

Effect of a microbial phytase produced by solid state fermentation on the performance and nutrient utilisation by broilers fed wheat–soy–canola diets

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The effects of a phytase (Alltech Inc., Nicholasville, KY) produced by solid-state fermentation, which contains several side-enzyme activities in addition to phytase, on the performance and nutrient utilisation by male and female broilers fed a wheat–soy–canola diet was investigated in a 6-week trial. Dietary treatments were: (1), negative control with 0.30 and 0.20% nonphytate phosphorus during weeks 1–3 and 4–6, respectively; (2, 3, and 4), treatment 1 plus 0.06, 0.12, or 0.18% nonphytate phosphorus as monocalcium phosphate; and (5, 6, 7, and 8), treatment 1 plus 500, 1000, 1500, or 2000 PU phytase/kg diet. Within sex, each diet was fed to five pens of eight birds each. Total excreta were collected during week 3 for the determination of apparent metabolisable energy (AME). Ileal digesta and toe samples were obtained on day 42. Apparent ileal phytate degradation (AIPD) and apparent ileal nitrogen digestibility (AIND) were calculated from the concentrations of TiO₂ marker in the diet and ileal digesta.

In general, the treatment effects on parameters tested were similar in both sexes, but only the data for males are presented (Table 1). Weight gains, feed/gain and toe ash contents were increased as the inorganic P or phytase was added to the low-P diet, the magnitude of the increases being greatest for the first addition of P or phytase and then tended to plateau with further additions. Gain and toe ash content of birds fed the low-P diet (5) with 500 PU phytase/kg were similar to those of birds fed the adequate-P diet (4), but the feed efficiency was better. Ileal phytate degradation data provided direct evidence on the efficacy of phytase in hydrolysing the phytic acid. Improvements in broiler performance with phytase addition were also associated with linear increases in AIND and AME. The overall responses observed may in part reflect the side-enzyme activities present and suggest that multiple enzyme products may be a competitive strategy to improve the nutritive value of wheat-based diets.

Table 1 Performance (1–42 days) and nutrient utilisation in male broilers fed wheat-based diets containing varying levels of dietary phosphorus (P) and microbial phytase (MP).

Diet	Gain (g/bird)	Feed/gain (g/g)	Toe ash (% DM)	AIPD	AIND	AME ¹
1	2452	1.911	9.7	0.32	0.81	13.3
2	2586	1.873	10.6	0.27	0.79	13.3
3	2600	1.880	10.7	0.31	0.79	13.1
4	2627	1.832	10.7	0.30	0.78	13.1
5	2640	1.775	10.7	0.57	0.81	13.5
6	2684	1.754	10.9	0.64	0.84	13.6
7	2701	1.730	10.8	0.70	0.83	13.7
8	2781	1.740	11.0	0.79	0.84	13.8
SEM	35	0.02	0.21	0.04	0.01	0.14
P effect	*	*	*	NS	**	NS
MP effect	***	***	*	**	*	**

¹ MJ/kg dry matter

NS, not significant; † $P < 0.10$; * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$