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Collagen as an increasingly popular functional ingredient in pet food

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

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

IMPORTANT NUTRIENT

Collagen mostly consists of protein and is naturally produced in the skin, bones, cartilage, and connective tissue of animals. In fact, collagen accounts for around 30% of the total amount of protein in the bodies of mammals. Its important functions include providing structure, support and strength to skin, bones, muscles, and cartilage. For pet food applications, collagen can be used as a nutritious, highly digestible source of protein. It is present in various animal-based ingredients, such as chicken and fish, but can also be supplemented as pure collagen.

NATURAL PRODUCTION AND BREAKDOWN

A well-balanced and high-quality diet normally provides cats and dogs with the raw ingredients required to make enough collagen naturally. As with all proteins, however, collagen does not last forever but follows a continuous natural cycle of breakdown and regeneration. This breakdown process can be exacerbated because of aspects like daily wear and tear, genetic issues of certain dog breeds, UV rays, stress, and ageing – making the skin 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 seriously restrict the mobility of pets. Collagen supplementation may then serve to support the animal's health and well-being.

PET HEALTH & WELL-BEING CLAIMS

Indeed, there is growing evidence that mobility issues can be mitigated through the supplementation of collagen, making it a suitable pet food ingredient to support health claims. Recent research shows that collagen, especially in its so-called hydrolysate form, can prevent the destruction of cartilage through the production of macromolecules and suppression of catabolic enzymes, and that omega-3 long-chain fatty acids combined with collagen peptides can reduce inflammation in the joints – specifically as part of osteoarthritis. Pure collagen peptides can be supplemented to help improve the skin and coat condition, and reduce mobility problems related to bones and muscles, as well as cartilage. Next to the direct effect on joint health that collagen peptides can have, there is also an indirect approach. For this immune-mediated mechanism, so-called undenatured type II collagen is used. This compound can inhibit the inflammatory cascade. Undenatured type II collagen and collagen peptides are the most studied collagen types for joint health applications.

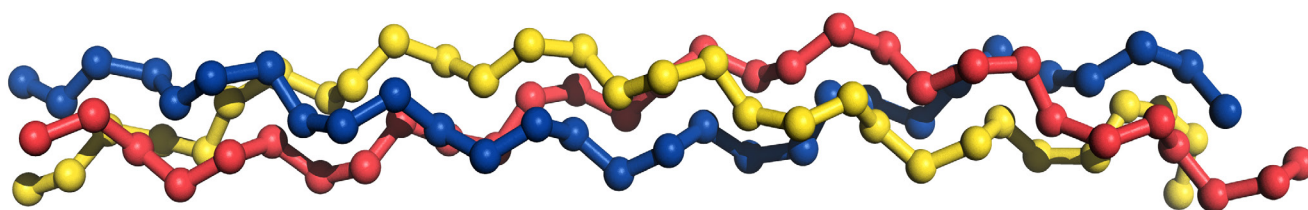
SOURCES OF COLLAGEN

Pure collagen can be extracted from animal skin, bones, cartilage, and connective tissue by a process called chemical and enzymatic hydrolysis. The result is hydrolyzed collagen (collagen peptides), which is often processed into a powder that can be added as a supplement to a pet's day-to-day food. Besides beef and pork skin and bone, chicken is a popular ingredient because it is rich in collagen, has low levels of fat and ash, very good functionality, and is very palatable to both cats and dogs. Dried chicken collagen powder is made from food-grade pure chicken without using by-products and takes the form of a fully soluble, nutritional powder with a very high protein content. In most products, this content is about 80%. Undenatured type II collagen is derived via a state-of-the-art extraction method from chicken sternum.

TYPES OF COLLAGEN

There are many types of collagen with varying benefits and attributes; cats and dogs have a whopping 28 types of collagen in their body. All these share the same basic characteristic of having three polypeptide chains coiled together in a triple helix structure (see picture). Collagen types I, II and III are most interesting and relevant to the health and well-being of cats and dogs.

Type I collagen is the most abundant, making up over than 90% of the protein content of mammal bones. It is also the major collagen type of tendons (connective tissue that attaches muscles to bones) and ligaments (connective tissue that attaches one bone to another bone – holding joints together), providing structure and strength to these tissues. This goes to show that collagen is a unique animal-based ingredient for which there is no real vegan substitute. Research has indicated, however, that eggshell membrane – which is primarily composed of type I collagen – may serve as an alternative, vegetarian ingredient that contributes to pet joint health.



TECHNO-FUNCTIONAL COLLAGEN

The most significant distinction within collagen type I is that between techno functional collagen vs. collagen peptides (or 'collagen hydrolysate'). Techno functional collagen is mostly produced or offered as gelatin, which contains more than 83% protein but typically has a low nutritional value because of its poor amino acid profile.

However, it is a highly functional and fully digestible ingredient with a wide range of applications in pet food. Because of its high protein content, high water binding capacity and low calorific value, gelatin can be a valuable ingredient for premium formulations. It improves texture, durability and mouth feel of kibbles, and provides chewable hardness and mechanical elasticity when used in snacks and treats formulas.

BENEFITS OF TECHNO-FUNCTIONAL COLLAGEN

- Increases durability & improves texture of extrudates
- Used as a starch replacer and efficient binder
- Enriches formula with nutritious, highly digestible protein
- Low caloric value
- Gives satiety feel (excellent for weight control diets)
- Natural ingredient – clean labeling

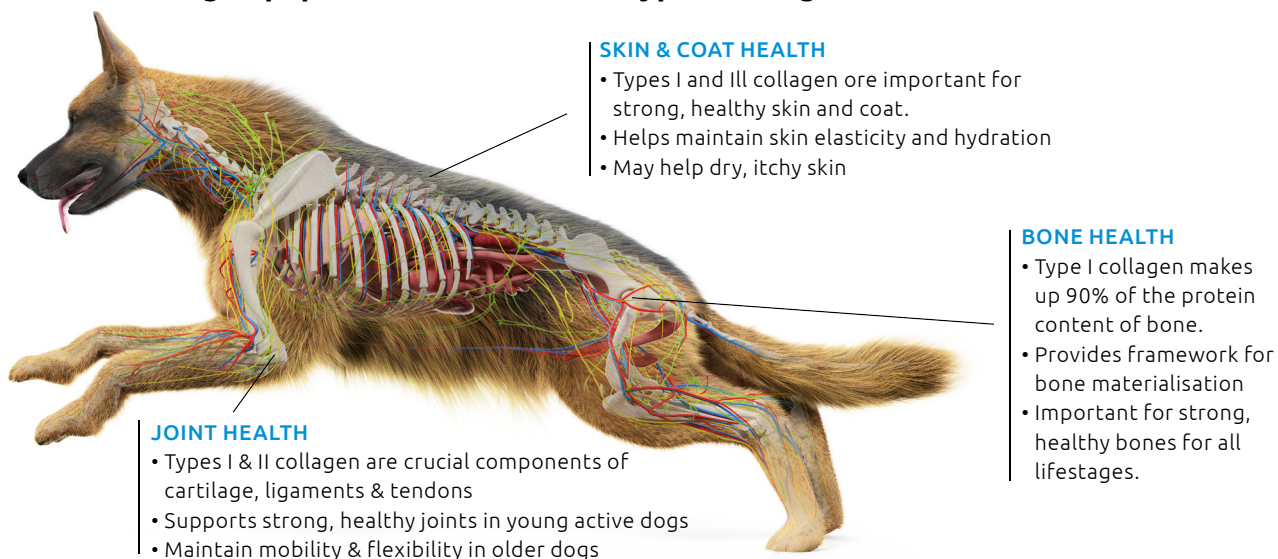
COLLAGEN PEPTIDES

Besides ingredients containing functional collagen, like chicken, there is a new version to this trend: collagen peptides. These are made up of short chains of amino acids derived from intact collagen. Because they are smaller chains, collagen peptides are easier to absorb and therefore more clearly defined as an ingredient for pet food. Consisting of almost 100% highly digestible protein, they are excellent for achieving high protein targets. Research has shown that collagen peptides can improve skin elasticity, hydration, and increase bone density. Specifically for dogs, research indicates that they beneficially affect the clinical signs of canine osteoarthritis (a degenerative and inflammatory condition) through an acceptable underlying mechanism. Research also suggests that collagen peptides provide an excellent source of building blocks for cartilage tissue, which has an important mechanical functionality within mammal joints.

UNDENATURED TYPE II COLLAGEN

Unique about undenatured type II collagen is that it undergoes minimal processing during extraction. As a result, the product keeps the same 3D structure as in humans and pets – enabling the body to recognize it and adequately react to it to stop the inflammation. As such, pain can be reduced in the joints and connective tissue, which in turn improves flexibility and mobility for pets. Many pet related research trials (see 'want to know more') suggest that undenatured type II collagen should be used in combination with sufficient amounts of omega-3 (EPA & DHA).

Key benefits collagen peptides & undenatured type II collagen



IDENTIFYING COLLAGEN CONTENT IN PET FOOD

It is one thing to understand what collagen is and how it contributes to pet joint health, but how to identify it as an ingredient in pet food? This can be done relatively easily by pet food manufacturers. Like all proteins, collagen consists of amino acids. Hydroxyproline is an amino acid that is unique to collagen and makes up approximately 12% of collagen protein. By analyzing the hydroxyproline content in pet food, this will make it easy to calculate and determine the collagen content of the pet food.

COLLAGEN SOLUTIONS BY IQI TRUSTED PETFOOD INGREDIENTS

IQI offers a wide portfolio of collagen for pet food applications. Our portfolio ranges from chicken to pork and beef collagen powder based on techno functional collagen. On top of that, we can share the nutritional profile, bloom strength and palatability of techno functional collagen as an ingredient in pet food. Besides techno functional collagen, we offer collagen peptides derived from pork, beef, fish, and chicken. To complete our portfolio, we offer a state-of-the-art undenatured type II collagen product. For more information about these different collagen applications and other ingredients for the pet food industry, please visit our [website](#) or contact us directly.

Want to know more?

[Gelatine Manufacturers of Europe](#)

[Efficacy of Chondroprotective Food Supplements Based on Collagen Hydrolysate and Compounds Isolated from Marine Organisms](#)

[Collagen as a suppressor of inflammation in the joints as part of osteoarthritis](#)

[The Effectiveness of Specific Collagen Peptides on Osteoarthritis in Dogs-Impact on Metabolic Processes in Canine Chondrocytes](#)

[Role of Collagen Derivatives in Osteoarthritis and Cartilage Repair: A Systematic Scoping Review With Evidence Mapping](#)

[Oral Administration of Gelatin Hydrolysate Reduces Clinical Signs of Canine Osteoarthritis in a Double-Blind, Placebo-Controlled Trial](#)

IQI products related to this white paper:

[Dried chicken collagen powder](#)

[Dried chicken collagen powder FP82](#)

[Dried pork collagen powder](#)

[Chicken meat hydrolysate \(50% collagen + chondroitin\)](#)

[Pork collagen peptides](#)

[Beef collagen peptides](#)

[Fish collagen peptides](#)

[Undenatured type II collagen \(chicken\)](#)

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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