OLDER MAY BE BETTER
ANCIENT GRAINS

Ancient grains in pet foods and treats are growing in popularity as alternatives to traditional grains and legumes in standard and grain-free products. This popularity is attributed to their novelty as primitive ingredients that have not been genetically modified.

Addressing the need for research on pet applications, ADM partnered with the University of Illinois to evaluate the nutritive value of select ancient grains. An in-vitro fermentation model was used to assess the fermentative characteristics of cereal-based ancient grains (white proso millet, oat groats, red millet) and pseudo-cereals (amaranth, quinoa). Cellulose and beet pulp were used as negative and positive controls, respectively.

Nutrient analyses show all ancient grains have similar macronutrient and starch profiles (Table 1). The exceptions are red millet with a higher level of resistant starch (2.4% vs. <0.5%) and oat groats with the only detectable level of beta-glucan (3.5%). Although not shown, the pseudo-cereals (amaranth, quinoa) have more free glucose while the cereal-based grains (white millet, oat groats, red millet) contain more hydrolyzed glucose. All sources are virtually devoid of oligosaccharides.

Total SCFA production was similar for all ancient grains after 3 hours of in-vitro incubation. All sources had significantly higher levels of total and individual SCFA than cellulose at 6, 12 and 9 hours. The pseudo-cereals also produced more total SCFA than beet pulp while levels were similar for the cereal-based grains and beet pulp. Acetate and propionate were similar to beet pulp for all ancient grains but butyrate was significantly higher for all ancient grains at hours 9 (Figure 1) and 12. These in-vitro SCFA responses are very similar to fecal SCFA levels observed when these test ingredients were included in extruded dog foods and fed to adult dogs (Figure 2).

The ancient grains had similar fermentation profiles as beet pulp demonstrating they can support healthy digestion and nutritional wellness. Higher butyrate levels also imply they could provide a greater digestive health benefit than the current gold-standard fiber source. We are reminded by these results that there is more to learn about these centuries-old ingredients and how to best use them in foods and treats for today's dogs and cats.

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Gary is responsible for providing technical support, nutrition training, formulation services and new product development for ADM's customers in the pet food industry. He has more than 33 years of animal nutrition experience as a research nutritionist. Gary previously held positions with the IAMS Company and as a research & teaching faculty member at Auburn University, Animal & Dairy Science Department. His research interests and activities have included protein and amino acid nutrition, skin and coat health, sporting dog nutrition, nutrigenomics, hairball nutrition and successful aging. At Auburn his research and teaching focused on animal nutrition and the relationship between nutrient availability and the hormonal regulation of growth. Gary received his undergraduate and graduate degrees from the University of Kentucky. He has numerous scientific publications and granted patents.

Nutrient	Amaranth	White Proso Millet	Oat Groats	Quinoa	Red Millet
Moisture, %	11.2	10.0	10.5	10.7	11.1
---- % Dry Matter Basis					
Crude Protein, %	16.6	12.1	14.3	12.0	10.5
AH-Fat, %	6.4	5.3	7.4	4.5	5.0
Ash, %	2.7	3.8	2.3	1.9	1.6
Starch, %					
Total[1]	62.9	74.8	68.7	74.4	77.8
Resistant	0.4	0.2	0.1	0.1	2.4
Non-Resistant	62.5	74.7	68.7	4.2	75.4
Dietary Fiber, %					
Total	12.6	11.0	10.1	8.2	13.2
Insoluble	12.6	10.4	6.9	7.5	11.1
Soluble[2]	0.0	0.6	3.2	0.7	2.1
Beta-Glucan, %	n.d.[3]	n.d.	3.5	n.d.	n.d.
Gross Energy kcal/kg	4.7	4.6	4.6	4.6	4.5

[1] Total starch = Resistant + Non-Resistant.
[2] Soluble = Total – Insoluble.
[3] Non-detectable (<0.35%)

Figure 1 ***In-vitro*** **Short-Chain Fatty Acid Production at Hour 9**

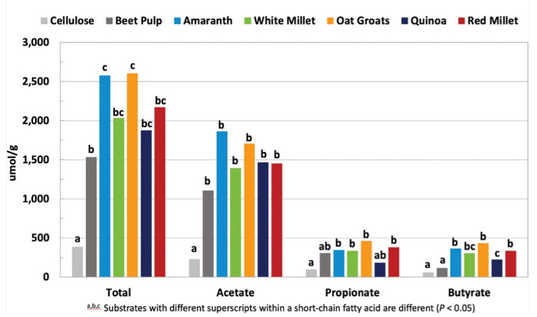
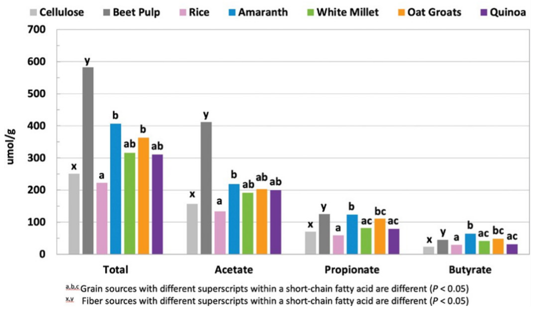


Figure 2 **Fecal Short-Chain Fatty Acids from Dog Studies**



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