

## MEETING THE NUTRITIONAL NEEDS OF SENIOR CATS

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### INTRODUCTION

As cats age, weight loss is common. Geriatric cats are more likely than adult cats to be underweight. There are numerous reasons and mechanisms for this, some of which are associated with “normal” aging. Weight loss, to the point of poor body condition, is a risk factor for illness and death in humans as well as in cats.<sup>1-4</sup> To some degree, we can impact these changes through nutritional intervention.

### THE SKINNY ON WEIGHT LOSS

Obesity is an epidemic in young and senior adult cats (i.e., < 12 years of age) are prone to overweight or obesity as their maintenance energy requirements (MER) decrease without concurrent decrease in energy intake. Lean body mass, (LBM, skeletal muscle, bone, skin, and organs), decreases in cats with advancing age, just as it does in other species. Because LBM is a primary driver of metabolism, decreases in muscle and activity result in weight gain. Obesity is a risk factor for manifesting diabetes mellitus and arthritis in predisposed individuals.

However, about 15% of cats over 12 years of age have a low body condition<sup>5,6</sup> and after 14 years of age, cats have a 15 times greater risk for being under condition<sup>6</sup>. In a study of 90 healthy cats over seven years of age that were followed until death, an average weight loss of almost 50% of adult weight was found<sup>7,8</sup>. Additionally, this study showed an association between longer life span and less weight loss. Further analysis showed that each 100g loss of weight increased the risk of death by 6.4%, each 100g loss of lean body mass increased the risk of death by 20%, but that each 100g loss of body fat increased the risk of death by 40%<sup>7</sup>. Some loss of weight is part of normal aging and is not caused by illness but that we may be able to address it nutritionally to some degree, potentially improving longevity as well as quality of life.

### TRENDS - ESPECIALLY IMPORTANT IN THE SENIOR CAT

Serial evaluation over time is invaluable because it helps detect trends such as weight loss, progressive changes in muscle mass, serum biochemical or hematological parameters. Rather than focusing on point-in-time values, this simple technique detects subtle changes before clinical illness becomes apparent allowing for intervention to prevent or slow the progression of problems. Studies have shown that weight loss can begin as long as 3 years before diagnosing chronic kidney disease (CKD) and up to 4 years before death from any cause.

Additionally, addressing weight and muscle loss can impact the development of disease, reduce its severity, as well as mortality. The loss of LBM has profound effects on survival as well as immune function, wound healing and strength in people. In companion animals, studies have identified decreased survival as being associated with thin body condition.<sup>1,2,9</sup> Weight loss, anorexia, weakness and a perceived poor quality of life are reasons for clients to seek euthanasia. Being slightly overweight improves outcomes for people with heart disease and cancer. In one study of cats with large cell lymphoma, those that lost > 5% body weight during treatment had a significantly shorter survival time than those who were able to maintain their weight<sup>10</sup>. Other cancer patients with a slightly increased or ideal BCS survived up to six times longer than underweight cats<sup>11</sup>. Cats with higher BCS and CKD, lived longer than those with lower BCS.<sup>12</sup> Similarly, cats with heart failure had best outcome if they were normal (or slightly increased) weight before treatment rather than being underweight or obese<sup>13</sup>.

In the extensive study already mentioned evaluating feeding healthy<sup>8</sup>, the use of dietary antioxidants (Vitamin E, beta carotene) alone or in combination with a prebiotic (chicory root) and a blend of oils to supplement n-3 and n-6 fatty acids was evaluated for effect on the health and longevity of cats when compared to a complete and balanced diet. Ninety healthy cats over seven years of age (grouped into 7-9, 10-12 and 13 + years of age at time of start) were studied in a controlled environment for five years. As described earlier and as expected, all cats lost weight as they aged, but cats in the fully supplemented group lost less weight than those in the other two groups. Other beneficial effects noted were improved LBM scores, improved fecal microflora, fewer diseases (notably gastrointestinal) during the study and longer life.

## WHAT TO FEED SENIORS

In general, “senior” diets are designed for mature, overweight cats. They are reduced in calories and may also not be of sufficient digestibility to meet the protein and fat needs of a *thin* geriatric cat. Ascertaining the type and quantity of food fed is critical in managing an underweight, elderly cat. Key to determining the appropriate diet for any given individual is a nutritional assessment<sup>14</sup>.

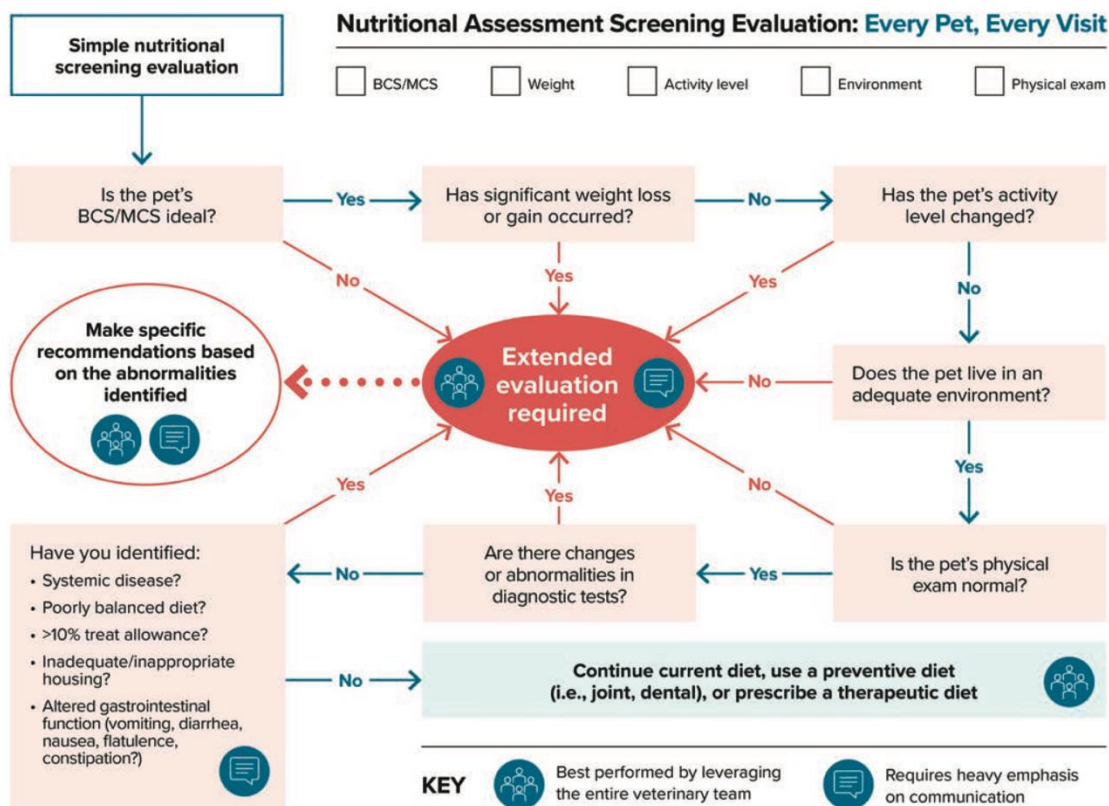
## ASSESSING NUTRITION AND BODY CONDITION

A nutritional assessment should be part of every consultation. This does not need to be intimidating or a burden. Start by asking about the specifics regarding foods, treats, and supplements, (brands, quantities, frequency and whether bowl or feeding puzzle used, etc) and amount of water drunk. Move on to assessing and recording body weight, body and muscle condition scores (BCS, MCS) at every visit, and asking whether activity level or environment have changed<sup>15</sup>. Muscle quantity and quality are a measure of protein intake and utilization. Another easy and useful tool is to determine the percentage weight change as this helps with the early detection of inappropriate weight gain, illness with weight loss or success in managing unhealthy body weight.

$$\% \text{ weight change} = \frac{(\text{previous weight} - \text{current weight})}{\text{previous weight}}$$

A simple diet history form can be found at: <http://www.wsava.org/nutrition-toolkit>.

Cline, et al<sup>15</sup> use the following algorithm:



## HYDRATION, NUTRITION, ANALGESIA, AND MEETING BEHAVIOURAL NEEDS

Optimizing hydration, meeting nutritional needs, alleviating pain and ensuring that a cat is able to perform species-specific and personal behaviours are the four pillars for ensuring well-being at any age.

Factors resulting in stress, such as environmental or social changes may cause, or contribute to, inappetence. Difficulty getting to food, comfortably is often due to arthritis, but possibly from diabetic neuropathy or interference by other individuals can result in muscle and/or weight loss. A decline in taste, smell or vision may cause inappetence. Pain and nausea may interfere with eating: pain is commonly associated with arthritis and oral disease (periodontal disease, root exposure, odontoclastic resorptive lesions, stomatitis and oral masses).

**NORMAL WEIGHT LOSS & SARCOPENIA IN APPARENTLY HEALTHY OLD CATS**

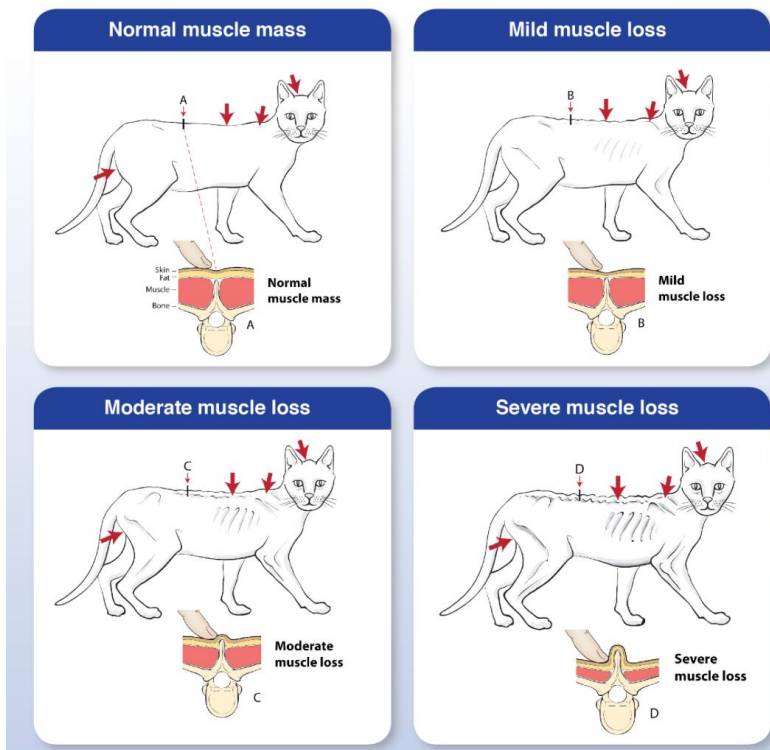
**Sarcopenia**, “poverty of flesh”, is an age-related loss of lean body mass. It is not caused by disease and is a gradual process, progressing with aging. Initially it is inapparent, because increases in body fat maintain, or even cause increases in body weight. Loss of muscle can occur without fat loss or a decrease in BCS and individuals can retain an obese or overweight BCS yet be under muscled (“sarcopenic obesity”). Because of this, both subjective BCS and muscle condition scoring (MCS, Figure 1, Table 1) should be performed in all cats, in order to evaluate fat mass and lean mass independently of each other <sup>16</sup>. (In humans, a calculated lean mass index has been suggested as being more relevant than body mass index [BMI]). Similar to humans, a mean loss of 34% LBM has been reported in a group of geriatric cats over eight years of age <sup>7</sup>. Sarcopenia is associated with increased morbidity and mortality in cats <sup>7</sup>. They manifest sarcopenia to lesser or greater degrees, therefore loss of weight and especially loss of muscle should be investigated before attributing it to natural causes.

**Table 1: Muscle condition scoring criteria<sup>17</sup>**

Score	Assessment of Muscle Condition*
0	Muscle mass is severely wasted
1	Muscle mass is moderately wasted
2	Muscle mass is mildly wasted
3	Muscle mass is normal

\*Muscle condition is assessed by palpation over the spine, scapulae, skull, or wings of the ilia

**Figure 1: Muscle condition scoring image<sup>17</sup>**



Numerous other factors besides sarcopenia can contribute to muscle and weight loss. Maintenance energy requirements vary with age, genetic potential, health status, and gender (intact or altered). MERs decrease with age in humans, dogs and rats. In cats, while MERs decrease until about 21-12 years of age resulting in weight gain, MERs per unit body weight actually increase after this age<sup>5,16,18-19</sup>. In addition, studies in geriatric cats over 12 years of age show that fat digestibility decreases with age<sup>17</sup>.

Studies in geriatric cats have shown a reduced digestive ability and this may contribute to their increased MER<sup>18,19,21</sup>. Perez showed a reduced ability to digest protein in 20% of geriatric cats with about 33% having a significant reduction in their ability to digest dietary fat, as high as 30%<sup>17</sup>. Another study revealed similar results reporting an 8% average reduction in energy digestion and 6% in protein digestion<sup>22</sup>. Micronutrient absorption is also decreased in healthy cats: potassium, phosphorus, sodium, choline, B vitamins and Vitamin E<sup>23</sup>.

This is of clinical relevance when we try to design the optimal nutritional regime for our older feline patients: protein and fat restriction may well be contraindicated. Especially if underweight, older cats will benefit from a more energy-dense, highly digestible diet to help offset these age-related digestive and metabolic changes. Some loss of weight is part of normal aging, is not caused by illness but that we may be able to address it nutritionally to some degree, potentially improving longevity as well as quality of life.

### **Management of weight loss and sarcopenia in the apparently healthy old cat**

Weight loss in older cats can be a frustrating and worrying change. While possibly normal in the older individual, it is of great importance to the cat and the client that the cause be determined<sup>24,25</sup>. (Ray) Optimising oral and dental health cannot be over-emphasized, yet clients may express concern about anaesthetising the elderly cat. Several papers have looked at risk factors for anaesthesia. Proper staging of the patient and taking appropriate precautions were found to minimize perianaesthetic complications; age was not found to be a risk factor<sup>26,27</sup> (Table 2). Reminding our clients that the majority of anaesthetic procedures in human medicine are performed on elderly patients, may provide reassurance that safe anaesthesia is possible allowing their cat to enjoy the benefits from the dental or other procedure if appropriate pre-anaesthetic precautions and intra-operative monitoring are undertaken.

### **Table 2: ASA physical status classification system**

The ASA classification refers to the American Society of Anesthesiologists' classification system, based on the physical status of the patient. Five categories relevant to veterinary patients are defined as follows:

- Class 1: Normal, healthy patient
- Class 2: A patient with a mild systemic disease
- Class 3: A patient with severe systemic disease
- Class 4: A patient with a severe systemic disease that is a constant threat to life
- Class 5: A moribund patient not expected to survive without the operation

Other causes of pain should be worked up. Lameness is not a common clinical sign of arthritis in cats. The signs are often insidious or attributed to ageing. They include inappropriate elimination (often adjacent to the litter box), decreased grooming, developing an antipathy for being combed, reluctance to jump up or down, sleeping more, moving less, withdrawing from human interaction, and possibly even hiding. When activity monitors have been attached to cats' collars<sup>28</sup>, activity counts increased with non-steroidal anti-inflammatory drug (NSAID) treatment suggesting alleviation of musculoskeletal discomfort. Thus, if the history exposes evidence of decreased mobility, adaptations for getting to favourite places, thickened nails, etc., then it is reasonable to recommend that radiographs be taken, and range of motion assessed of affected joints.

If physical evaluation fails to reveal a cause for the weight loss, before attributing this problem to sarcopenia or considering more intensive testing, the cat's environment should be considered. What may not be threatening to us, or even to the cat in the past, may be perceived as a source of stress in the older, less secure cat. A discussion about ease of access to all-important resources may find a crucial defect that may be readily corrected<sup>29</sup>. Cognitive dysfunction may also contribute to changes that may affect nutritional status. A questionnaire to assess cognitive dysfunction and mobility is found as Table 3.

**Table 3: Mobility/cognitive dysfunction questionnaire\*** (modified from table courtesy of Daniëlle Gunn-Moore)

My cat:	Yes	Maybe/sometimes	No
Is less willing to jump up or down			
Will only jump up or down from lower heights			
Shows signs of being stiff			
Is less agile than 3, 6, 12 months ago**			
Cries when lifted			
Shows signs of lameness or limping			
Has difficulty getting in or out of the cat door			
Has more accidents outside the litterbox			
Spends less time grooming			
Is more reluctant to interact with me			
Plays less with other animals or toys			
Sleeps more and/or is less active than 3, 6, 12 months ago**			
Cries out loudly for no apparent reason			
Has become more fearful and/or more aggressive			
Appears forgetful			

\*Ensure there have been no environmental reasons for the change

\*\* Please indicate at what time the change occurred, i.e., compared to 3 months, etc.

Following these evaluations, should no evidence of disease, pain or stress is found, then nutritional management may prove beneficial. Both the weight loss and muscle wasting need to be addressed, as cats utilize their protein stores for a source of energy. In general, senior cats need 70 kcal/kg ideal weight/day. (Adult cats need 40-60 kcal/kg ideal weight/day.) The caloric requirements should be calculated in order to determine the amount of food (and treats) required and this amount communicated clearly to the person/people feeding the cat. While canned food may be preferable in providing more moisture, some cats are reluctant to eat it. If a change is desired, it must be made gradually with the client monitoring that the cat is eating enough food. Dry food should be available at all times, in quiet locations that are readily accessed by this individual. If a cat prefers to eat only a small quantity, eating canned food may not be appropriate as it is much less calorically dense than dry food is.

Due to the possibility of a reduced digestive ability, a high energy, highly digestible diet with an increased protein content may be appropriate. Older cats require 5-6 g of protein/kg and insufficient dietary intake results in muscle catabolism.<sup>30-32</sup> (Diets should contain approximately 10-13 g protein/100 kcal metabolizable energy to provide enough protein.) If cats are eating only small amounts of food, a higher percentage of calories from protein may be needed to meet their needs. Kitten diets may be an appropriate choice as they are fortified with micronutrients and are highly digestible. For a patient with apparent maldigestion such as seen with chronic small intestinal disease<sup>33,34</sup>, folate and cobalamin supplementation has been shown to be beneficial (folate: 0.5-1.0 mg/cat/day PO X 1 month; cobalamin 250 mg/cat SC once weekly X 6 weeks).

#### **MEETING NUTRITIONAL NEEDS FOR SPECIFIC CONDITIONS OF SENIOR CATS**

At every life stage, cats are at greater risk to develop certain conditions. (Table 4.) Age-appropriate wellness programs facilitate trend assessment to detect conditions suitable for nutritional management. (Table 5.) Arthritic cats may benefit from diets supplemented with fatty acids while cats with chronic kidney disease need phosphorus restriction. While a detailed discussion of these specific needs exceeds this presentation, the addition of omega-3 fatty acids appears to be beneficial to cats with arthritis, as does supplementation with green-lipped mussel extract and glucosamine/chondroitin sulfate. Older cats are also predisposed to diabetes and hyperthyroidism, both resulting in an increased need for cellular nutrition. Neither carbohydrates nor dry extruded diets cause diabetes (or obesity), however, exchanging dietary carbohydrate for protein appears to be useful in the management of diabetes. Hyperthyroid cats have multiple specific nutritional requirements due to weight and muscle loss, hyperglycemia, glucose intolerance, and insulin resistance. It has been suggested that feeding a diet for diabetic cats may be appropriate for cats with this endocrine disorder. Additionally, phosphorus intake should

be controlled as many of these cats have concurrent chronic kidney disease (occult or otherwise)<sup>35</sup>. In chronic kidney disease, restriction of dietary protein may be of limited use or even be detrimental. Dietary phosphorus restriction, potassium supplementation and alkalinization are useful. The suitability of the diet for the individual should be reassessed repeatedly through regular nutritional assessment and examination.

**Table 4: Conditions cats are predisposed to by age (Note: not exclusive to these ages)**

Birth to 6 years	6+ to 10 years	10+ years
Congenital: cleft palate, heart disease, hernias	Obesity	Weight loss and muscle wasting
Infectious diseases:	Diabetes	Dental disease
<ul style="list-style-type: none"> <li>• Panleukopenia</li> <li>• Feline Infectious Peritonitis</li> <li>• Upper respiratory tract infections (Herpesvirus, calicivirus)</li> </ul>	Hyperthyroidism	Chronic kidney diseases
Parasites: fleas, intestinal worms and other parasites	Hypertension	Pyelonephritis
Injury from fighting or other trauma	Urinary tract problems: calcium oxalate stones, early kidney disease	Urinary tract problems: calcium oxalate stones, bacterial cystitis
Urinary tract problems: struvite crystals, Idiopathic Cystitis	Dental disease	Hyperthyroidism
Behavioural problems	Heart disease	Heart disease
Early dental disease	Asthma	Hypertension
Obesity	Cholangitis	Diabetes
	Inflammatory bowel disease (IBD)	Cancer
	Pancreatitis	Moderate to severe arthritis
	Early to moderate arthritis	Dehydration and constipation

Modified from Morris Animal Foundation website: <http://www.research4cats.org/mystery/is-your-cat-at-risk.html> and the WellCat log.

**Table 5: Recommended ages, types and frequency of screening**

Life-stage	Examination and consultation (including behaviour, nutrition)	FeLV and FIV tests	Blood tests: CBC, chemistries, electrolytes) with T4 and blood pressure after 6 years	Urinalysis	Fecal exam; deworming
Kitten: Birth to 6 months	2X or more	1-2X	+/-	+/-	Test: 2-4X; Deworm every 2 weeks until 9 weeks then monthly
Young adult: 1-6 years	1X	+/-	+/-	+/-	Test: 1X Deworm 2-4X/year
Mature adult: 6+ to 10 years	1-2X	+/-	1X	1X	Test: 1X Deworm 2-4X/year
Senior: 10+ years	2X	+/-	2X	2X	Test: 1X Deworm 2-4X/year

Modified from Quimby 2021 AAHA/AAFP Feline Life Stage Guidelines J Feline Med Surg<sup>36</sup>

**\*These are guidelines for healthy cats.** If the patient is unwell or has been in an accident or fight, these tests will need to be performed as appropriate. Blood pressure measurement is recommended as part of screening in cats from 6+ years onwards as well as in all sick cats.

+/- = usually not needed at this age unless cat is ill or has been in an accident  
1X = recommended once a year  
1-2X = recommended 1-2X/year  
2X = recommended twice a year

### **WEIGHT LOSS ASSOCIATED WITH CACHEXIA IN OLDER CATS**

**Cachexia** refers to weight and muscle loss secondary to chronic inflammation or disease. The causes of cachexia are not fully understood. Inflammatory mediators, oxidative stress, up-regulation of the ubiquitin-proteasome proteolytic pathway and hormonal mediators appear to play a role in this complex process. Heart failure, neoplasia, advanced kidney disease and failure are often associated with cachexia. Muscle loss is more rapid and therefore, more obvious in cachexia compared to sarcopenia and may also include fat loss. Morbidity and mortality increase when LBM is catabolized.

When inappetence due to illness, and malnutrition from an inappropriate diet or an insufficient quantity of food are factored in, the results can be catastrophic. Nutritional support is critical but, unlike sarcopenia, reversal of the loss of LBM is unlikely.

### **Management of cachexia in older cats**

The most effective approach to cachexia is through early treatment of disease and nutritional intervention directed towards preventing muscle wasting. As older cats are predisposed to those conditions in which cachexia occurs, a goal in this population is to achieve and maintain a slightly higher BCS (e.g., 6-7/9 or 4/5) as this appears to reduce the risk for mortality.<sup>7, 9-13</sup>

At the present time, there are no anticatabolic drugs that have been shown to be effective for the treatment of cachexia. Medical therapies focus on treatment of the underlying medical problems to help the patient feel well, to control nausea and alleviate pain. Appetite stimulation using cyproheptadine (1 mg/cat PO BID), or mirtazapine (1.88 mg/cat PO q 24-48h) may help jump-start a cat's appetite, but one must pay attention that the total calories consumed are adequate<sup>37</sup>. If a cat is eating but the dietary intake is insufficient, supportive feeding (assisted syringe feeding or tube feeding) must be considered.

As mentioned regarding weight loss of non-cachectic origin, one should address mobility, ease of access, stress, and palatability. With cancer, especially when being treated with chemotherapy, the sense of taste is altered in humans. Presumably the same occurs in cats, hence what previously was flavourful to an individual, may no longer appeal and other diets will need to be tried. It is likely that with metabolic disease, such as cancer, heart failure or chronic kidney disease, cats may require even more protein in the face of muscle catabolism.

The omega-3 fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) from fish oil appear to have some beneficial effects in human cachexia<sup>38,39</sup>. As they have anti-inflammatory effects in cats as well, it may be reasonable to incorporate them into therapy. A dose of 40mg/kg of EPA and 25mg/kg DHA (approximately 1g fish oil per 5kg ideal body weight/day) has been suggested for any animal with cachexia<sup>9</sup>. While antioxidants have not been studied specifically in this context in cats, oxidative stress plays a role in cachexia. As was mentioned earlier, healthy cats receiving Vitamin E, beta carotene, a prebiotic and fatty acids in the diet and longevity study<sup>7,8</sup>, lived approximately one year longer and preserved their BCS and lean mass.

### **SUMMARY**

Inappetence, sarcopenia and cachexia occur commonly in old cats. Lean body mass is preferentially lost and is associated with higher morbidity and mortality. Approaching senior and geriatric stage of life with a slightly increased BCS appears beneficial to survival and a better quality of life. Optimizing dietary protein intake is important as older cats have higher protein needs than adult cats do, especially when they have reduced digestive capacity.

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