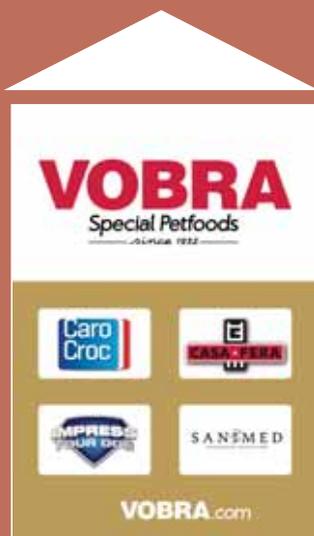




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Starch in Dog Foods

Carbohydrates are composed of carbon combined with hydrogen and oxygen, which are in about the same ratio as in water. The carbohydrates in dog food are of plant origin and may be classified as non-structural and structural constituents, the latter occurring in the cell walls. Both classes contain fibre: carbohydrates that are resistant to the dog's digestive enzymes. Starch, which is present in many plants as a reserve carbohydrate, is the major digestible carbohydrate in dog foods.

The various species of grains contain 50 to 70 percent starch. In the ingredient lists of grain-rich dog food, different grains can be found. Wheat, maize, barley and rice are commonly used. In dry foods, the amount of digestible carbohydrates can be up to 55 percent, with a starch level of 44 percent. Many owners believe that nature did not design dogs to consume grains and utilise the starch constituent. Although this view is refuted by scientific data, it has made grain-free a top trend.

Dog foods without grains can be high or low in starch. Grain-free, high-carb foods contain similar amounts of starch as grain-rich foods. They are produced with alternative starch sources such as potato and cassava roots. In grain-free, low-carb foods, starch is restricted, causing protein to take up more room. Such dry foods may contain less than 16 percent starch and about 40 percent protein, mainly of animal origin.

Low-starch, high-protein foods, without or with a little grain, can have health disadvantages and are relatively unsustainable and expensive. Abundant protein from food and its associated high dietary phosphorus concentration may increase kidney disease risk in aging dogs. Livestock production is a resource-intensive process, implying that foods higher in animal protein are more eco-unfriendly.

Carbohydrates

Carbohydrates may be categorised on the basis of their number of sugar units. Glucose belongs to the monosaccharides as it consists of one molecule of sugar. Glucose can be polymerised into the storage polysaccharide starch by plants and into glycogen by animals. Starch is most abundant in cereal grains, tubers and roots. Meats have negligible amounts of carbohydrates. Indigestible carbohydrate polymers in plants are termed fibres.

Dog food labels generally do not declare the content of carbohydrates, but the percentage of so-called nitrogen-free extract (NFE) can be calculated. The nature of NFE is complex, but it is assumed to represent principally digestible carbohydrates. When the sum of crude protein, crude fat, ash, crude fibre and moisture, expressed as percentages, is subtracted from 100, the outcome is designated as NFE.

Grain-Rich Foods

Most industrially produced, dry dog foods are grain-rich and hence high-carb. They hold 30-55 percent digestible carbohydrates with starch as main component. As a rough guide, high-carb food provides at least 30 percent of its calories as carbohydrates.

Grains are suitable ingredients. The starch provides energy, thereby sparing protein, while grains also supply protein. Starch in cooked grains is digested efficiently by the dog's small intestine. Domesticated dogs willingly accept grain-rich foods. They thrive on these foods which do not impose extra risk of canine diseases. Wheat, maize, barley and rice are common ingredients. Some dog foods are marketed with (wild) rice, barley, oats, spelt or millet as part of the product name. Few foods feature sorghum or a pseudograin such as buckwheat, quinoa or amaranth. Pseudograins are grain-like and starch-rich, but not grains botanically.

Grain-Free Foods

Within the concept of natural canine nutrition there is no place for cultivated grains, especially wheat and corn. The anti-grain sentiment has driven the market for grain-free dog foods. Grain-free, high-carb, dry foods are produced with alternative starch sources such as (sweet) potatoes, potato starch, cassava roots or legumes (beans, peas or lentils). Grain-free, low-carb foods are low in non-grain, starch-rich ingredients or are essentially starch-free. Some low-carb foods are not free of grains, but contain smaller amounts.

Starch-Free Foods

Clearly, grain-free is not synonymous with starch-free. The view rejecting grains is based on various arguments. One line of argument is that eating grains is unnatural for dogs and that starch cannot be digested. Thus, it is remarkable that all grain-free, extruded dog foods contain starch. The only exception may be an American brand that uses starch-free as marketing tool; the brand variants contain 60-63 percent crude protein.

The qualification starch-free cannot be based on the NFE fraction of pet food.

It requires the absence of starch sources

in the declaration of individual ingredients on the label. Foods free of starch can be found among canned, deep-frozen and freeze-dried products.

No-Carb Foods

Digestible carbohydrates act as precursor of blood glucose and source of calories. The dog has no nutritional need for carbohydrates as they can be replaced by protein and fat. Glucose is synthesized from protein and

calories are derived from both protein and fat. Technically, no-carb food lacks polysaccharide fibre and therefore may cause diarrhoea.

Dog food classification according to digestible carbohydrates

High-carb foods		
Grain-rich	Grain-free	
Low-carb foods		
Grain-restricted	Grain-free	Starch-free
No-carb foods		
All-meat	Experimental	



Extruded and pressed dry foods that are positioned as grain-free and low-carb generally contain less than 20 percent digestible carbohydrates or 16 percent starch. Basically, the room in the food created by lowering carbohydrates is filled by protein. Low-carb dry foods generally contain 35-40 percent protein, but products with a level as high as 60 percent can be found in the marketplace. Canned, deep-frozen and freeze-dried foods may be promoted as grain-free, low-carb and protein-rich.

Dr Anton C Beynen writes this exclusive column on dog and cat nutrition every month. He is affiliated with Vobra Special Petfoods.