

The Science of Pet Food: Role of Carbohydrate

What are dietary carbohydrates?

Carbohydrates are one of the three categories of macronutrients (along with proteins and fats) in the diet of animals. Carbohydrates, protein, fats, and added vitamins and minerals all play important roles in a commercial dog or cat food recipe, and provide key nutrition for pets. Carbohydrates (“carbs”) are a group of molecules with a common structure of carbon (C), hydrogen (H) and oxygen (O). They are a main source of energy and provide fibre, which can be beneficial for gastrointestinal health. Carbohydrates include sugars, starches and dietary fibres. The

simplest molecules within carbohydrates are sugars (monosaccharides and disaccharides). Longer chains and structures made of those sugars are complex carbohydrates like starches (polysaccharides) and dietary fibres (oligo and polysaccharides). Sugars and starches are called *digestible carbohydrates*.

For more information regarding the nutritional needs of cats and dogs, please check [here](#) the relevant GAPFA factsheet.

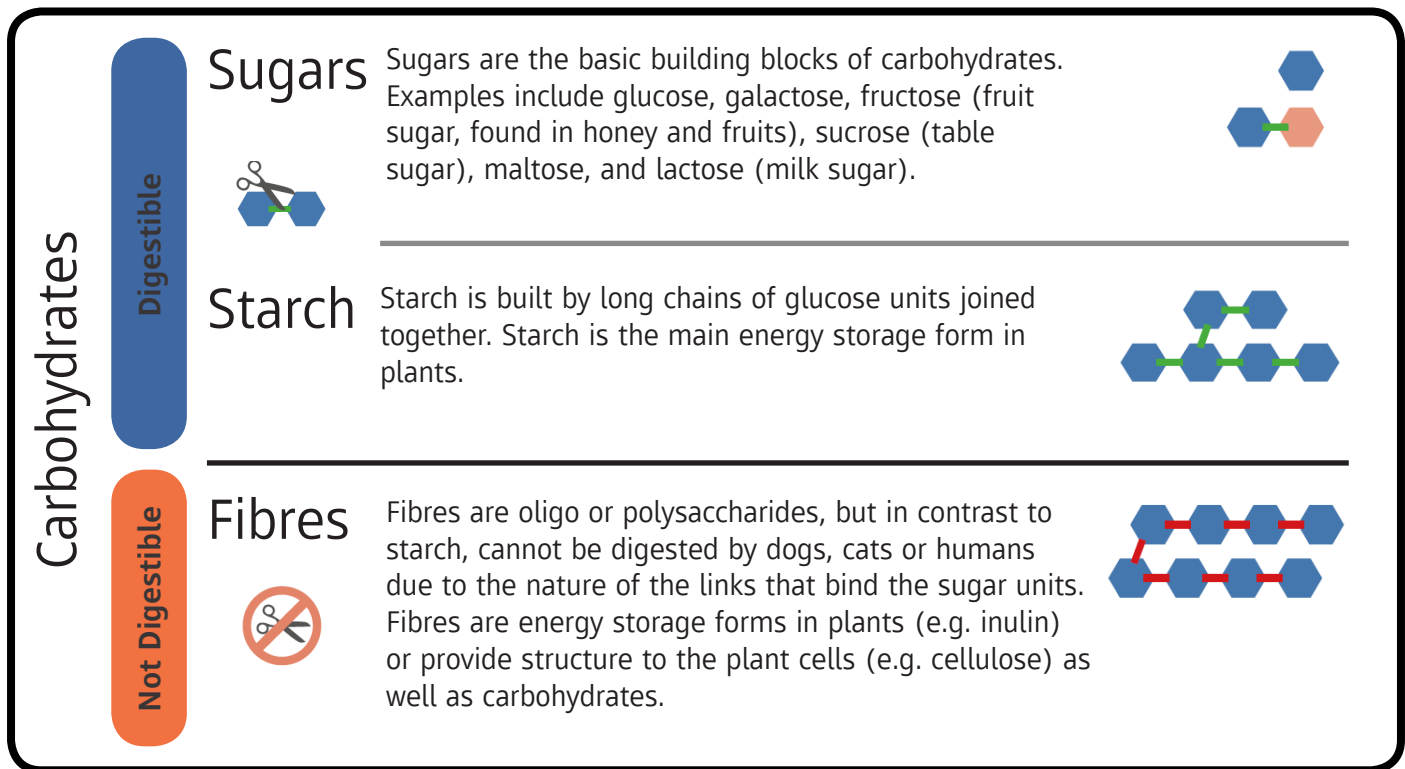




Figure 1. Overview of carbohydrates

 = enzymatic breakdown
 = no enzymatic breakdown

What is the main purpose of digestible carbohydrates in pet foods?

Digestible carbohydrates provide an important source of energy for the body in the form of glucose, which is the main form of energy for tissues like the brain and red blood cells. When carbohydrate supply is limited, glucose can also be synthesised from proteins and other compounds.

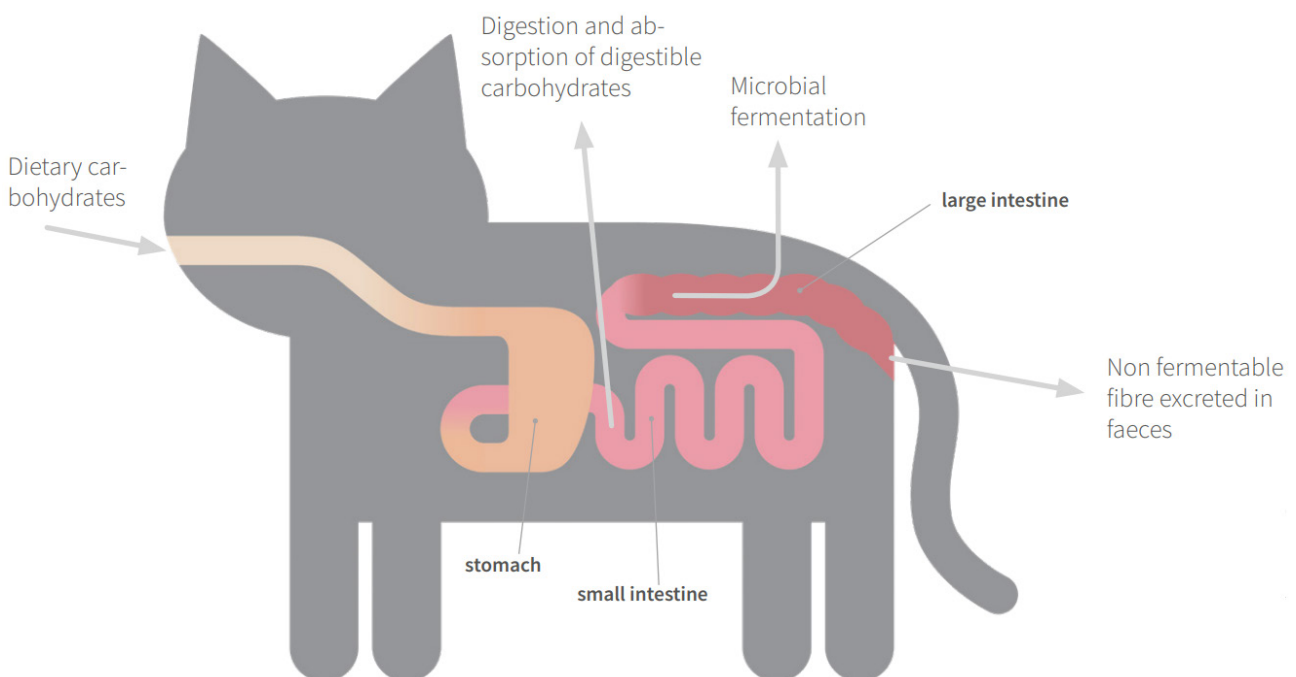
Cats and dogs can utilise and benefit from carbohydrates in their diet. Both animals are able to digest starch, and recent research reveals that the early ancestors of modern dogs underwent genetic changes which allowed them to thrive on

a higher starch diet. An exception is milk sugar, lactose, which is not adequately digested in adulthood by a majority of dogs and cats and can cause gastrointestinal upset.

Starch also has important technological properties for dry kibble manufacturing, since its gelatinization is a crucial part of the extrusion process. More information about how pet food is made can be found in the [dedicated GAPFA factsheet](#).



What about fibre?

Dogs and cats do not have the ability to turn fibre into a source of glucose, meaning that fibre does not serve as a direct source of energy for an animal. However, once fibre reaches the large intestine, it is fermented by the microbiota (mainly bacteria and yeasts) to provide energy to bacteria and large intestinal cells. The degree of fermentability varies depending on the fibre type.



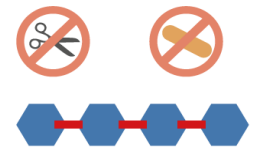
Fibre has several benefits to pets. Some fermentable fibres known as prebiotic fibres support balanced intestinal microbiota. The fermentation products of fibre are beneficial to large intestinal cells. Non-fermentable fibre promotes regular bowel movements and regulate faecal consistency.

Fibre

Fermentable The intestinal microbiota () utilise fermentable fibre as their own nutrient and energy source. The fermentation products () (such as short chain fatty acids, like butyrate) maintain healthy intestinal pH and provide nutrition to intestinal cells. Fermentable fibres may supply as much as 2 Kcal ME/g.



Non fermentable This type of fibre does not provide energy to the microbiota and is excreted mainly unchanged. Provides bulk and promotes intestinal transit.



Most pet foods use ingredients to provide a mixture of fermentable and non-fermentable fibres, offering the benefits of both fibre types.

What are the main sources of carbohydrates in pet food?

The common starch sources in pet foods are cereals ('grains'), legumes and root vegetables. Starch needs to be well cooked to be properly digested and to prevent intestinal upset.

Fibre is provided by ingredients such as whole grains, purified cellulose, beet or chicory pulp, psyllium, fruit and vegetable fibres, inulin and FOS (fructooligosaccharides) or MOS (mannooligosaccharides).

Benefits of carbohydrates in pet food

Although not an essential nutrient, digestible carbohydrates provide a source of energy and glucose, which allows for the formulation of moderate fat diets and low-calorie diets to manage weight problems. It also helps to spare the use of animal protein, which is a limited resource in pet nutrition. Dietary fibre is not an essential nutrient either, but it has multiple benefits, such as promotion of a healthy intestinal microbiota, adequate intestinal transit, and satiation (the sensation of feeling full).

The main fibre and carbohydrates sources included in pet food can also serve as important sources of essential nutrients such as vitamins, minerals and fatty acids.

The optimal digestible carbohydrate and fibre intake is going to vary from pet to pet. Please consult with your veterinarian or veterinary nutritionist to choose the best diet for your pet.



Are carbohydrates reported on the pet food label?

Governmental regulatory agencies are responsible in various regions around the globe for setting pet food quality and safety standards, and this includes standards to ensure the accuracy and consistency of pet food labels in each region. For example, EU law determines the mandatory minimal nutritional information on the pet food label, listed under the heading “*analytical constituents*” as grams per 100 grams of food as fed, represented as a percentage (e.g. 6 g per 100g as fed = 6%). This includes protein (or crude protein), fat (or crude fat), inorganic matter (or crude ash) and crude fibre; but does not include digestible carbohydrates.

The crude fibre value on the label is the result of a chemical analysis that underestimates the total dietary fibre content of the diet; the fibre content in the product is typically much higher than reported. Therefore ‘crude fibre’ does not provide accurate information concerning the functional or nutritional properties of carbohydrates. It is because of this that claims for carbohydrate levels in pet foods are discouraged since at this time there is no uniform method for determining carbohydrates. For more detailed information about the carbohydrate content of a specific pet food, it is best to contact the manufacturer.

