



21 November 2017

FEDIAF Scientific Advisory Board Statement Nutrition of senior dogs

The proportion of senior dogs in the total population is increasing. There is a need to take their specific dietary requirements into account [1]. Diets for senior dogs having typical diseases associated with old age [2] are beyond the scope of this guideline. This SAB statement aims to support and inform industry and the public. It represents a collection of available data, when no data are available, the views of the members of the SAB are represented.

Ageing process

In small breeds, a higher lifespan is to be expected than with larger dogs, especially the giant breeds. Therefore, no exact time setting for the onset of "ageing" is possible, as there are individual differences and for this reason, the biological age may differ from chronological age. In large dogs, "old age" starts earlier compared to smaller breed dogs of the same chronological age. Commonly, large breed dogs are classified as senior from the age of 5-8 years, small breed dogs from the age of about 10 years [3, 4]. In this context, it is important to mention large differences between breeds, which suggests a strong genetic influence on the development of certain diseases.

The ageing process is characterized by a decreasing adaptive and compensatory capacity against external and internal stress factors, associated with a higher disease susceptibility [5]. The functions of the body decline and homeostasis is impaired due to programmed changes in gene expression as well as cumulative environmental damage that surpasses the capacity to repair. This is associated with progressive damage of cell organelles, accumulation of debris substances (e.g. lipofuscin) [6], impaired immunocompetence [7], and a suspected, but not clearly demonstrated, increased exposure of the organism to reactive oxygen radicals ("oxidative stress") [8]. Physical and laboratory abnormalities often occur in "healthy" elderly dogs, indicating a need for regular veterinary consultations [9]. Degenerative defects also occur in the nervous system [10]. Behavioral changes often also occur, for example diminishing learning ability (cognitive function decline) [11-13].

Common age-related diseases

Age-related changes in the cognitive functions, behavior, skin, digestive tract, cardiovascular system, respiratory tract, degenerative joint and skeletal diseases, urinary and endocrine diseases are the main problems in older dogs [14-16].

Many of the problems addressed above are relevant for the nutrition of the older animal due to their effects on the energy and nutrient requirements. For example, degenerative joint diseases may have negative repercussions on the activity of the dog and can thus contribute to reduced energy requirements.

When specific dysfunctions are present, veterinary advice and specific dietetic modifications are indicated.

Changes in the digestive tract

Changes in the digestive system, primarily tooth loss and gum diseases, can hinder food intake. In the case of very old dogs, the sense of taste and/or olfaction may decrease [17], so that higher palatable food has to be provided in order to ensure an appropriate energy and nutrient intake. Texture (dry, wet) may be important to ensure sufficient food intake.

The often-assumed general decline in the digestive capacity such as to some extent a lower fat digestion as seen in cats [18-21], does not appear to occur in dogs. The composition of the intestinal microbiota in older dogs has a tendency towards reduced counts of Lactobacilli and an increased occurrence of Clostridia compared to younger animals [22, 23]. The implications of these changes and the impact of ageing on microbial diversity requires further research.

Changes in energy metabolism

Functional limitations of various organ systems (e.g. heart, kidney), reduced physical activity, higher or lower body fat, lower lean body mass and endocrine changes (e.g. reduced thyroid activity due to illness [24]) influence the whole organism. In most cases, increasing age is associated with a reduced energy requirement, but it can also be higher because of hormonal malfunctions (e.g. uncontrolled diabetes mellitus) or in some cancers.

In addition to the correct supply of energy during old age, lifetime restrictive energy allowances can be expected to have a positive effect on life as well as age-related metabolic changes and health problems. In a study in Labrador retrievers, results indicated that 25% restriction in food intake increased median life span and delayed the onset of signs of chronic disease [25]. A further advantage of a restrictive energy allocation is a lower tendency to osteoarthritis [26-28]. Optimal body condition (slim, ideal body condition score) seems to be a major factor supporting healthy ageing. Owners should be made aware of the importance of adjusting daily feed allowances to maintain optimal body condition.

Energy and nutrient requirements of older dogs

At present there are no experimental data dealing with energy or nutrient requirements for older dogs. For feeding practice, the following principles can be recommended.

Energy

The energy supply should be adjusted to maintain optimal body condition. Reduction or increased allowances have to be defined based on body condition scores [29]. The World Small Animal Veterinary Association provides practical aids for the nutritional assessment, including diet history form, body condition score charts, and energy recommendations for dogs and cats (<http://www.wsava.org/nutrition-toolkit>). Muscle condition scoring systems are not yet sufficiently standardized, but assessment of muscle mass seems important in senior dogs.

Senior dogs are at risk for becoming overweight and obese with all related health problems. Changes in activity can affect energy requirements. Moderate energy intake and optimal body condition at a younger age is associated with better health and lower prevalence and severity of metabolic disorders at older age [26, 30, 31]. Underweight occurs when food intake is low in very old cats [32] and dogs (> 12 years), for example due to dentition problems, multimorbidity or functional disorders.

Protein

The protein supply should correspond to the recommendations for adult dogs for maintenance metabolism and should minimize the loss of lean body mass. When food intake is lower in older dogs, diets should contain a higher protein concentration in order to meet their needs [14] and delay age related loss of lean body mass, except when specific diseases (in advanced stages) require quantitative or qualitative adjustments of the protein supply. The protein should supply sufficient levels of essential amino acids.

Fat

Linoleic acid, the dominant n-6 fatty acid, is essential for dogs. There is growing evidence that n-3 fatty acids have an important function for dogs. Docosahexaenoic acid has a specific role for neural membranes, neurologic development, and visual acuity, it is more likely to be essential than eicosapentanoic acid [33]. n-3 fatty acids and n-6 fatty acids have been shown to affect plasma fatty acid profiles of dogs [34], immunological reactions [35-37] and behavior. However, to the best of our knowledge, there are no specific recommendations available for the senior dogs, and at least minimum maintenance requirements defined by FEDIAF should be guaranteed.

Fiber

Diets for older dogs should contain sufficient crude fibre to ensure adequate intestinal motility. Both fermentable and non-fermentable fibres have positive effects on intestinal health, including provision of substrates to the gut microbiota.

Minerals

Specific data for senior dogs are not available to our best knowledge. Therefore, the mineral supply should not exceed the recommendations for adults. Calcium and phosphorus allowances and adequate Ca/P ratio should be maintained. The mineral salts used should be readily soluble so that sufficient amounts are absorbed.

Trace elements

In the case of the trace element supply, particular attention should be paid to zinc for its essentiality for many biological systems including the immune function [38], selenium for muscle integrity and for its role in antioxidative defense and iodine for thyroid function. The zinc intake can be adjusted to higher levels within the recommended frame, normal copper intake is recommended.

Vitamins

The vitamin supply should follow the recommendations for maintenance metabolism. Supply might be increased when lower absorption and/or increased losses are expected. A sufficient supply of vitamin E is important for the prevention of cell damage caused by oxidative metabolites. Further antioxidative substances might be supportive to prevent cognitive dysfunctions and the immune system, but there is currently insufficient knowledge of the dose-response relationships [14, 39].

Food quantity and feeding schedule

The daily ration should be given in 2-3 portions at fixed feeding times. Pouring warm water over dry food may improve acceptance for some dogs.

Water

As for all animals, fresh water has to be constantly available.

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