

## Enzyme supplementation of barley based diet for broilers

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### Abstract

The effect of a feed enzyme complex on the performance of broiler chickens fed barley-based diets was investigated using 360 day-old broiler chickens. The feed intake, live weight gain, and feed conversion ratio of broilers receiving diets containing 0, 30 and 60 percent barley supplemented with an enzyme complex (Agrozyme) at 0 and 1g kg<sup>-1</sup> were determined at 1-21 and 21-35 days of age. There were no significant differences in feed intake between control and enzyme supplemented groups. No significant difference observed in chicks fed with corn based diet and barley based diet with or without enzyme supplementation. Feed conversion ratio was grater (P<0.05) in chicks fed with 60 percent barley with and without enzyme supplementation at 1-21 days of age. In age 21-35 this different was not significant. Broiler chickens could receive diets containing 30 percent barley at 1-21 day and up to 60 percent at higher ages.

### Introduction

Maize, wheat, and barley are major cereal grains that used in least-cost formulation of broiler diets. Because of the world-wide high cost of corn, especially in corn importer countries, the use of locally grown grains such as barley in broiler diets has become more appealing in these countries. Although barley is the lowest priced, its level of inclusion is limited because of its negative effects on bird performance, adverse effects on litter quality, and increasing the incidence of sticky droppings (Hesselman et al. 1981). These undesirable features have been attributed to because of the non-starch polysaccharides, especially beta-glucan which consists of units of glucose joined by  $\beta$ -1,3 and  $\beta$ -1,4 bonds. Beta-glucans form gels in the digestive tract of birds that are not broken down because of the lack of appropriate enzymes and the rapid rate of passage in poultry. The use of feed enzymes, most notably those containing beta-glucanase activity, in barley-based broiler diets may raise bird performance (Han, 1997 and Mroz et al. 1999). Friesen et al. (1992) by using 35 and 70 percent of barley in broiler diets showed a reduction in feed intake and enzyme supplementation improved weight gain and feed conversion ration in chicks fed diet containing 70 percent barley. In broilers receiving enzyme supplemented barley-based diet, Brenes et al. (1993) reported 4 and 13 percent improvement in feed conversion ratio and body weight, respectively. These improvements are less pronounced in older broilers. Young broilers (less than three weeks of age) may receive diets containing up to 20 percent barley when supplemented with appropriate enzymes. From three to six weeks of age, broilers may be fed diets containing up to 40 percent enzyme-supplemented barley. This level may be increased to 50 percent of the diet for broilers over six weeks of age (Jeroch and Danicke, 1995).

The objective of this study was to evaluate the effect of recommended inclusion levels of a commercial enzyme complex (Agrozyme) on the performance of broiler chickens fed with low and high levels of barley.

### Material and Methods

A total of 360 one-day old broiler chicks of a commercial breed were placed in 24 pens, 15 per each. Feed and water were provided *ad libitum*. The chicks were allocated randomly to 6 experimental diets. Treatments were included 0, 30 and 60 percent barley with and without a commercial enzyme (Agrozyme) at 1g kg<sup>-1</sup>. Each treatment group consisted of four replicates. The diets were formulated to meet nutrient requirements according to NRC (1994). Broilers were weighed on a pen basis at 1, 21 and 35 d of age and weight gains were

calculated. Feed intake was determined at 21, 35 d of age and adjusted for mortality. Feed conversion ratios were calculated at 21 and 35 d of age.

The results obtained from the experiment were analyzed by an analysis of variance using the general linear model (GLM) procedure of SAS and means were compared by Duncan's Multiple Range Test (SAS Institute, 1995).

## Results and Discussion

*Feed intake:* No significant differences were observed for feed intake in the starter (0 to 21 day) and grower periods (21 to 35 day). This finding is in agreement with Friesen et al. (1993) and Bedford and Classen (1992) who reported no significant differences in feed intake of chicks fed with supplemented barley diets. However, in this study, adding enzyme to diets in most cases increased feed intake numerically, and it could be partially a result of reduced digesta viscosity and increase in digesta passage rates.

*Weight gain:* chicks fed with 60 percent barley had less weight gain than those fed with corn based diet at 1-21 day; however this difference was not significant. Adding enzyme to diets, also could not affect weight gain in 1-21 day of age. But in 21-35 day adding enzyme to diets containing 60 percent barley increased weight gain numerically.

*Feed conversion ration:* feeding 60 percent barley resulted in an increase in feed conversion ration at 1-21 day old broilers ( $P < 0.05$ ) and adding enzyme to this diet could not improve feed conversion ratio significantly. At 21-35 day old chicks there was no significant difference in feed conversion ration between all experimental groups. This result shows the influence of age on the response of barley-fed birds to enzyme supplementation. During the first weeks after hatch, the chicken's digestive system undergoes changes and becomes more capable of efficiently digesting many of the ingredients included in the diet (Dibner et al., 1996; Nahas and Lefrancois, 2001).

It could be concluded from our finding that from 1-21 days of age, broilers may be fed diets containing up to 30% barley. This level may be increased to 60% of the diet with enzyme supplementation over 21-35 days of age.

Table 1. Effect of different levels of barley with (+) or without (-) enzyme supplementation on broiler performance.

Enzyme	Feed Intake(g)				Weight gain (g)				Feed conversion(g/g)			
	1-21 day		21-35day		1-21 day		21-35day		1-21 day		21-35day	
	-	+	-	+	-	+	-	+	-	+	-	+
Barley												
0	997	1007	1366	1370	536	543	690	664	1.85 <sup>b</sup>	1.85 <sup>b</sup>	1.98	2.07
30	1023	1035	1413	1417	544	564	724	735	1.87 <sup>b</sup>	1.82 <sup>b</sup>	1.95	1.93
60	1051	1040	1416	1423	516	529	686	735	2.04 <sup>a</sup>	2.01 <sup>a</sup>	2.06	1.93

<sup>a-b</sup> - Values with no common following letter in each column differ significantly ( $p < 0.05$ ).

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