PAPER

Effect of a multi-enzymatic mix in a sorghum-soybean meal-based ration on hen performance

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Abstract

The use of individual enzymes in the diet of hens has shown an improvement in egg production, and mixtures are now being included to increase feed utilisation and impact on performance in hens. The objective of our study was to evaluate the use of an enzyme blend in a sorghum-soymeal-based ration (protein 17.5% and ME 2900 kcal/kg) on performance. Hens of two lines: Hy-line (n=732) and Bovans white (n=365), aged eighteen weeks, were used to evaluated three treatments (control, Ronozyme blend or Cybenza). The birds were lodged in cages with a density of 485 cm^2 per hen (four hens per cage). There were no differences (P>0.05) among enzymatic treatments or their interactions with the hen line on egg yield, egg mass, feed-to-egg ratio, or egg quality. However, the efficiency was higher with Hy-line (P<0.05) and enzymes (P<0.05) but was not affected by the interaction (P>0.05). Based on our results, we concluded that the use of a multi-enzyme mixture in a sorghum-soymeal-based hen feed has a minor effect on performance, regardless of hen genetics.

Introduction

The use of feed additives has been shown to improve nutrient use and poultry production and the addition of exogenous enzymes to the feed has an economic and ecological impact by sparing certain ingredients and nutrients (Attia *et al*., 2008; Silversides *et al*., 2006). A multi-enzyme complex is available for use in monogastric birds, with a variable response that depends on the ingredient in the diet (Bedford, 2000; Madrid *et al*., 2010; Jalal *et al.*, 2001; Scheideler *et al*., 2005).

In the published literature on poultry, the main source of energy is reported to be the polysaccharides present in the grains and co-products, with corn having the most and sorghum with less (Attia, 1998; Yörük *et al*., 2006). However, even though the sorghum contains undesirable factors, in certain countries and locations it is normally used in animal feeding, including that for poultry.

Supplementing exogenous enzymes in cereal-based diets can overcome the undesirable effects and improves the productivity of the poultry (hens, broilers, turkeys) by increasing the availability of nutrient and, hence, of production (Mathlouthi *et al*., 2003). There are many different multi-enzyme products on the market, with quite variable activity and various results; that is why they should be constantly evaluated (Attia *et al*., 2003; Wyatt *et al*., 1997). Furthermore, little published evidence was found on the use of multi-enzymes in hen feeding when the main source of nutrients is sorghum grain.

The main aim of our study was to investigate the advantage of using a multi-enzyme complex containing six or more enzymes versus those containing less, compared with a control diet. Two strains of commercial layers were used because it may be possible that their digestion or metabolism differs, affecting the outcome.

Materials and methods

The experiment was carried out on a farm located in Tepatitlán Morelos, Jalisco, Mexico. Eighteen-week-old hens from Hy-Line W36 (n=732) and Bovans White (n=365) were used to assess two multi-enzyme complexes utilising low tannin, sorghum grain-based diets. The birds were lodged in wire cages (485 cm^2/hen, four hens/cage). The weather temperature (minimum 14°C and maximum 28°C) was not controlled and the hens received 16 hours of light per day. The birds were fed with a commercial feed containing 17.5% protein and 2900 kcal of metabolic energy (ME/kg) of dry matter (Table 1). Treatments assessed were: control (no enzymes), 300 g Ronozyme™ (containing endoxylanase, 500 fungal xylanase units/g, and endo-β-glucanase, 25 fungal β-glucanase/g) per ton of feed, or 500 g of Cybenza™ (containing, per kilogram: 2,000,000 units of endoxylanase, 75,000 units of endoglucanase and 25,000 units of galactosydase) per ton of feed. Treatments were assigned at random to the cages. *Ad libitum* water and feed were offered for consumption. The trial lasted 15 weeks, after which time the feed intake (g/day), egg weight (g), production (% and mass) and shell resistance (kg to break an egg) were evaluated. Data were analysed statistically using the Minitab (ver. 15.1.1.0) programme with an alpha value of 0.05 for significant differences among treatments; when differences existed, means were separated using the least squares means procedure.

Results and discussion

Contrary to expectations that enzymes could improve the feed intake and feed conversion and would increase availability of nutrients for

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egg production (Attia *et al*., 2008), in general an effect of the multi-enzyme complex or the genetic line of the hens was not detected. Feed intake was unaffected with the multi-enzyme mixture (P>0.05; Table 2). A similar observation has been reported by others (Çiftci *et al*., 2003; Gunawardana *et al*., 2009; Yörük *et al*., 2006) with the use of a multi-enzyme complex. In our study, egg yield averaged 77% (from breaking to the end of the experiment), and was similar among treatments (P>0.05). The egg mass and quality were similar among treatments (P>0.05). Mathlouthi *et al*. (2003) reported no effect of a multi-enzyme complex on egg yield and quality, and their data were similar to the observations in our trial.

Yörük *et al*. (2006), using a supplementation of a multi-enzyme to a corn-soybean diet for Lohman hens, found no effect on body weight, feed consumption and egg production while improving the feed conversion ratio. In addition, these authors found no significant effect in metabolic parameters of the hens. Furthermore, Gunawardana *et al*. (2009), using Hy-Line W-36 hens, found no significant effect of a multi-enzyme blend (Robavio™) on hen intake and performance. Çiftci *et al*. (2003), Cook *et al*. (2000), Harms *et al*. (2000) and Jaroni *et al*. (1999) also reported no significant effect of multi-enzyme supplementation in producing hens. Similarly, Wu *et al*. (2005) reported that diets supplemented with β-mannanase, a part of the multi-enzyme Rovabio, significantly increased egg weight in some weeks only. On the other hand, some researchers (Attia *et al*., 2003; Fischer *et al*., 2002; Han *et al*., 2010; Madrid *et al*., 2010) reported that the use of a multi-enzyme complex in a cereal-soybean meal diet for broilers has some significant effect on digestibility and production.

Table 1. Diet composition.

	Control	Cybenza	Ronozyme
Ingredients, kg/ton			
Sorghum grain, 8.5%	583.00	572.00	571.00
Full fat soybean meal, 36%	134.00	59.00	79.00
Soybean meal, 45%	101.00	99.00	101.00
Calcium ground, 38%	56.00	56.00	56.00
Calcium grit, 38%	40.00	40.00	40.00
Dry distillers grain plus solubles	33.00	70.00	70.00
Corn gluten, 60%	29.00	30.00	29.00
Canola, 36%	0.00	50.00	30.00
Ronozyme blend	0.00	0.00	0.30
Cybenza CSM	0.00	0.50	0.00
Methionine, 99%	1.66	1.35	1.41
Lysine-HCl, 99%	1.60	2.09	1.80
Salt	2.70	2.70	2.70
Monocalcium phosphate	11.50	10.00	10.50
Canthaxantine, 10%	0.021	0.021	0.021
Xantophil, 30%	0.07	0.05	0.05
Vitamin and mineral premix[o]	6.44	7.28	7.21
Calculated analysis			
Protein, %	17.50	17.51	17.50
Available phosphorus, %	0.47	0.47	0.48
Fat, %	4.55	3.52	3.88
Lysine, %	0.90	0.90	0.90
Methionine, %	0.45	0.45	0.45
ME, Mcal/kg	2.90	2.90	2.90

[o]Contains, per kilogram: vitamin A, 10,000 U; vitamin D_3, 3000 U; vitamin E, 30 U; vitamin K, 3 mg; riboflavin, 7 mg; pantothenic acid, 10 mg; niacin, 26 mg; choline, 350 mg; vitamin B_{12}, 15 mcg; biotin, 55 mcg; Mn, 100 mg; Cu, 9 mg; Zn 100 mg; Se, 0.30 mg. ME, Metabolizable energy.

Table 2. Effect of the multi-enzyme complex on hen performance.

	Control	Cibenza	Ronozyme	SEM	Probability
Egg production, %	76.90	75.33	77.38	0.077	0.176
Egg mass, kg	4.82	4.70	4.79	0.061	0.375
Egg weight, g	56.48	56.11	55.93	0.190	0.141
Shell resistance, kg	3.64	3.70	3.70	0.760	0.845
Efficiency	0.480	0.456	0.470	0.004	0.001
Feed consumption, g/d	96.76	99.25	98.34	0.890	0.145
Energy intake, Mcal/hen/day	0.280	0.287	0.285	0.002	0.145

Conclusions

Based on the results of our trial, we concluded that, regardless of the genetics of the hens and cereal or grain used, there is little effect of multi-enzyme pre-mixes.

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