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Evaluation of Ancient Grains and Grain Free Dog Food on Nutrient Utilization and Stool Consistency in Dogs

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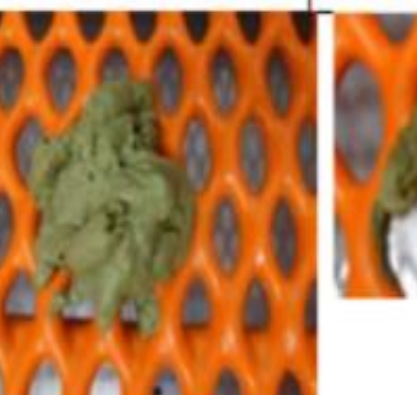


Introduction

Over the years, the relationship between humans and dogs has been changing drastically. Dogs evolved from working animals to family members. More than ever before, human food trends are being followed by the pet food industry as pet owners want to feed their pets similar food to what they are eating. As a result, “grain-free” and “ancient grain” claims have become popular in the pet food industry as they are perceived as healthy alternatives. However, there are no studies evaluating these types of diets. Thus, the objective of this study was to evaluate the effects of “grain free” and “ancient grain” carbohydrate sources on nutrient utilization and stool consistency in dogs.

Material and Methods

- Two dog diets were formulated to contain the same amount of carbohydrate sources: an ancient grain (AG) with spelt, millet and sorghum, and a grain free (GF) with potato, pea, and tapioca starch (Table 1).
- Experimental diets were assigned to twelve Beagles by a switch-back design. The experiment consisted of 21 d (15-d acclimation and 6-d fecal collection). Titanium dioxide (0.6 g) an indirect marker was applied daily as a top dressing on each dog food to enable calculation of digestibility according to the formula below:

$$\frac{[1 - (\%Ti \text{ in food} * \%nutrient \text{ in feces})] * 100}{(\%Ti \text{ in feces} * \% Ti \text{ in food})}$$

1	2	3	4	5
				
watery, liquid diarrhea	soft, unformed stool	softer stool, retains shape	Firm, formed stool	very hard, dry pellets

Fecal samples were collected twice a day during the 6 day collection phase and score on a 5-point scale increment; wherein: 1 = watery; liquid that can be poured, and 5 = very hard, dry pellets.

Data was analyzed using the GLIMMIX procedure in SAS (version. 9.4, SAS Institute).

Table 1. Ingredient and chemical composition of experimental diets processed by extrusion

Item, %	Ancient Grain	Grain Free
<i>Ingredient composition (as-fed basis)</i>		
Hydrolyzed pork protein	44.39	44.39
Potato, white	-	17.74
Peas, green	-	27.74
Tapioca starch	-	7.74
Spelt	17.74	-
Millet	17.74	-
Sorghum	17.75	-
Salt	0.506	0.506
Potassium Chloride	0.323	0.323
Choline Chlorine, 60% dry	0.252	0.252
Vitamin Premix	0.252	0.252
Dicalcium Phosphate	0.252	0.252
Calcium Carbonate	0.252	0.252
Trace mineral premix	0.175	0.175
Fish oil, Menhaden	0.127	0.127
Taurine	0.127	0.127
Natural antioxidant	0.125	0.125
<i>Chemical composition (on DM-basis)</i>		
Moisture	6.51	7.43
Crude Protein	37.3	37.7
Crude Fat	12.1	10.4
Nitrogen-free extract (calculated)	37.95	37.43
Ash	3.85	3.79

Results and Discussion

- Dogs fed GF had lower apparent total tract digestibility of organic matter, and nitrogen-free extract (NFE) compared to those fed AG.
- Fecal dry matter and number of defecations per day were greater for dogs fed AG than for GF, but stool quality was not affected by treatment.
- Carbohydrate sources present in the GF diet may be increasing dietary fiber content, thus impacting nutrient utilization and fecal quality.



Figure 1 – Morning feeding

Table 2. Apparent total tract digestibility, food intake, and fecal characteristics of dogs fed ancient grains and grain free diets

Item	Ancient Grain	Grain Free	SEM	P-value
<i>Food intake and fecal characteristics</i>				
Feed intake, g/day	143.12	146.20	2.26	0.3599
Fecal DM, %	34.21	29.77	1.08	0.0182
Defecations per day	1.22	1.61	0.08	0.0049
Fecal Score	3.50	3.53	0.07	0.8013
<i>ATTD¹, %</i>				
Organic Matter	87.27	84.98	0.08	0.0170
Energy	83.37	84.84	0.61	0.1084
Crude Protein	86.86	85.17	0.63	0.0864
Crude Fat	90.59	91.43	0.23	0.2290
NFE ²	98.66	95.52	0.46	0.0008

¹Apparent total tract digestibility; ²Nitrogen-free extract.

Conclusion

This study suggests that different carbohydrate sources have an impact on nutrient utilization, and on fecal quality of Beagle dogs. Total dietary fiber content of grain-free diets should be monitored in order to maximize fecal quality and improve nutrient utilization.