



Immunological Effects of a Purified β -1,3/1,6-glucan Supplementation in Retorted Canine Diets

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Background

- Yeast products have immune modulatory activity through beta-glucan and mannoprotein structures within the cell wall.
- Yeast products have been shown to increase efficacy of vaccinations in livestock and aquaculture species.
- Yeast beta-glucans are recognized as pathogen-associated molecular patterns and can trigger both the innate and adaptive immune systems

Objectives

- To evaluate the effects of 150-ppm dietary inclusion of a yeast β -1,3/1,6 glucan (58% β -glucan) on apparent total tract digestibility (ATTD) of macronutrients, and peripheral blood mononuclear cells (PBMC) of adult dogs and to test the effects of retorting on the efficacy of these β -glucans.

Materials and Methods

- Twenty-four adult, female beagles were used in a completely randomized design.
- Three retorted diets were prepared: **CON**: Control diet ($n = 8$), **BG**: CON with beta-glucan included in formulation prior to retorting ($n = 8$), and **C+B**: CON plus beta-glucan top-dressed on food upon time of feeding ($n = 8$).
- Yeast product was added at 150-ppm of diet.
- Following a [7 d adaptation to CON](#), dogs were fed their respective dietary treatments for 42-d and were challenged with an oral *Bordetella bronchiseptica* vaccine on d 14 with [blood collections](#) on d 0, 21, 28, and 42 with a [4-d fecal collection](#) ending on d 42.
- Feces were analyzed for digestibility and fermentative end-products.
- Blood was analyzed for PBMC and vaccine-specific immunoglobulins.

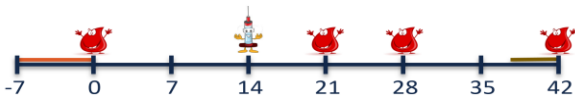


Table 1. Diet Chemical Composition

Item, %	Treatment	
	CON	BG
Moisture	77.7	74.5
Dry Matter Basis		
Crude protein	39.1	39.4
Acid hydrolyzed fat	22.9	23.2
Total dietary fiber	2.2	2.2
Ash	6.7	4.3
G.E., kcal/g	5.6	5.6

Table 2. Apparent Total Tract Macronutrient Digestibility

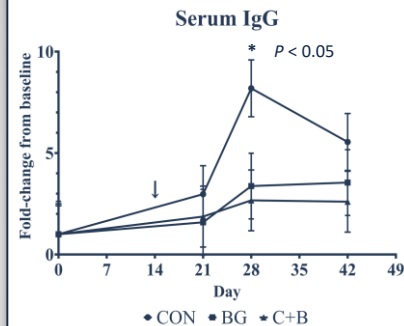
Item, %	Treatment			
	CON	BG	C+B	SEM
Dry matter	85.4 ^b	87.3 ^a	86.1 ^{ab}	0.50
Organic matter	90.0 ^y	91.2 ^x	91.0 ^{xy}	0.34
Crude protein	85.2 ^b	87.5 ^a	86.5 ^{ab}	0.46
Acid hydrolyzed fat	95.3 ^y	96.3 ^x	95.5 ^{xy}	0.29
Energy, kcal	5.0 ^b	5.2 ^a	5.1 ^{ab}	0.02

^{a-b} $P < 0.05$
^{xy} $P < 0.10$

Table 3. Change from Baseline Values of Antigen Presenting Cell Populations of PBMC in Dogs fed Diets with or without Yeast Beta-glucan Supplementation

Item, % units	Treatment										Type 3 Fixed Effects			
	Control			BG			C+B			SEM	T* <i>D</i>	Trt	Day	T* <i>D</i>
	d21	d28	d42	d21	d28	d42	d21	d28	d42					
Monocytes														
Total	5.4	4.3	8.8	0.3	9.9	10.2	4.5	14.1	9.7	4.40	0.8205	0.0088	0.1849	
Mon:MFla	11.8	5.4	4.6	18.8	3.2	8.1	13.5	8.4	12.6	5.23	0.7981	0.0043	0.3752	
Mon:MFIb	29.9	9.2	5.8	35.6	-0.1	9.2	33.8	17.7	11.2	9.55	0.8536	<0.0001	0.343	
B-cells														
Total	2.18	2.49	0.7	4.59	3.23	3.5	2.28	-0.73	0.6	1.74	0.4170	0.0376	0.1849	
Bcell:MFla	52.2	15.9	17.2	67.0	21.6	25.7	71.7	41.4	27.7	62.94	0.9049	<0.0001	0.7741	

Figure 1. Vaccine-Specific Serum IgG Response



Conclusions

- The 150-ppm inclusion of this yeast β -glucan had no detrimental effects on ATTD, fecal characteristics and metabolites, nor any analyzed PBMC.
- Higher doses of yeast-derived β -glucan might be needed to elicit an immunological modulation in healthy adult dogs.

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