AMYLOSE AND AMYLOPECTIN:

UNDERSTANDING STARCH FROM THE INSIDE OUT

Starch is an important component of pet foods for both its functional and nutritional properties. It binds water and thickens to create viscosity. When cooked, starch is highly digestible and provides a readily available energy source for dogs and cats. In extrusion, it is also important for kibble expansion and texture. Given the essential role of starch in producing dry kibble and wet foods that are appealing to both pets and their human companions, it is important for pet food manufacturers to know their starch from the inside out.

Starch granules are composed of two distinct glucose polymers – amylose and amylopectin. The structure of amylose is mostly linear. In contrast, amylopectin is a structural component of the starch granule and is highly branched (Figure 1)*. The branching increases water binding which results in higher water holding capacity and promotes greater viscosity compared to amylose. The amylose and amylopectin content varies greatly by starch source as shown in Table 1 for various sources commonly used in pet foods and treats. Knowing the amylose and amylopectin content of the specific starch sources in a pet food formulation is important for predicting how the finished product will perform in terms of viscosity, texture, structure, appearance, and mouthfeel. A higher amount of amylopectin in a formula will result in greater kibble expansion during extrusion but it can also result in more product fines than a formula with a high amount of amylose. At ADM, we help our customers determine the amylose and amylopectin content of starches while leveraging our inter-nal starch experts and various analytical techniques to assess starch functionality for achieving the desired finished product characteristics.

Table 1. Typical Starch Composition of Pet Food Ingredients[a]

Source	Amylose, % Total Starch	Amylopectin, % Total Starch	Amylose to Amylopectin Ratio
Corn (waxy)	1	99	0.01
Amaranth	11	89	0.12
Quinoa	11	89	0.12
Barley (hulled)	15	85	0.18
White millet (proso)	16	84	0.19
Buckwheat	17	83	0.20
Potato	22	78	0.28
Wheat	23	77	0.30
Tapioca/Cassava	24-26 (25)[b]	74-76 (75)[b]	0.33
Corn	20-28 (25)[b]	72-80 (75)[b]	0.33
Sorghum	28	72	0.39
Oat groats	30	70	0.43
Chickpeas	30-35 (33)[b]	65-70 (67)[b]	0.49
Yellow pea (smooth)	24-49 (35)[b]	51-76 (65)[b]	0.54
Corn (high amylose)	50-90 (75)[b]	10-50 (25)[b]	3.00

[a]Starch analysis conducted at the ADM James R. Randall Research Center, Decatur, IL.
[b]Range (typical value used to calculate amylose to amylopectin ratio)

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