) or ~1 gm protein/lb BW.<sup>8, 20, 21</sup> This level of protein intake should minimize the risk of protein deficiency. Senior dogs may need up to 50% more than this.<sup>21</sup> Older dogs also require fewer calories, or less food than younger dogs. Diets for older dogs should not only contain lower calories but a higher percentage of protein, or a higher protein:calorie ratio in order to meet the dog's age-related nutritional needs. Based on the diet history, assure the patient is meeting daily protein needs; ~1 gm protein/lb BW (2.55 gm/kg BW), and for cats, 2 gm/lb BW (5 gms/kg)<sup>22-24</sup> minimum. Food with 25% of the calories from quality protein should meet the needs of most

healthy aged dogs and minimize loss of LBM. Assess MCS to monitor LBM.

## Nutritional Intervention of Selected Age-Related Diseases

Although the most common age-related conditions are best managed with a multimodal approach combining nutritional strategies, exercise or environmental enrichment and possible medical management, this discussion will focus on nutritional management.

### Overweight/Obesity

Hyperadiposity, the most prevalent form of malnutrition, contributes to many of the diseases linked to obesity.<sup>25-27</sup> Still, pets that are overweight very often go unrecognized or may not have this health concern addressed. Based on the canine life span study,<sup>15</sup> which demonstrated the benefits of maintaining a lean body condition, many negative health consequences can occur with as little as 15% weight gain above healthy ideal BCS (4.5-5/9). Thus maintaining or achieving healthy weight and body condition should remain a top priority for senior pet health. Yet overweightness and obesity is still one of the most significant health problems among middle-aged and elder dogs. Monitor the pet's diet, BW, BCS, and MCS at each veterinary visit. Once excess weight is diagnosed, action should be taken to achieve healthy BW and BCS. Creating a negative energy balance promotes weight loss, but nutritional needs still must be met with fewer calories. This is best achieved by feeding foods with low-calorie density, increased protein content and increased nutrient calorie:ratio to assure adequate intake of essential nutrients while restricting calories.

### Degenerative Joint Disease

Osteoarthritis (OA), the most prevalent joint disorder in dogs, affects as many as one in four dogs, with OA increasing in incidence and severity with advancing age. Being overweight or obese is recognized as a primary risk factor.<sup>28</sup> Poor mobility and decreased activity are both components of a frailty score in dog. Increased frailty is associated with time to death.<sup>29</sup> Nutritional strategies for improving geriatric health span and minimizing OA include the following:  
**Weight and Muscle Management:** Loss of excess body weight/fat can improve clinical signs of lameness in arthritic dogs.<sup>30</sup> Strategies to maintain healthy BW, BCS and LBM and prevent sarcopenia should be prioritized for senior dogs. This can be achieved by selecting a complete and balanced diet that meets protein and other nutrients while also providing the amount of calories to prevent excess body fat gain. The nutritional goal is to delay the onset and prevent the progression of OA and delay frailty.

**Long-Chain Omega-3 Fatty Acids (n-3):** These show the greatest evidence for synovial anti-inflammatory effects<sup>31,32</sup>

compared to other nutraceuticals. Omega-3 fatty acids, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) compete with arachidonic acid (AA) in cell membranes to yield less inflammatory leukotrienes prostaglandins and thromboxanes, which reduce the pain of OA. Marine oils (EPA>DHA)<sup>33</sup> are preferred with more effective anti-inflammatory effects compared to shorter chain flax or other plant source n-3 oils. Studies have shown prefeeding an n-3 supplemented diet to dogs before cruciate ligament rupture helped reduce the severity of damage to the joint. There is currently no standard accepted dose. Veterinary diets formulated to help pets with OA have enriched concentrations of omega-3 fatty acids, EPA (EPA: 20:5, n=3) and DHA (DHA: 22:6, n=3). The therapeutic joint diets also include some combination of proteoglycan precursors (glucosamine and chondroitin sulfate) and antioxidants. Consumption of therapeutic diets may allow a reduction in NSAID use. These diets would be better-suited for pets that are not overweight, as therapeutic joint diets are not intended for weight reduction and limiting food to achieve weight loss may not only lead to nutrient deficiencies but also may not deliver the therapeutic level of supplements. For this reason, a new generation of combination diets featuring therapeutic diets formulated with a weight-loss component combined with mobility supplements is entering the market.

### Cognitive Dysfunction

As many as 20 to 68% of middle-age to elder dogs are thought to experience cognitive dysfunction or behavioral changes that can manifest in varying degrees of mental decline<sup>34</sup> (Table 2). Nutraceuticals may have potential use both in prevention and treatment but are best when combined with environmental enrichment.<sup>35-37</sup>

**Antioxidants:** The brain is especially susceptible to free-radical damage and cognitive dysfunction. Multiple studies have shown improved clinical signs of age-related cognitive changes in dogs fed antioxidant-enriched diets or supplements.<sup>35-37</sup>

**Medium-Chain Triglycerides:** Supplementation with medium-chain triglycerides (MCT) improved cognitive performance and preserved the brain structure of elder dogs. MCT provides an alternate cerebral energy source by way of ketones without restricting dietary carbohydrate or proteins.<sup>38-40</sup>

**Supplements Versus Enriched Diets:** One caveat for the use of nutraceutical supplementation is that they have not been adequately assessed for efficacy, optimal doses or nutrient interactions. When considering whether to select a diet containing the supplement or to prescribe a supplement, consider the nutrient composition of the "base diet." Assure that the base diet meets the macronutrient needs of the patient and then determine if it will provide an adequate dose of the intended supplement when fed to meet the energy needs of the pet. If not, it would be prudent to select a more appropriate diet and give the intended dose of supplement.

**Table 3.** Common Nutrient Modification Ranges for Managing Comorbidities

Nutrient Modification	Dog	Cat
Low protein	<5 gm/100 kcal	<7 gm/100 kcal
High protein	>8 gm/100 kcal	>10 gm/100 kcal
AAFCO* minimum protein requirement	2.0 gm/100 Kcal	4 gm/100 kcal
Low fat	<2.5 gm/100 kcal	<3 gm/100 kcal
High fat	>5 gm/100 kcal	>5 gm/100 kcal
Low sodium	40-120 mg/100 kcal	50-100 mg/100 kcal
AAFCO* minimum sodium requirement	20 gm/100 kcal	50 gm/100 kcal
Low phosphorus	40-120 mg/100 kcal	80-135 mg/100 kcal
AAFCO* minimum phosphorus requirement	100 mg/100 kcal	1.25 mg/100 kcal

\*2016 AAFCO adult maintenance minimums  
Typical nutrient ranges and AAFCO minimum levels for adult maintenance to use as reference when selecting products with nutrient modifications to either enrich or restrict a particular nutrient.

### The Condundrum of Comorbidities

Making a nutritional recommendation seems straightforward when the senior pet is healthy or has only a single problem. Challenges arise when patients present with multiple seemingly competing or conflicting comorbidities such as being overweight with renal disease or cancer and pancreatitis. Except for obesity and osteoarthritis, there is little research in how to manage multiple problems. Yet in the absence of evidence, a patient must eat. A general approach is to perform a thorough nutrition assessment and first try and meet minimum nutrient requirements. If a patient is not eating enough to maintain weight, nutritional support is indicated. If the patient is eating, prioritize problems by determining which condition is progressive, impairing quality of life or imparting the poorest prognosis. Manage those aspects and when possible, address the nutrients of concern for the other conditions. Table 3 lists typical ranges of nutrient modifications to consider when managing multiple medical conditions. For example, an overweight senior cat or dog with early kidney disease may benefit from a modestly high protein, lower phosphorus diet.<sup>41</sup> Once a diet plan is implemented, the patient is monitored to see if the desired effect is achieved with a repeated nutritional assessment and modifications to the plan as necessary in an iterative process.

### Summary

Senior pets are increasingly becoming a sizable proportion of patients seen in primary care. Therefore, a proactive approach to making nutrition recommendations to support optimal health and body condition will contribute to their health span. More frequent health screens beginning when pets are middle-aged help to improve disease surveillance, early detection and medical and nutritional intervention.

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