

## NUTRIENT CONTENT AND CALORIC DENSITY ASSESSMENT OF DIFFERENT TYPES OF SENIOR COMMERCIAL CAT FOOD

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### Abstract

Ageing should be considered as an inevitable physiological state and results in a progressive decline in the body's ability to cope with physiological, metabolic and environmental stress. Nutritional requirements change once the senior cat reaches the senior cat stage, so attention and care is needed, depending on the needs of the individual, even more if a pathological condition is present. Calorie control in mature and senior cats usually means reducing calorie intake by about 20-30%. In the case of geriatric cats, it may be more important to increase calorie intake to maintain their normal physique, as their body condition and weight naturally decline with advancing age. Most diets for senior cats are formulated with appropriate nutrient limits and are lower in calories than rations for adult and young cats; however, there are currently no specific nutritional requirements set. This shows the amounts of nutrients found in different foods can vary greatly. Our main objective was to evaluate the caloric density as well as the concentrations of protein, fiber, fat and carbohydrates in different commercially available canned and dry feeds for senior cats.

**Key words:** cat, caloric density, chemical composition, senior food

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Improvements in veterinary treatment, living conditions, and the increasing numbers of pet owners who provide their animals high-quality food at all phases of life have all contributed to cats' increasing lifespans (Shauf S. *et al.*, 2021). The definition of a "senior" cat is subjective, as it differs from case to case, and the chronological age does not always match the physiological age of the animal. The ageing process can be influenced by breed size, genetics, the environment in which the animal grew up, etc. However, the convenient way to classify a cat according to age is to classify: the "mature" cat at 7-10 years; the "senior" cat at 11-14 years and the "geriatric" cat from 15 years (Pittari J., 2009, Vogt A.H. *et al.*, 2010). With more diet alternatives available because to the pet food industry's response to the aging cat population, owners and vets are finding it harder and harder to choose the best diet for older cats (Hutchinson D. and Freeman L.M., 2011).

Nutrition has always played a key role in the management of animals under physiological stress (such as growth and reproduction) and during disease states. Senescence should be considered a physiological condition that requires specific attention (Gajanayake I., 2017). Getting the right nutritional balance in senior cat food is important because felines have very specific needs for proteins, amino acids and vitamins. Cats have high

protein requirements and can quickly become deficient in certain amino acids and vitamins.

The ageing process brings about a number of physiological changes, some of which are obvious, such as bleaching of the fur, decreased muscle mass and decreased function of the visual, auditory and olfactory system; there may also be less obvious changes in the digestive tract, immune system, kidney function and other organs (Bellows J. *et al.*, 2016).

Senescence should be regarded as an unavoidable physiological condition and results in a progressive decline in the body's ability to cope with physiological, metabolic and environmental stresses. Nutritional requirements change once the senior cat reaches the senior cat threshold, so attention and care is needed, depending on the needs of the individual, even more so if a pathological condition is present (Miele A. *et al.*, 2020). Aging cats, like dogs and humans, have reduced energy requirements and therefore a tendency towards obesity (Lund E.M. *et al.*, 2005; Laflamme and Blamm, 2002).<sup>1,8</sup> This appears to be true for cats, but only up to about 10 to 12 years of age (Laflamme D.P. and Blamm J.M., 2002). Energy requirements increase beyond this point, particularly after about 13 years of age (Perez-Camargo G., 2004; Cupp C. *et al.*, 2004). The main objective of this work was to evaluate the nutrient

content and caloric density in different types of senior commercial cat food.

## MATERIAL AND METHOD

The analyses were performed on a number of 9 samples, 5 samples of dry food and 4 samples of senior canned food, collected from supermarkets, veterinary practices, pet shops and veterinary pharmacies in Cluj-Napoca. Standardized methodology was followed for sample preparation. Commercial dry cat food was stored in bulk and packaged. The food samples were homogenized before analysis. Moisture, crude protein, crude fiber, crude fat, and ash were measured using AOAC official method. The carbohydrate content of the foods was calculated by difference (100 minus crude protein, crude fiber, crude fat, ash, and moisture). In our study we used calories as the unit of measurement, (Castrillo C. *et al*, 2009), and the energy value per 100 g produced was calculated according to the equation (NRC, 2006)

## RESULTS AND DISCUSSIONS

The sensory examination of the 9 samples of dry and canned commercial feed showed no changes in appearance, consistency and odour, considering their conditioning for long-term storage.

Following the analysis of the gross chemical composition of the 9 samples of senior dry and canned cat food, differences could be observed between our data and the data indicated on the label. In terms of dry matter (DM), with the exception of sample 4, all the other dry food samples had a higher DM than that indicated on the label. Protein with the exception of sample 1, where the percentage of protein was higher, in all other samples the protein value was up to 5 % lower compared to the label. The same is the case of fat, with the exception of sample 4, for the rest of the samples the fat was much lower than the value indicated on the label. For fiber and ash, the values were approximately equal to those expressed on the label. From *Figure 1*, which shows the analytical composition of senior dry cat food/100 g product, it can be seen that the dry matter ranged from 93.16% to 94.70%, in the case of protein the lowest value was in sample S2 of 26.79% and the highest value in sample S1 of 33.32%. The lowest percentage of fat was in sample S2 (8.64) and the highest percentage in sample S1 (16.21%). Fiber ranged from 2.9% in sample S2 to 6.63 in sample S4 and the highest percentage of ash was in sample S5 (8.87%) and the lowest in sample S1 (5.15%). As for

carbohydrates, their percentage ranged from 49.28% in sample 2 to 37.65 % in sample 5.

Regarding the analytical composition of the senior canned cat food/100 g product, it is observed that the dry matter ranged from 7.03 % to 19.99 %, in the case of protein the lowest value was in sample S1 of 4 % and the highest value in sample S4 of 9.80 %. The lowest fat percentage was in sample S1 (1.10 %) and the highest in sample S2 (9.80 %). Fiber ranged from 0.1 % in sample S1 to 3.97 in sample S4, and the highest ash percentage was in sample S1 (1.57 %) and the lowest in sample S1 (0.6 %). Carbohydrates ranged from 1.33 % in sample 1 to 8.73 % in sample 3 (*Figure 2*).

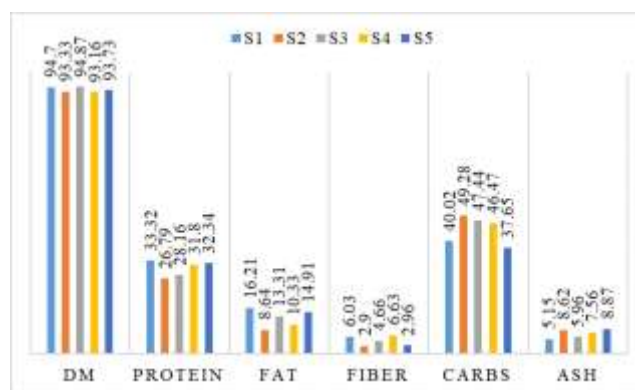


Figure 1 Analytical composition of senior dry cat food per 100 g/product

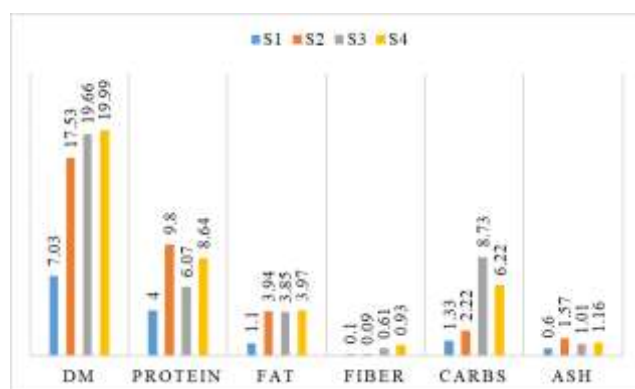


Figure 2 Analytical composition of senior canned cat food per 100 g/product

Following the calculation of the caloric density for senior dry cat food, these values ranged from 362 Kcal/100 g product for sample 2 to 412 Kcal/100 g product for sample 1. According to the legislation regarding nutrient requirements and caloric density in adult cat food (NRC, 2006), the caloric density must be between 280 and 480 Kcal/100 g product. In our case although all the samples examined are senior dry cat food samples, quite a large variation is observed between them (*Figure 3*).

The same can be observed for the senior moist feed, with caloric energy values ranging

from 30 Kcal/100 g produced in sample 6 to 95 Kcal/100 g produced in sample 9. In the case of canned food the energy value according to NRC, 2006, should be between 70-130 Kcal/100 g product. Following our calculation, we can say that sample 6, is below the limit of Kcal/100 g product in terms of senior cat requirements, having a value of only 30 kcal/100 g product (Figure 4).

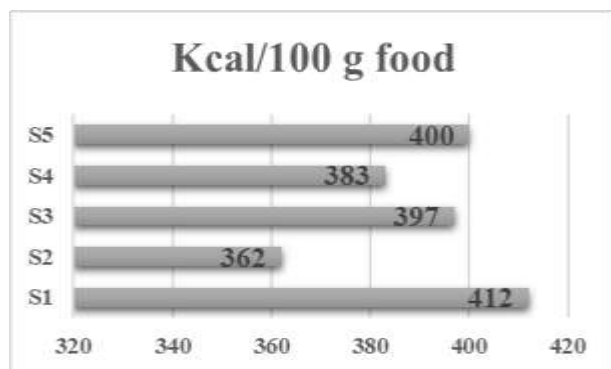


Figure 3 Caloric content of senior cat dry food

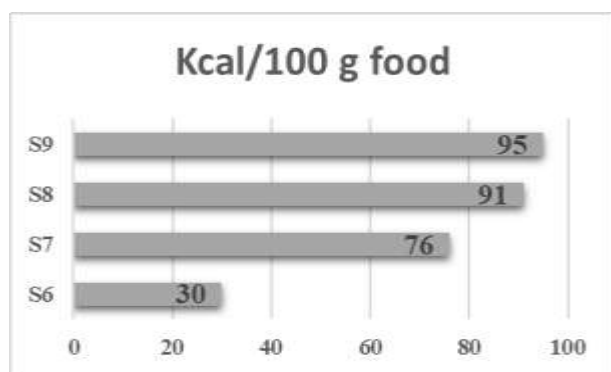


Figure 4 Caloric content of senior cat canned food

In the case of protein and fat, the minimum required according to AAFCO and NRC, is between 30% and 45% protein/100 g DM and minimum 9% fat/100 g DM, although most experts say that a cat's diet should contain somewhere between 20 and 40% fat. This percentage is much higher compared to other mammals. Certain groups of cats benefit from even higher levels, including young and pregnant or lactating cats, those needing extra energy for growth, and even some older cats can also benefit from high palatability and concentrated energy levels with a higher fat diet; especially when suffering from a lower appetite (Pekela A.Y. *et al*, 2020).

Cats have unique nutritional requirements. They are obligate carnivores, and their bodies cannot produce certain vitamins in the way that herbivores and omnivores can. Cats of all sizes need foods with a higher concentration of protein, taurine, arginine, niacin, vitamin A and vitamin D. Cats also do not have the liver enzymes needed to metabolize carbohydrates in the quantities that

humans and other animals can, so we need to be selective about the quantity and quality of carbohydrates we include in our felines' bowls. From scientific data, the carbohydrate requirement of a cat is between 10 and 15% of DM, or even less, and if we compare with our results we can see that the values are much higher than the requirement of a cat with values between 52.81% in sample 2 of senior dry food and 12.15% in sample 7 of senior wet food (Miele *et al*, 2020).

Cat diets are widely accepted in the industry with clearly defined nutritional guidelines. However, in contrast, the nutritional requirements of senior cats are not strictly defined by FEDIAF, AAFCO (The Association of American Feed Control Officials) or the NRC (National Research Council). Despite the fact that our pets spend proportionately more time classified as "senior" or "geriatric", their nutritional requirements are based on adult parameters. However, older cats may benefit from tailored nutritional modifications to support the physiological changes known to occur at this life stage. The minimum protein profile for adult cats according to AAFCO, is a minimum of 26%/SU, even if the cat is 2 or 12 years old. This is the reason why there are quite large variations in the caloric density and level of nutrients present in senior cat food. Some features of senior cat food on the market include reduced calorie density, protein, sodium and phosphorus levels compared to adult cat food (Laflamme D., 2018).

Adult and senior cats have changing dietary needs and it is extremely important to provide guidance on daily feeding amounts. DER (Daily energy requirements) for mature adult cats (aged 7 to 10 years) may be equivalent to RER (Resting Energy Requirement), although adjustments should be made according to individual needs. For senior cats (older than 10 years), RER will need to be multiplied by a factor of 10-20%, and in some cases even 25% (Miele A. *et al*, 2020). Senior cats may also experience a reduction in digestive capacity, leading to decreased BCS and therefore increased caloric intake (Teng K.T. *et al*, 2018). Underweight is a common problem in senior cats (Laflamme D.P., 2005; Laflamme D.P., 2018). Increased energy requirements may be due to reduced digestion in older cats. A large percentage of ageing cats have a reduced ability to digest fat: about 10% to 15% of mature cats and 33% of geriatric cats have reduced fat digestibility. Although the onset of reduced digestive function may be gradual, in the long term it contributes negatively to the energy balance of a large number of geriatric cats. Reduced protein digestibility also occurs in geriatric cats. One in 5 cats over 14 years

protein, reduced digestibility with age could contribute to a negative nitrogen balance and loss of LBM (lean body mass) (<https://www.aaha.org/>).

It is often assumed that older cats are prone to obesity and that energy intake should be restricted. The prevalence of overweight and obesity is highest for middle-aged cats (5-11 years) because many aging cats are less active. After 11 years of age, the prevalence of overweight and obesity for cats decreases, and some senior cats may be underweight.<sup>8</sup> Therefore, a higher fat and caloric density food may be beneficial depending on individual needs (Summers S.C. *et al*, 2020).

There is some evidence to support this, but studies of elderly cat populations indicate that this view is too simple. In a large colony of research cats, the percentage of body fat increased significantly in those aged 7-12 years compared to adult cats (1-7 years Perez-Camargo, 2004). However, a decrease in body fat percentage was observed in cats over 12 years (Perez-Camargo G., 2004). Similar results were also reported in a survey of client-owned cats, where more than 60% of "mature" cats (7-10 years) and "senior" cats (11-14 years) were classified as "too fat". This survey revealed that about 40% of geriatric cats (>15 years) were considered "too fat", but also about 40% of geriatric cats were classified as "too thin" - due to fat loss, but also due to muscle loss. Protein and fat digestibility decreases in some cats as they age, with the highest incidence in cats over 12 years of age (Perez-Camargo G., 2004). This correlates with the increased occurrence of fat and muscle loss in this age group (Peterson M.E. and Little S.E., 2018).

This points to various nutritional modifications to best support the needs of "senior" cats. For senior cats (e.g., over 7 years old), high-protein, low-fat diets would be most indicated to help maintain muscle mass while limiting fat deposition and weight gain or obesity. For "geriatric" cats (12+ years), an increase in dietary fat combined with high protein would be appropriate to help maintain body weight and body mass (Perez-Camargo G., 2004).

There is a lack of consensus regarding optimal dietary protein levels in mature adult cats. A published study has shown that aging cats should, in fact, be fed higher protein diets to avoid loss of muscle mass (Lafamme D.P., 2018).

The Association of American Feed Control Officials (AAFCO) recognizes only two life stages: growth and maintenance. This means that senior cat foods are adult maintenance formulas that meet AAFCO nutritional requirements, with adjustments made to adapt to aging cats. Energy requirements increase sharply and progressively in

these cats as they age, starting at the age of 10-12 years. If daily caloric intake is not increased, a progressive weight loss will result, largely due to loss of muscle mass, a phenomenon called age-related sarcopenia.

## CONCLUSIONS

Foods marketed for senior cats are highly variable in their nutrient content and caloric density. Finding the perfect diet for senior cats is a real challenge, as guidelines regarding nutrient requirements for senior cats are not set either. It is therefore essential that dietary recommendations are based on a thorough nutritional assessment of each individual cat, including dietary history, body condition, appetite as well as diseases they suffer from.

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