



## The Fuss About Fiber

---





Leading with Technical Expertise - White Paper

Leah Lambrakis & Jarrod Kersey, Department of Technical Services

### Why Is Fiber Important?

We all hear a great deal about consuming the right amount of fiber in our diets, but what about our pets? While fiber is not a required nutrient for cats and dogs, this complex carbohydrate is important for the proper functioning and health of the gastrointestinal tract, or simply, the digestive system. Just like us!

The addition of fiber to a pet's diet will be driven by the individual needs of the animal, depending on life-stage, overall health, weight and physiological status. Although the addition of fiber is not necessary in the diets of cats or dogs, small amounts of dietary fiber can provide the following health benefits:

-  Achieving and maintaining healthy weight.
-  Promoting healthy gut bacteria.
-  Regular and consistent emptying of the bowel.
-  Therapeutic management and prevention of specific diseases.

### Not All Fibers Are Created Equal

From a broad perspective, fiber refers to a multitude of compounds which are categorized as complex carbohydrates (Gross et al., 2010). For this discussion pertaining to small animal nutrition, fiber can be described as the carbohydrate in plants that cannot be digested by mammalian enzymes in the small intestine. Sources of fiber span across various plant-based foods, including whole grains, fruits, vegetables, legumes, nuts and seeds. However, the fiber contained in these foods are not all the same, and can be classified based on their **solubility** and **fermentability**. Many different types of fibers vary greatly in their physiological effects on diet digestibility, nutrient availability, stool quality, speed of passage of food through the digestive system, and overall health and wellness.

### Why all the Fuss about Fiber?

Let's do a technical deep dive!

#### Solubility

Solubility is a measure of how fibers are able to disperse or dissolve in water. Plant fibers can either be primarily soluble, insoluble or a blend of both. Examples of soluble fibers are pectins and gums, both of which are able to readily absorb water. Soluble fiber blends with water in the gut, forming a thick, viscous gel, which increases the viscosity of the digesta through the gastro-intestinal tract. Soluble fiber can provide various health benefits, such as reducing blood sugar spikes, binding cholesterol, and promoting healthy colonic mucosa and immune function



RESEARCH & DEVELOPMENT - TECHNICAL POSITION PAPER

# The Fuss About Fiber

Leading with Technical Expertise - White Paper

*Leah Lambrakis & Jarrod Kersey, Department of Technical Services*

in the large intestine (Weickert et al., 2008, Linder 2017). Common soluble fibers used in pet foods are guar gum and the prebiotic inulin.

Now that we mentioned it, prebiotics, which are what we like to refer to as ‘microbiome-healthy ingredients’, are increasingly appearing on pet food labels. Prebiotics such as inulin and fructooligosaccharides (FOS), are soluble and fermentable fibers that positively affect the gut by stimulating the activity of beneficial bacteria, ultimately improving overall health of the microbiome (Wernimont et al., 2020).

Insoluble fibers such as cellulose, hemicelluloses and lignin do not blend well with water and pass through the digestive system relatively intact. These fibers tend to increase both the volume and frequency of stools and act as a ‘bulking agent’ in the gut, thus aiding in the prevention of constipation (Anderson et al., 2009). Insoluble fibers commonly found in pet foods are cellulose, oat fiber and wheat bran. Of note, several ingredients used in pet foods can provide a blend of both soluble and insoluble fiber; beet pulp, flaxseed and psyllium are some examples. Interestingly, even the fractions of certain ingredients can re-define their fiber status. Oats for example, can be classified as soluble in their whole form, but the fiber fraction is insoluble, yet the bran fraction remains soluble.

**Table 1.0 – Common Fibers in Pet Foods**

Fiber Source	Soluble Fiber	Insoluble Fiber
Beet Pulp	✓	✓
Cellulose		✓
Citrus Fiber	✓	✓
Guar Gum	✓	
Flaxseed Meal	✓	✓
Inulin	✓	
Oat Fiber		✓
Pea Fiber		✓
Rice Bran		✓
Wheat Bran		✓



RESEARCH & DEVELOPMENT - TECHNICAL POSITION PAPER  
**The Fuss About Fiber**

Leading with Technical Expertise - White Paper  
*Leah Lambrakis & Jarrod Kersey, Department of Technical Services*

**Fermentability**

Fibers are also categorized by their fermentability. As described earlier, fibers resist digestion in the small intestine of cats and dogs, and as a result some fibers are then fermented in the large intestine. If the fiber is moderately or rapidly fermentable, short-chain fatty acids are formed that can be absorbed and metabolized to produce energy in the colon. While complicated, this is a very important consideration when it comes to fiber sources!

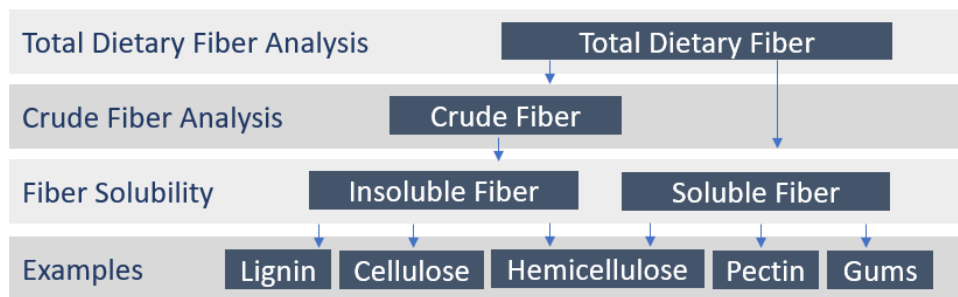
While fermentation can provide health benefits to the gut, we need to be cautious as one of the end-products of fiber fermentation is gas and discomfort from bloating. Ideally a diet should have a lower ratio of soluble to insoluble fiber (ideally soluble fiber should only be 10-30% of the total dietary fiber content), and the introduction of meaningful levels of fiber to a diet should be a slow process. Otherwise, the outcome may not be very pleasant!

**What Is “Crude Fiber” On Pet Food Labels?**

To add an additional level of complexity to this topic, the level of fiber declared on pet food labels, listed as Crude Fiber, does not provide the complete picture. The “Guaranteed Analysis” of Crude Fiber primarily includes insoluble fiber, and does not include any soluble fiber. Further to that, the declared value of Crude Fiber on a label only provides the *potential* maximum content in the product. This is not very useful if you are seeking to understand the true fiber content of your pet’s food!

The method of analysis for Crude Fiber results in a residue of cellulose, some hemicelluloses and lignin. To this, the declaration of Crude Fiber on the label represents an incomplete fraction of the fibrous components of a product (de-Oliveira et al., 2011). Conversely, the analytical methodology for Total Dietary Fiber (TDF) includes both the soluble and insoluble fiber content. Table 2.0 below may aid in better understanding these differences.

**Table 2.0 – Total Dietary Fiber vs. Crude Fiber**



*(Adapted from Linder DE, 2014)*



## The Fuss About Fiber

---

Leading with Technical Expertise - White Paper

*Leah Lambrakis & Jarrod Kersey, Department of Technical Services*

### Novel Fiber Considerations

The role of fiber in overall gastrointestinal health, food digestibility, nutrient availability, weight loss, and disease management continues to be a strong focus in pet nutrition research. As an industry, we continue to research and learn how to best feed our pets, every day.

As some examples, beyond the common fibers found in pet foods, recent research by Donadelli and Aldrich (2019) demonstrated that a novel insoluble fiber source called Miscanthus Grass could be used in place of cellulose fiber in pet foods, based on improved digestibility and stool quality results found in their research. Dainton (2018) studied the functionality and properties of a moderately soluble and fermentable fiber source in avocados, and found that the meal component of avocados could be a suitable dietary fiber source for pets. Further, a unique type of soluble fiber found in oats and barley that has been gaining interest due to its multi-functional properties, are beta-glucans. As described by de Godoy et al. (2013), just as for humans, beta-glucans may be beneficial to pets in managing blood sugar levels and obesity.

While more research is needed to better understand the long-term impact of fibers on nutrient availability, it is exciting to discover unique fiber sources to further drive optimal nutrition! From a food science and food processing perspective, alternative fibers can allow for improved product texture, water holding capacity and improved processing performance.

### The Finale – Fiber Sweep!

Not only is dietary fiber a ‘broom-like nutritional tool that sweeps out the digestive tract’, the role of dietary fiber in pet nutrition is important for the long-term health of our pets. Of significant importance, fiber plays a meaningful role in cases where your pet requires a therapeutic or nutritional aid for a specific health condition. Especially with the rise of pet obesity, fiber can help your pet feel full for longer after their meal. A small amount of fiber can go a long way, and as discussed, the ratio of insoluble to soluble fiber should be of special consideration. With fiber’s many health benefits, selecting a diet with the right fiber content and balance is key, but tailoring each animal’s fiber needs with your animal health expert may be needed, to determine the best choice for your pet.

**Our Commitment** – Leading with Technical Expertise – Leah and Jarrod are here to provide guidance and insights – do not hesitate to connect with us at Simmons Pet Food, [pfccomments@simfoods.com](mailto:pfccomments@simfoods.com). We would love to hear from you and be part of your pet’s nutrition solution!



RESEARCH & DEVELOPMENT - TECHNICAL POSITION PAPER

## The Fuss About Fiber

---

Leading with Technical Expertise - White Paper

Leah Lambrakis & Jarrod Kersey, Department of Technical Services

### Literature Referenced

Anderson JW, Baird P, Davis RH Jr, Ferreri S, Knudtson M, Koraym A, Waters V, Williams CL. Health benefits of dietary fiber. *Nutr Rev.* 2009, 67(4):188-205

Dainton, AN. Avocado meal: A novel dietary fiber source in feline and canine diets. Masters of Science Thesis. 2018. University of Illinois at Urbana-Champaign. Urbana-Champaign, IL.

de Godoy MR, Kerr KR, Fahey GC, Jr. Alternative dietary fiber sources in companion animal nutrition. *Nutrients.* 2013, 5(8):3099-3117.

Donadelli RA and Aldrich CG. The effects on nutrient utilization and stool quality of Beagle dogs fed diets with beet pulp, cellulose, and Miscanthus grass<sup>12</sup>. *J Anim Sci.* 2019, 97(10):4134-4139.

Gross KL, Yamka RM, Khoo C, Friesen KG, Jewell DE, Schoenherr WD, Debraekeleer J, Zicker AC. Macronutrients. In: Hand MS, Thatcher CD, Remillard RL, et al, eds. *Small Animal Clinical Nutrition. 5th ed.* Topeka, KS: Mark Morris Institute. 2010, 73-81.

Linder DE. Fiber-Responsive Diarrhea. *Clinician's Brief.* 2014, Feb:31-33.

Linder DE. Featuring Fiber: Understanding Types of Fiber & Clinical Uses. *Today's Veterinary Practice Journal.* 2017, Jan/Feb:69-74.

Weickert MO, Pfeiffer AF. Metabolic effects of dietary fiber consumption and prevention of diabetes. *J Nutr.* 2008, 138(3):439-42.

Wernimont SM, Radosevich J, Jackson MI, Ephraim E, Badri DV, MacLeay JM, Jewell DE, Suchodolski JS. The effects of nutrition on the gastrointestinal microbiome of cats and dogs: impact on health and disease. *Front Microbiol.* 2020, 11(1266)24.