



Allzyme® Vegpro supplementation of corn-soy broiler diets containing different fiber levels: environmental impact and nitrogen excretion ratio

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Introduction and objectives

Variations in dietary fiber content can affect nutrient absorption and broiler performance and increase the excretion of potentially contaminating residues. Our objective was to evaluate the effect of soybean hulls and enzyme supplementation (Allzyme® Vegpro, Alltech Inc.) on the excreta production and nitrogen and water excretion of growing broilers.

Materials and methods

ANIMALS AND FACILITIES:

- 190 growing Ross broilers (14 to 19 d old).
- Housed in metabolic cages (9–10 birds/cage) in a temperature-controlled room.

DIETS/TREATMENTS:

Corn/soybean meal-based diets — growing broilers (Table 1)

Table 1. Experimental diet composition

Ingredients (natural matter, %)		
Ground corn	59.24	39.71
Soybean meal (45% CP)	-	30.22
Soybean meal (48% CP)	31.21	-
Soybean hulls	-	10.00
Wheat bran	-	10.00
Vegetable oil	5.60	5.75
Additives and supplements*	3.95	4.32
Composition (dry matter)		
Gross energy, kcal/kg	4888	4954
Ash, %	5.05	5.61
Crude protein, %	23.33	22.62
Ether extract, %	10.97	11.43
Crude fiber, %	3.68	7.64
Acid detergent fiber, %	5.22	9.52

*Include Vegpro in the treatments with enzymes added.

TWO DIETS WITH OR WITHOUT VEGPRO:

- Low-fiber diet (LFD): high-protein soybean.
- High-fiber diet (HFD): low-protein soybean + soybean hulls.
- Similar levels of minerals, fat, crude protein and digestible limiting amino acids.

EXPERIMENTAL DESIGN

- Completely randomized.
- Factorial arrangement: two diets (LFD, HFD) x two enzyme levels (0, 1 kg/ton).
- Replicates: 5 per treatment = 20 cages.

MEASUREMENTS

- Feed intake and weight gain (4-h fast).
- Daily quantitative excreta collection.
- Dry matter and nitrogen analysis.

VARIABLES AND CALCULATIONS

- Whole manure excretion (excreta wet weight, g/bird/d).
- Dry matter and water excretion (g/bird/d).
- Residue coefficient: DM excretion/body weight gain (g/kg).
- Nitrogen excretion rate: N excreted/N intake (g/g).

STATISTICAL ANALYSIS

ANOVA followed by Tukey test (5%).

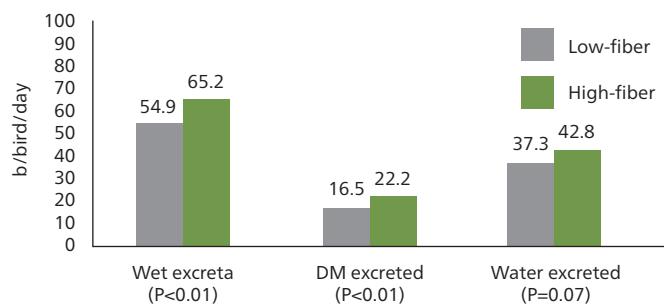
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Results

MANURE AND WATER EXCRETION

Figure 1. Effect of dietary fiber content on manure and water excretion by broilers.



- Whole manure and DM excretion significantly differed based on dietary fiber content only (Figure 1).
- Water excretion rates tended to differ based on fiber content only.

RESIDUE COEFFICIENT AND N EXCRETION

- Residue coefficient and N excretion rates were highest for the high-fiber diet (Table 2).
- Vegpro supplementation significantly reduced these negative fiber effects.

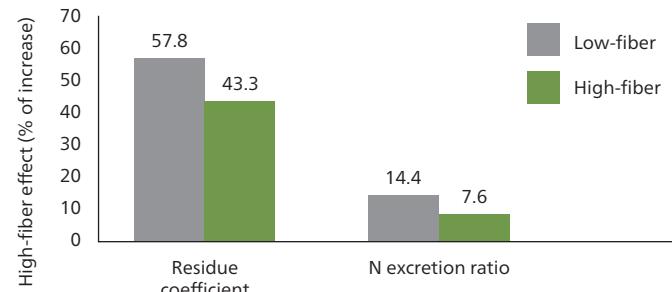
Table 2. Residue coefficient and N excretion ratio by broilers on low- and high-fiber diets with or without Vegpro supplementation¹

Diets	Residue coefficient ²			N excretion ratio ³		
	Low-fiber	High-fiber	Average	Low-fiber	High-fiber	Average
Vegpro	289 ^c	456 ^a	372	0.278 ^b	0.318 ^a	0.298
No Vegpro	299 ^c	414 ^b	356	0.289 ^b	0.299 ^{ab}	0.294
Average	294	435		0.284	0.307	
Probabilities						
Fiber		<0.001			<0.001	
Vegpro		0.097			0.518	
Interaction		0.012			0.025	
CV (%) ⁴		3.54			3.11	

ENVIRONMENTAL COSTS

- Vegpro supplementation to a diet high in fiber reduced the environmental cost of production by 25.1% based on the residue coefficient and 47.5% based on the N excretion rate (Figure 2).

Figure 2. Vegpro supplementation reduced the environmental cost of broiler production, measured by the residue coefficient (g DM excreted/kg BW gain) and the nitrogen excretion ratio (g N excreted/g N intake.)



Conclusions

Results showed that Vegpro can be an efficient way to reduce the environmental impact of production and the nitrogen excretion ratio in broilers fed diets formulated with high-fiber soybean meal.