New Tricks for Feeding Old Dogs
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Maturity is not a disease
Senior dogs commonly present to veterinarians for primary care and represent approximately one third of the pet dog population. Lifespans are increasing and thus both the percentage and the age of elder dogs may be increasing. Pet owners perceive that most pets, including senior dogs are healthy and do not require a therapeutic food, but they are still left with hundreds of pet foods to choose from. Advice and information recommending the best food is available almost anywhere; from trainers to pet food retailers, from magazines, internet sources and social media. However it is important to remember that there is no established AAFCO nutrient profile for a "senior" life stage, thus the nutrient content of products marketed for senior pets varies widely. 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.

What is old?
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 are also variable. They may include loss of senses (hearing or vision), reduced energy requirements and lean body mass as well as a decline in various organ functions. The American Animal Hospital Association Senior Care Guidelines suggest that, with exception of large-breed dogs, most dog breeds reach middle age by 7-8 years of age and should be considered seniors when they reach the last 25% of the predicted life span for their breed. Despite this arbitrary categorization, physiologic changes that occur in middle-aged and senior dogs make them less tolerant of nutritional deficiencies or excesses. Middle aged dogs are “at risk” or more vulnerable to age-related health problems. Middle age may bring an increasing incidence of chronic diseases, many of which can be influenced by nutritional management. 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 slow onset of age-related diseases. Every senior health screen should include a thorough nutritional assessment followed by an individualized nutritional recommendation.

Performing a nutritional assessment
Before any diet changes are recommended, a nutritional evaluation should be performed. Each nutritional assessment and recommendation should include 3 components: the patient, the diet and feeding management factors. 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 re-evaluation and treatment modifications to match changing needs of the pet.

Patient assessment
An initial assessment of the patient can be done quickly and utilizes information collected as part of a health assessment: a complete medical and diet history and a thorough physical examination and appropriate lab work (ex, CBC, serum biochemical profile, urinalyses). The nutritional screening process (Table 1) can quickly identify patients with “nutritional” risks. Healthy seniors, ( those without identified risks), who are eating a nutritionally balanced diet, have a healthy body weight, body and muscle conditions (BCS, 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 name of 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 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

Diet assessment
A complete diet history is important for evaluating the pet’s current nutritional status. Ideally you would like enough information that you can 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 to a significant portion of the dog’s intake. Diet history information combined with the patient assessment provides 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, and overweight pet with a robust appetite, should not be fed a calorie dense product. Reducing the amount of a high calorie product as a way 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 how the pet accepted those changes. This information will allow the veterinary team to determine the nutritional adequacy of the current diet, as well as help 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 results in changes to both structure and functional of the GI tract. However, no studies report clinically relevant differences in nutrient absorption between young adult and geriatric dogs. Maintenance energy requirement (MER) is defined as the energy required to keep an animal in a “maintenance state”, or maintaining a normal activity. MER caries 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). Loss of lean body muscle (LBM) appears to be the primary factor influencing the reduction in energy requirements. LBM accounts for about 96% of an animal’s basal energy expenditure. Aging dogs are less active which also 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 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. 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. 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. Thus water intake should be monitored or ensured when elder dogs are exercising or exposed to hot environments. Senior dogs may also be at risk dehydration if they have subclinical renal insufficiency. When a senior pet’s appetite is good 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. Healthy senior dogs do not benefit from protein restriction and may be harmed by limiting dietary protein. Protein restriction of seniors could be more detrimental than protein deficiency in younger animals. A general guideline for estimating daily protein needs is to provide 2.55 gms protein /kg body weight (BW) or ~ 1 gm protein/lb BW. This level of protein intake should minimize risk of protein deficiency. Senior dogs may need up to 1.5-2 times more than this. 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 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, the discussion will focus on nutritional management.

Overweight/obesity

Hyperadiposity, the most prevalent form of malnutrition, contributes to many of the diseases linked to obesity\textsuperscript{21-23}. Still pets that are overweight go unrecognized or may not have this health concern addressed. Based on the canine lifespan study\textsuperscript{12} which demonstrated many negative health consequences of overweightedness and benefits of being lean, weight management should remain a top priority for senior pet health. Yet it remains one of the most significant health problems among middle aged and elder dogs. Monitor the pet’s diet, BW, BCS and MCS at each visit. Once excess weight is diagnosed, action should be taken to achieve healthy BW and BCS. Creating a negative energy balance promotes weight loss. 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 20\%, and obesity is recognized as a primary risk factor\textsuperscript{24}. Nutritional strategies for OA include the following:

- **Weight and muscle management**

  Loss of excess body weight/fat can improve clinical signs of lameness in arthritic dogs\textsuperscript{25}. Strategies to maintain healthy BW, BCS and LBM and prevent sarcopenia should be prioritized for senior dogs. The can be achieved by selecting a complete and balanced diet that meets protein and other nutrients when providing the amount of calories to prevent excess body fat gain. The nutritional goal is to delay onset and prevent progression of OA.

- **Long chain omega-3 fatty acids (n-3)**

  Shows the greatest evidence for synovial anti-inflammatory effects\textsuperscript{26,27} compared to other nutraceuticals. Marine oils (EPA> DHA)\textsuperscript{28} are preferred with more effective anti-inflammatory effects compared to shorter chain flax or other plant source n-3 oils. There is no standard accepted dose.

Cognitive dysfunction

As many as 20-68\% of middle age to elderly dogs experience cognitive dysfunction or behavioral changes which can manifest in varying degrees of mental decline\textsuperscript{29}. (Table 2). Nutraceuticals may have potential use both in prevention and treatment, but are best when combined with environmental enrichment\textsuperscript{30-32}.

- **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\textsuperscript{30-32}.

- **Medium chain triglycerides**

  Supplementation with MCT improved cognitive performance and preserved brain structure of elder dogs. MCT provides an alternate cerebral energy source by way of ketones without restricting dietary carbohydrate or proteins\textsuperscript{34, 35}.

Supplements versus enriched diets

One caveat for the use of nutraceutical supplementation is that 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 the base diet meets the macronutrient needs of the patient and 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 1. Initial screen: assessing for nutritional risk factors

<table>
<thead>
<tr>
<th>Nutritional Screen for Risk Factors</th>
<th>Require extended evaluation if (✓)</th>
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<tbody>
<tr>
<td><strong>HISTORY OF:</strong></td>
<td></td>
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<tr>
<td>Treats/snacks/human foods &gt; 10% intake</td>
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<tr>
<td>Inadequate information/inappropriate feeding/food</td>
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<tr>
<td>Consuming unconventional diets</td>
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<tr>
<td>Previous/ongoing medical problems</td>
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<tr>
<td>Gastrointestinal signs</td>
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<tr>
<td><strong>PHYSICAL EXAMINATION:</strong></td>
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<tr>
<td>Any abnormal BCS (≠5/9 or 3/5)</td>
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<tr>
<td>Any MCS &lt;3</td>
<td></td>
</tr>
<tr>
<td>Unintentional weight loss OR gain</td>
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<tr>
<td>New medical condition</td>
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<td>-----------------------</td>
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<tr>
<td>Poor skin hair coat</td>
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<tr>
<td>Dental disease</td>
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Adapted from Table 2, AAHA Nutrition Assessment Guidelines

Table 2. Extended screening: assessing senior dogs for nutritionally relevant age-related factors

Extended evaluation:
Age-related diseases to evaluate in senior dogs

<table>
<thead>
<tr>
<th>Abnormal Body Condition- Is this pet overweight or Underweight?</th>
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<tbody>
<tr>
<td>Diet- Is the pet eating appropriate amounts of balanced diet?</td>
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<tr>
<td>• Assess appetite and intake</td>
</tr>
<tr>
<td>• Assess ability to eat; prehension, mastication swallowing for those underweight &amp;/or poor intake</td>
</tr>
<tr>
<td>• Assess sensory input; smell, vision, palatability of food. Consider palatability enhancer if necessary</td>
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<table>
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<tr>
<th>Mobility and access to food and water</th>
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<tr>
<td>• Is the pet able to walk, access food provided? Able to stand to eat?</td>
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<tr>
<td>• Other pets or physical limitations impairing access?</td>
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<tr>
<td>• Mobility and exercise- is the pet’s MCS normal (3/3)?</td>
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<tr>
<td>• Presence of osteoarthritis, lameness, pain?- play a role in maintenance of comfort, fitness and healthy BCS</td>
</tr>
<tr>
<td>• Activity minimizes sarcopenia</td>
</tr>
<tr>
<td>• Exercise and activity provide mental stimulation and environmental enrichment</td>
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Assess cognitive function

| • Disorientation/confusion-becomes lost or confused, fails to recognize familiar people? |
| • Changed interactions with family members? Isolates or seeks attention less often? |
| • Change in sleep/activity cycles? Wander or pace, sleep more in day, less at night? |
| • Loss of house training (non-medical reasons) |

References available upon request


The influence of dietary protein, lipid, phosphorus and sodium on renal structure and function in geriatric dogs. Churchill J, in PhD thesis. Department of Veterinary Clinical Sciences, College of Veterinary Medicine, University of Minnesota, St Paul, MN 2001.


