Proteins "outside the box": Resource-saving, Grain-free and Vegan

Protein flours, press cakes and algae can replace meat as the classic source of protein to a considerable extent. The alternatives have both nutritional and sustainability advantages: They exhibit a significantly better carbon footprint than meat and are not subject to the widely discussed issues involving factory farming.

Proteins: Their functions and Pet-specific protein needs

Proteins are significant components of the cells in your pet's body. Among others, theyhave the following functions:

- Providing support and structure – as the organic substance in connective tissue, hair and feathers
- Protection – as antibodies
- Regulating bodily functions – as enzymes and hormones

20 to 50 percent of an animal's body are proteins. Although proteins perform the same functions in different species, the needs of each species can vary significantly. For example, a cat needs almost twice as much protein as a dog . The increased need stems from the fact that a cat's body processes proteins and amino acids at a very high rate. As there is no way to reduce that rate, cats can come to suffer from protein deficiencies very quickly if they do not consume sufficient amounts of the necessary amino acids. In addition, it is important to mention the special role taurine plays in feline diets. Cats can only metabolise this organic compound in very small amounts. Taurine is found far predominantly in animal sources. In contrast to cats, dogs can produce taurine from methionine and cysteine themselves. Within each species of animal, the food and nutritional needs vary for each individual – the most important factors being age, breed, weight and physical activity.

Advantages of alternative sources of protein

Traditionally, meat is the main source of protein in pet food. However, nowadays more and more pet parents seek more sustainable dietary options. Particularly vegans and vegetarians want to raise their pets on a more or less exclusively plant-based diet. They purposefully buy pet food that meets these requirements – but without compromising nutritional value, for example the amount of protein and amino acids.

Other ingredients are explicitly undesired. For example, pet parents are increasingly making sure that the food is grain-free whenever possible, as grains have been said to trigger allergies and hypersensitivities. This presumption boosts the trend towards grain-free pet food, which the pet parents wish to find in one product together with their demand for a predominately or exclusively plant-based feed. However, a purely vegan diet is difficult to realize for a cat, considering its taurine needs previously mentioned. Nevertheless, there are some very good arguments for a largely plant-based diet with some animal-based components to cover all nutritional needs. One of the main arguments here is th at plant-based sources of protein are unburdened by the negative emotions and ethical conflicts associated with factory farming and slaughtering. At the same time, plant-based proteins represent a powerful "yes" to resource conservation and climate protection: Animal-based proteins, i.e., meat, can only be produced by farm animals first consuming (plant-based) proteins and then metabolizing them into animal-based proteins in their bodies – a process that by its very nature entails transformative losses. This is just one of the reasons why meat has a significantly worse environmental footprint than plant-based alternatives. A found that the production of one kilogram of beef produces approximately 13 kilograms of CO_2, whilst the same amount of protein flour produces less than one kilogram. Not too long ago, soy protein was the dominating basis for meat substitutes on the food market. Nowadays, there are far more plant-based sources of protein for both humans and pets available.

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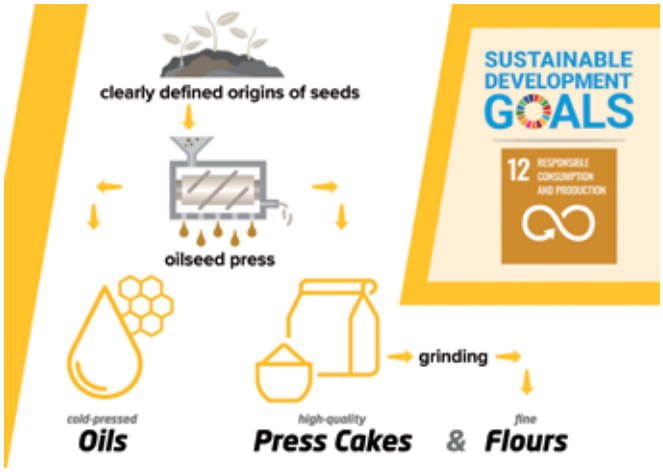
Overview: Protein flours

The process of gently cold pressing oilseeds or fruit pulp produces oil and press cakes. The latter can be ground into a fine flour. These completely natural flours have a residual oil content of five to ten percent and contain very attractive components, such as

- proteins and (essential and non-essential) amino acids
- dietary fibers
- energy
- minerals and trace elements

The flours are excellently suited for predominately plant-based or completely vegan pet food. In the following, we describe grain-free flours that are frequently available in organic qualities. Depending on the raw material and type of processing, the natural protein content lies between 30 and 50 percent. This can be further increased by natural, physical processing to approximately 80 percent, though this depends on the raw materials used. As does, the amino acid profile. The following flours contain all amino acids essential for dogs without exceptions.



Protein flours contribute to the holistic use of raw materials e.g., seeds. Pet parents interested in sustainability appreciate this feature. It also represents the flours of protein flours and press cake for responsible production and consumption – one of the 17 Sustainable Development Goals of the United Nations.

Hemp Flour

Hemp products result from approved hemp varieties low in THC (= tetrahydrocannabinol). The hemp protein contained in the hemp press cake is made of approximately 65 percent edestin, a bioactive globulin protein that is easy to digest. Thanks to their residual oil content, hemp press cake and flour have an ideal fatty acid composition. They are a valuable plant-based source of essential omega-3 and -6 fatty acids, which, for example, can have a positive effect on the fur of both dogs and cats. Furthermore, they are rich in the branched amino acids isoleucine, leucine and valine, which are important for muscle development. Hemp flour has a number of uses, e. g., in wet, supplementary and snack foods for dogs as well as in treats for horses. The Hemp can score with sustainability-aware pet parents: It is a crop that needs little or no pesticides or fertilizer since it grows faster than (almost) any weed. As a rich source of pollen for insects, hemp contributes significantly to biodiversity. At Henry Lamotte Oils, we also press organic hemp produced in Germany in our Oil Mill Lipos, some of which is locally sourced in neighboring Lower Saxony. Hemp can be cultivated and processed within a radius of 400 kilometers in Northern Germany, further optimizing its carbon footprint.

Linseed Flour

Linseed press cake and flour are valued as a plant-based source of alpha-linolenic acid, an essential omega-3 fatty acid. Significant amounts of globulin and albumin, lead to pronounced water binding and emulsification capabilities. Thanks to their protein composition, linseed press cake and flour have good rheological properties, e. g., with respect to elasticity and firmness. Linseed flour is commonly used in dog treats. Alternatively, the flour can be substituted with coarsely ground linseed. It is easily digestible and contains 15 to 30 percent omega-3 fatty acids, since coarsely ground linseed has a significantly higher oil content – i.e., 35 to 40 percent – than press cake or flour. Furthermore, linseed is rich in lignan, a phyto-oestrogen with oxidation-inhibiting properties, which can have a positive effect on the feed quality.

Sesame Flour

The sulphuric amino acids methionine and cysteine make up a rather large portion of the protein content of sesame press cake and flour. These two amino acids are particularly (though not exclusively) known for

- their oxidation-inhibiting properties in the intestines,

- their pivotal role in building up and stabilizing protein structures, for example in the keratin of fur and hooves.

Methionine and cysteine are metabolised by dogs to form taurine. With taurine, they conjugate bile acid, which plays a fundamental role in digesting fat. Dogs who receive food with sufficient amounts of methionine and cysteine do not need added taurine in their food, which is available far predominantly from animal sources. Birds – from gallinaceous birds like quails or guinea fowl to homing pigeons and ornamental birds – have a particular need for the two sulphurous amino acids, especially when moulting and while growing. Their feathers contain creatine which is produced from methionine, among other things. In addition to the two sulphurous amino acids, sesame press cake and flour contain calcium in a high concentration and in the ratio frequently recommended for adult dogs: 1.3 parts of calcium to 1 part phosphor (18,000 to 14,000 mg per kg). In combination with vitamin D, this ratio benefits dogs in particular for strong bones and healthy teeth. With regard to processing: it's interesting to note that sesame press cake and flour contain abundant globulin proteins. These lend the sesame products a high water binding capacity and agglutinate the components in the desired formulation. Sesamolin and sesamol are antioxidant which is beneficial especially in light of the enlarged surface of extrudates.

Sunflower Flour

Henry Lamotte Oils offers a choice of sunflower flour and press cake made from shelled and unshelled seeds. Flour and press cake made from shelled seeds as offer a protein content of approximately 50 percent, those made using unshelled seeds approximately 25 percent. The amino acid profile of sunflower flour and press cake made from shelled seeds has a significant proportion of the sulphurous amino acids methionine and cysteine, similar to sesame (for details on their positive effects please see the section on sesame flour). In addition, sunflower seed and press cake contain a large amount of branched amino acids (leucine, isoleucine and valine) which are important for muscle development. Due to their oil content, sunflower flour and press cake are a very good source for linoleic acid, an essential omega-6 fatty acid. This acid plays a fundamental role in regulating the water balance of the skin and the body's own synthesis of gamma-linolenic acid. Sunflower flour made from shelled sunflower seeds has a relatively neutral taste and scent which increases acceptance. Furthermore, it easily takes on flavors, enabling gentle influence on the taste of food. Thus, sunflower flour is a GMO-free alternative to soy products. Sunflower flour and press cake have good water and fat binding capacities and are therefore able to give consistency to various formulas. Sunflowers are pollinated exclusively by insects – therefore, the plants have good reason to attract numerous species of wild bees and to provide them with ample amounts of pollen and nectar, making sunflowers key players in maintaining biodiversity.

Algae: Overview

In Asia, algae have been used as a purely plant-based source of protein for centuries. The European pet food industry association FEDIAF emphasises: "Algae protein also has great potential, it has almost double the protein content of beef [and] grows ten times faster than terrestrial plants." [2] Algae also offer a high density of other nutrients. Their sustainability benefits include:

- No feed required for breeding
- Little or no fertilizer, the production of which is energy- and CO_2-intensive
- No need of pharmaceuticals
- Binding large quantities of CO_2, which is removed from the atmosphere

Algae are listed in the Catalogue of Feed Materials according to EU regulation 68/2013. They are found in a wide range of feed materials – e.g., from wet food for dogs to ready-mixes for cats and horses.

Spirulina

Spirulina (Spirulina platensis) is a genus of cyanobacteria, colloquially referred to as blue-green algae. It is mainly obtained from aquaculture, which is also well possible in salty brackish water – as Spirulina naturally occurs in shallow, subtropical waters with high salinity. Spirulina is one of the natural plant foods with the highest protein contents. It contains approximately 60 to 80 percent of protein, including a large proportion of the essential branched amino acids isoleucine, leucine and valine, which are essential for muscle development. Combined with the numerous vitamins and minerals, the amino acids make spirulina a high-quality source of protein in various types of pet food. It is used, for example, in cat and horse food as well as is in fishkeeping due to the pigments it contains.

Chlorella

Chlorella (Chlorella sp.) is a spherical green alga that thrives mainly in fresh water and is found all over the world. Chlorella can be easily cultivated commercially, which is mostly done in aquaculture. The alga contains roughly 50 to 80 percent proteins and numerous essential amino acids. Moreover, Chlorella offers a wide range of vitamins and minerals. The carotenoids it contains have anti-oxidative and detoxing effects, for which they are widely known in BARF diets. Chlorella is used as supplementary foods for horses, dogs and cats and in fish food, among others.

Amino acid (g/100g)	Press Cakes and Flours						Algae	
	Hemp Press Cake, 30	Hemp Press Cake, 50	Linseed Flour, 30	Sesame Seed Flour, 40	Sunflower Press Cake, 50, from shelled seed	Sunflower Press Cake, 25, from un-shelled seed	Chlorella	Spirulina
Arginine - total	3.40	5.73	3.33	6.13	4.84	2.11	2.76	4.16
Cysteine and cystine	0.45	0.76*	0.59	1.03	0.85	0.51	0.51	0.61
Histidine	0.85	1.30	0.75	1.28	1.39	0.64	0.93	1.04
Isoleucine	1.18	1.84	1.47	1.73	2.17	1.02	1.61	3.52
Leucine	2.00	3.15	2.10	3.23	3.37	1.62	3.92	5.65
Lysine	1.29	1.88	1.43	1.39	1.90	0.97	2.49	2.99
Methionine	0.70	0.86	0.60	1.37	1.13	0.67	1.04	1.34
Phenylalanine	1.41	2.13	1.61	2.29	2.51	1.26	2.02	2.86
Threonine	1.09	1.69	1.35	1.79	1.95	1.04	1.93	3.20
Tryptophan	0.36	0.61	0.63	0.83	0.80	0.44	0.78	1.02
Valine	1.58	2.33	1.79	2.36	2.73	1.32	2.64	3.95

* cystine only

Excerpt from the amino acid profile of selected Henry Lamotte Oils products. Analyses conducted by an external laboratory in June 2021 and by suppliers

References

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For more information
www.lamotte-oils.de