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Finding the right ingredients for senior pet nutrition to support healthy aging

By Geert van der Velden, Innovation Manager at IQI Trusted Petfood Ingredients

Pet parents are increasingly aware of the importance of high-quality food to ensure that their four-legged companions grow old in good health. As a result, many countries now have a strong aging pet population as well as a human one, which accelerates market demand for senior pet nutrition. Ensuring that cats and dogs get the right nutrition for their age and condition is a specific area of expertise. Ingredients for senior pet nutrition need to cater for their changing digestive system, support cognitive functioning, and help prevent, treat, or mitigate different kinds of health issues.

Aging can be defined as a complex set of biological processes resulting in physical and physiological changes, metabolic changes, and behavioral changes. For cats and dogs, the physical and physiological changes influence the condition of their skin, coat, and teeth for example, cause deterioration in joint health and functionality, reduce their ability to digest and absorb nutrients, and may result in either weight gain or loss. The metabolic changes may include a reduced basal metabolic rate, resulting in less energy and decreasing vitality, decreased immune function, more vulnerability to allergies and disease, and decreased ability to use glucose for brain functions. Declining brain functioning may result in behavioral changes, such as altered sleep cycles or reduced stress tolerance. Many of these issues can be controlled or mitigated by choosing the right ingredients for senior pet nutrition.

NUTRITIONAL NEEDS OF SENIOR PETS

The composition of senior cat and dog food needs to focus on maintaining health and optimal body condition, including special attention to organ functioning, thereby extending life expectancy and prolonging the quality of life. Good nutrition helps to delay the onset of geriatric dysfunction and chronic diseases, or helps to manage any diseases already present. The nutritional needs of aging cats and dogs develop differently, however. All cats develop similarly across different breeds from mature (7-10 years) to senior (11-14 years) and then geriatric (>15 years). For dogs, the senior stage differs between large breeds (5-8 years or 7-10 years), small breeds and cross-breeds (8-10 years).

A prime concern is that the energy requirements of both dogs and cats decrease as they become senior, while particularly pets who have just reached the senior stage will still have the same appetite as before. The maintenance energy requirement (MER) of senior dogs is approximately 20-25% less than that of adult dogs. When the diet of aging dogs is not adjusted accordingly, there is a risk of obesity at the senior stage of life. In cats, the MER evolves differently over time: the peak risk of obesity is between 7 and 13 years old, while cats older than 13 run a serious risk of becoming underweight due to lean body mass (LBM) loss, which in turn is associated with increased risk of morbidity and mortality. LBM loss is a result of sarcopenia, a type of muscle loss

related to aging, characterized by the degenerative loss of skeletal muscle mass, quality, and strength. Senior cats risk losing one third of LBM from 10-15 years of age. Senior dogs risk losing approximately 10% of LBM while their fat mass increases by 10%, making sarcopenia harder to detect. This can be managed by adapting the amount of fat in dog food.

THE NEED FOR HIGHLY DIGESTIBLE PROTEIN

As senior pets get older, their appetite decreases and they also have a reduced ability to digest and absorb nutrients. To compensate for decreasing digestibility, both senior cats and dogs require sufficient intake of high-quality, highly digestible protein to prevent LBM loss, specifically in skeletal muscle. Likewise, they require highly digestible nutrients to help support the aging digestive system and enhanced levels of antioxidants to support the declining immune system. The requirement for dogs is that at least 21% of total digestible protein should be highly digestible protein, whereby total protein in senior diet should be no less than 24%. For cats, at least 31% of the total digestible protein should be highly digestible protein and preferably over 36% protein of high quality in senior diet.

Pepsin digestibility is the most commonly used as a typical indicator for true in vivo protein digestibility in cats or dogs. The pepsin digestibility should be at least 85% for 0.02% pepsin. Typically, fresh or minimally processed ingredients, such as spray-dried proteins or proteins processed through other low-temperature drying steps, have higher digestibility than rendered meals. But there can also be a very big difference in digestibility between rendered meals. Protein sources with the highest digestibility include hydrolyzed fish proteins, hydrolyzed animal proteins (such as chicken products), spray-dried fish meal, fresh meat of good quality, and highly digestible vegetable proteins, such as potato protein.

MARKET ACCEPTANCE OF PURE CHICKEN

Of the different available spray-dried animal proteins, those of poultry origin have the highest acceptance in the market, are the most versatile, and offer several advantages for the health and well-being of senior pets. Chicken meat powder (CMP), for example, is a nutritional powder with a very high protein content of at least 75%, more than 92% protein digestibility, and is palatable to both cats and dogs. CMP is made from fresh, human food-grade chicken carcasses, necks, and skins, which are concentrated after the removal of bones and fat. These specific ingredients are selected in order to obtain the optimal protein composition that is rich in lysine and other essential amino acids and has an optimal biogenic amine index.

Another good example is chicken liver hydrolysate (CLH), a nutritional, hypoallergenic hydrolysate powder that is obtained from human food-grade fresh chicken livers. It has a high protein content of typically 67%, high digestibility and is very palatable to both cats and dogs. For both CMP and CLH,

the use of enzymatic hydrolysis and low-temperature spray drying ensures that all proteins and nutrients are preserved. The proteins, peptides, and free amino acids induce satiety-triggering factors, thereby helping in obesity prevention. CLH and CMP offer a clean label for pet food producers that want pure chicken and have no restrictions in terms of pet parents' religious considerations.

Spray-dried chicken plasma (SDCP) offers similar benefits. SDCP has a high protein content of > 60%, very good digestibility and greatly improves the palatability of pet food. Plasma is an excellent source of essential amino acids, in particular tryptophan, which is used in the biosynthesis of proteins and is also recognized as an effective calming agent, reducing stress in humans as well as cats and dogs. Plasma powder also has a high immunoglobulin G (IgG) content, which is the main type of antibody found in blood circulation and particularly favorable for weaker or older cats and dogs. IgG protects the body from infection by binding many kinds of pathogens, such as viruses, bacteria, and fungi, thereby supporting the immune system. This has a favorable impact on gut health, reduces allergic reactions that cause itching and scratching, and reduces joint inflammation. Studies suggest that animal plasma can be a very effective component of pet food to improve the animals' quality of life and help them to maintain activity and movement by reducing limping, for example.



Another noteworthy chicken-based protein is dried chicken collagen (FP82), a fully soluble, nutritional powder with a very high protein target content of 82%. This powder is made from food-grade pure chicken with no use of by-products. Dried chicken FP82 It is also rich in collagen, has low levels of fat and ash, and has very good functionality and is very palatable to both cats and dogs.

MANAGING HEALTH ISSUES WITH OMEGA-3

Another nutrient that can improve walking ability in senior pets, besides a number of other health benefits in all stages of life, is omega-3 fatty acids. Omega-3 fatty acids play an essential role in the physiological processes of mammals, such as cats and dogs. In particular, the intake of adequate levels of the long-chain eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) offers a number of benefits to the health and well-being of senior cats and dogs. These fatty acids increase the absorption of vitamins and minerals and help to manage inflammatory problems related to joint health and functioning, skin/coat, and in the prevention and treatment of heart and bladder diseases. The intake of these omega-3 fatty acids also has a positive influence on eye health and supports cognitive functioning in aging brains.

Specifically, EPA and DHA can enhance joint health in dogs and, particularly important in old age, improve their walking ability. The long-chain omega-3 fatty acids help to improve clinical symptoms in cats and dogs with osteoarthritis by reducing inflammatory reactions and the breakdown of cartilage. Research has shown that supplementation with EPA and DHA significantly increases mean peak vertical force and weight bearing in dogs with osteoarthritis. Furthermore, EPA can reduce the severity of cachexia in cats and dogs, thereby prolonging their life expectancy. EPA specifically can attenuate the immune response after an infection and it stimulates the formation of anti-inflammatory components. At the same time, it impedes the formation of pro-inflammatory components, such as cytokines (e.g. $\text{TNF-}\alpha$) and eicosanoids (e.g. Prostaglandine PGE_2 and Leukotrine LTB_4), thus preventing an overshooting reaction after a bacterial infection. Long-chain omega-3 fatty acids are converted in vivo into anti-inflammatory components that help reduce pain.

Since cats and dogs are unable to synthesize any of the essential omega-3 fatty acids, they must be obtained through diet. The most common is the short-chain alpha-linolenic acid (ALA), which is present mainly in vegetable oils, such as flax oil, soya oil, and canola oil. But to achieve any health benefits, ALA first needs to be converted in the body into EPA and then into DHA, which only happens at a very low, almost negligible conversion rate. Therefore, the most efficient and effective method to ensure sufficient inclusion levels of the beneficial long-chain fatty acids EPA and DHA in the diets of dogs and cats is by supplying them directly via pet food. EPA and DHA long-chain omega-3 fatty acids are mostly found in marine oils, such as krill oil, fish oil, or algae DHA. A unique aspect of krill is that approximately 40% of the fat (lipid) content is made up of

phospholipids, which contain more than 20% of the two most important omega-3 fatty acids, EPA and DHA. Phospholipids can also be found in eggs and lecithin.

HIGH-QUALITY FATS

Marine oils, such as krill oil, fish oil, or algae DHA, are not only an important source of long-chain omega-3 fatty acids, but also of high-quality fats. Senior pets require high-quality fats with good digestibility and a low percentage of free fatty acids (FFA), which are not oxidized and have a good fatty acid profile, and a ratio between omega-6 and omega-3 of around 4 to 1. While marine products are rich in the long-chain omega-3 fatty acids EPA and DHA, vegetable oils, such as rapeseed and linseed oil, are rich in the short-chain omega-3 fatty acid ALA as well as omega-6. Especially when combined with commonly used poultry ingredients, this can result in pet food with an imbalance between the amounts of omega-6 and omega-3. High amounts of omega-6 may cause inflammatory health problems.

DIETARY FIBERS FOR GOOD GUT HEALTH

Senior pets can also benefit from slightly increased fiber levels in pet food. A healthy gut and a good digestive system help to dilute food energy density and prevent weight gain, which is particularly important for senior pets. A healthy diet for cats and dogs contains a mix of both soluble and insoluble, fermentable and non-fermentable dietary fibers. Soluble fiber dissolves in water and gastrointestinal fluids, when it enters the stomach and intestines, and is fermented in



the large intestine. Insoluble fiber does not dissolve in water or gastrointestinal fluids and passes through the intestinal digestive tract fully or mostly intact. Depending on the type of fiber, insoluble fibers may partially ferment into short-chain fatty acids that stimulate the 'good' microflora in the gastrointestinal tract, thereby acting like a prebiotic.

Specifically, insoluble fibers are particularly important for healthy bowel functioning and offer additional advantages, such as feline hairball control and weight management for senior pets. Cellulose fibers add bulk to pet food but contain no calories and ensure a longer period of satiation. Of the available fiber sources, purified cellulose powder offers the highest concentration of insoluble fibers, but other, more novel sources of insoluble fibers, such as miscanthus, can also be considered. Another advantage of including cellulose fibers in pet food is the scouring effect that helps to keep teeth clean.

VALUABLE SUPPLEMENTATION: COLLAGEN PEPTIDES AND UNDENATURED TYPE II COLLAGEN

As a nutritious, functional, and highly digestible source of protein, collagen is becoming a popular and highly targeted pet food ingredient. Especially for older cats and dogs, it can be a valuable supplement to make up for a balanced, nutritionally complete pet food profile with high-quality ingredients. Benefits range from supporting healthy skin and coat to promoting bone development and healthy strong cartilage and joints for mobility.

A well-balanced and high-quality diet normally provides cats and dogs with the ingredients required to make enough collagen naturally. However, as with all proteins, it doesn't last forever but instead follows a continuous natural cycle of breakdown and regeneration. Ageing typically exacerbates this breakdown process, along with aspects such as daily wear and tear, genetic issues of certain dog breeds, UV rays, and stress. As a result, the animal's skin gets thinner and more susceptible to damage, tendons and ligaments less elastic, joints stiff and/or painful to move, and weakening connective tissue structures. Eventually, this can severely restrict their mobility. Collagen peptides supplementation can then serve to support the health and well-being of older pets. Next to collagen peptides also undenatured type II collagen is a well-documented functional ingredient with regard joint health.

EGGSHELL MEMBRANE OFFERS HEALTH BENEFITS FOR JOINTS, SKIN AND COAT AND GUT HEALTH

Senior dogs are often subject to hip dysplasia and the resultant osteoarthritis, resulting in joint inflammation. Studies have shown that Ovopet® is a safe and highly effective ingredient for relieving pain and reducing inflammation. Eggshell membrane (ESM) contains compounds involved in the reduction of inflammation, the benefits of which can be seen in joint, skin and gut health.

Supplementation with this eggshell-derived ingredient produces a significant reduction in joint pain symptoms while also improving the physical function, enhancing the quality of life of your pet.

Eggshell membrane supplementation supports gut health by reducing inflammation-related bacteria and enhancing gut integrity. The non-digestible fraction serves as a substrate to be fermented by gut microbes and increases microbiota diversity. Fermentation of these components produces short-chain fatty acids (SCFAs), which nourish gut cells and foster a balanced microbiome.

ASTAXANTHIN AS A POWERHOUSE ANTIOXIDANT

Attention to senior pet nutrition not only prolongs their quality of life, but also helps to delay the onset of typical senior or geriatric dysfunction and chronic diseases, such as progressive deterioration of their cognitive function, skin, vision, and teeth, as well as joint health and functionality. Part of the solution can be natural astaxanthin, a natural reddish pigment responsible for the red-orange color of a number of marine animals and microorganisms like salmon, crabs, krill, lobsters, and even flamingos. Also known as the 'king of carotenoids', astaxanthin is mostly famous for its potent antioxidant and anti-inflammatory properties. Over the last few years, it has become especially popular for aging pets as it inhibits lipid peroxidation, improves brain function, and helps to maintain cognition, vision and immunity.

IQI has been working together with AstaReal in Sweden to bring their innovative and science-based version of astaxanthin, Novasta® EB15, to the European pet food market. The company cultivates the most abundant source of natural astaxanthin, the freshwater microalgae *Haematococcus pluvialis*, in-house in closed photobioreactors under sterile conditions, making it a clean, green, and sustainable source. Treating the ingredient to make it thermostable before manufacturing, its maximum activity in pet food applications and health benefits for aging pets are secured. This supports pet parents' ongoing pursuit of health-promoting and efficacious senior pet food products with high quality ingredients. Novasta® EB15's thermostability also creates resilience for the high temperatures that are typically used in pet food manufacturing processes, allowing for a wide array of pet food applications.

SENIOR PET NUTRITION SOLUTIONS FROM IQI TRUSTED PETFOOD INGREDIENTS

Together with its different suppliers, IQI delivers a range of ingredients that are beneficial for senior pet food applications. These include high omega-3 fish oil, algae DHA, full-fat krill meal, chicken meat powder (CMP), chicken liver hydrolysate (CLH), chicken plasma powder, fibers, and astaxanthin (see table 1).

Table 1: IQI premium ingredients for senior pet food diets

IQI Ingredient	High protein digestibility	Essential fat source	High palatability	Specific functionality
Chicken Meat Powder	YES		OK	
Chicken Liver Hydrolysate	YES		YES	Palatability
Dried chicken collagen	YES		OK	Binding
Salmon hydrolysate	YES		YES	
Chicken plasma	YES		YES	Binding
Dried beef	YES		YES	Sticky protein, high digestibility
Protastar	YES		OK	Low in TGA's
High n3 fish oils		YES	OK	Anti-inflammatory
Algae DHA		YES	OK	Cognitive functioning
Krill meal	YES	YES	YES	Source of Astaxanthin
Egg powder	YES		OK	Phosphor lipid source
Collagen peptides	YES		OK	Joint health
Undenatured type II collagen			YES	Joint health
SPC Oat Care			OK	Anti-diarrhea
EB15 Astaxanthin			OK	Cognitive function & vision
Oat beta-glucan			OK	Prebiotic
Cellulose or Miscanthus			OK	Gut health, weight management

For more information on these different ingredients for senior pet nutrition and the finest ingredients for the pet food industry, please visit our [website](#) or contact us directly.

Want to know more?

[IQI white paper 'Microalgae as a clean source of long-chain omega-3 fatty acid for pet food'](#)

[IQI white paper 'The benefits of chicken plasma powder in pet food applications'](#)

[IQI white paper 'Full-fat krill meal: excellent natural source of nutrients for pet food'](#)

[IQI white paper 'The benefits of insoluble cellulose fibers as an ingredient in pet food'](#)

[IQI white paper 'The benefits of fish oil as a source of long-chain omega-3 fatty acid for pet food'](#)

[IQI white paper 'GOS prebiotic pet food ingredient stimulates a healthy gut'](#)

[IQI white paper 'Natural astaxanthin: How the 'king of carotenoids' can upgrade pet food'](#)

[IQI blog 'Collagen on the rise: from human 'superfoods' to healthier pet food'](#)

[IQI white paper 'Collagen as an increasingly popular functional ingredient in pet food'](#)

[IQI white paper 'How the 'king of carotenoids' can upgrade pet food'](#)

[IQI product leaflet 'Chicken Meat Powders \(CMP\)'](#)

[IQI product leaflet 'Chicken Liver Hydrolysate \(CLH\)'](#)

[IQI product leaflet 'IQI dried chicken FP82'](#)

[IQI product leaflet 'Salmon meal, oil and hydrolysates'](#)

[IQI product leaflet 'How to get the most out of the potato as a natural and sustainable source of protein?'](#)

[IQI white paper on SPC Oat Care for dogs](#)

ABOUT IQI TRUSTED PETFOOD INGREDIENTS

IQI Trusted Petfood Ingredients is a global provider of premium-claim ingredients to the top brands in the pet food industry. Founded in 1994 as a trading company in raw pet food materials, today IQI offers an extensive variety of services to aid and assist our customers and suppliers worldwide. IQI Trusted Petfood Ingredients employs highly skilled personnel, owns and operates a global network of logistical hubs, and relies on a global supply network to obtain the purest natural resources available.

For IQI, quality is key. IQI Trusted Petfood Ingredients goes to great lengths to ensure the quality of its products and develop innovative new products. IQI also invests a great deal in maximizing the quality of its partnerships. Since this business is all about trust, IQI needs to bond with its partners to succeed. By working closely with both its customers and suppliers, IQI creates full transparency in the supply chain. IQI oversees and controls every step in the process from source to shelf and supplies products that are pure and traceable to their source.



ABOUT GEERT VAN DER VELDEN

Geert van der Velden is IQI Trusted Petfood Ingredients' Innovation Manager responsible for Business Development, generating new products and concepts that meet the needs of existing and new customers. Geert has more than 25 years' experience in the international pet food industry and has gained knowledge and experience in many sections of IQI's business.

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