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Original Article

Evaluation of Different Levels of Barley and Replace it Instead of Corn on Performance of Broiler Chicken

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ABSTRACT

In isoenergetic - isonitrogenous diets, barley at levels of 0, 25, 50, 75 and 100 % was substituted for corn and its effects on broiler chicken performance was studied. This study was carried out with 5 levels of barley (0, 25, 50, 75 and 100 %), 3 replicates and 14 birds in each replicate in a completely randomized design. In this experiment 300 day old broiler chicks (Lohman) were used for 42 days. The results showed that barley up to 25% substitution had no adverse effect on broiler performance. It is concluded that in diet supplementation with barley until 25% could done without any adverse effects on performance, although enzyme supplementation should be considered in the ration to decrease NSP in the barley.

Key words: Chicken, Barley, Corn and Performance

INTRODUCTION

Corn is the high-energy grain favoured by most poultry nutritionists and poultry producers. However, it is not always available at an economic price, for economical production, we should use unusual feed in broiler feeds.

Barley (*Hordeum Spp.*) is a cereal derived from the annual grass Hordeum Vulgare. This multipurpose grain deserves a top place in the farm for feeding livestock. It is irreplaceable by any other grain in diets.

Barley is a high fiber, low energy product that has approximately 89% of the energy content of corn. While barley contains a higher protein and amino acid level than corn, animal performance will likely be depressed due to the high fiber content.

Barley is one of the most important cereal crops in most parts of the world. It is one of the most ancient cultivated crops but its origin is not known (Magness et al., 1971). Barley is used both as human food and animal feed. It is eaten as grain just like rice in some parts of the world like the Middle East, and barley grains are also used to produce flour, breakfast cereals, malt sugar, alcoholic beverages and as an ingredient in soups. Recent research on barley grain and barley grass have unveiled a wealth of nutrients and compounds that play important roles in maintaining good health in humans (Ragaee et al., 2006). These have increased the utilization of barley either as a regular food item or as a health supplement. In animal feeding, barley is commonly used to substitute for corn. Limited amounts are used in feeding monogastrics because of its high fiber content.

However, similar growth performances were observed between pigs fed corn- and hulless barley-based diets (Wu et al., 2000).

Use of enzymes, in recent decades, in the poultry industry has increased. Research on the use of enzymes in poultry diets has shown that enzymes can be used a lot in food that are indigestible by poultry, which later become digestible materials, and the materials are used in poultry diets. Enzymes, such as cellulase and gluconase, increased barley nutritional value for poultry ration (Annison and Choct, 1993). Also, gesilonase caused a reduction in the adhesion of food material mainly by breaking pentosane and they play a vital role in ileum, which increase the overall performance of broilers that are fed wheat based diets (Gao et al., 2007; Steenfeldt et al., 1998).

Polysaccharides are major components of plant materials used in rations for monogastrics. They are macromolecular polymers of monosaccharides linked by glycosidic bonds. The most important, starch, shows glucose units linked by α-(1-4) with a few α-(1-6) bonds and 90-95% of starch is digested in the small intestine of poultry through endogenous enzyme activity. Non-starch polysaccharides (NSP) include celluloses, hemicelluloses, pectines and oligosaccharides (a-galactosides, etc.). They can also be divided into water-soluble and water-insoluble fractions; fractions which have greater relevance to their nutritional values (Carre, 1993). The use of barley in poultry diets is limited, because its high content in nonstarch polysaccharides (**NSP**) results in increased

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intestinal viscosity (**IV**), reduced litter quality, and poor productive performance (Garcia *et al*. 2003).

A prerequisite to accurate ration formulation is knowledge of phosphorus availability of natural feedstuffs. In commonly used cereal grain feedstuffs, such as barley and corn, the availability of P is approximately 30 to 40% (National Research Council, 1994). This low availability of P is due to the fact that, for 65 to 75% of cereal grain and oil seed meal, total P is found as phytic acid P, a compound poorly hydrolyzed by nonruminant animals (Jang et al, 2003).

The objective of this study was to evaluate the effects of replacing barley instead to corn in broiler chicks performance.

MATERIALS AND METHODS

This study was conducted as completely randomized design with 5 levels of barley (0, 25, 50, 75 and 100 %), 3 replicates and 14 birds in each replicate in a completely randomized design. In this experiment 300 day old broiler chick (Lohman) were used for 42 days. The chicks were allocated randomly to 5 experimental diets. The diets were formulated to meet the requirements of broiler chicks as established by the NRC (1994). The diets and water was provided ad libitum. The lighting program during the experimental period consisted of a period of 23 hours light and 1 hour of darkness.

Environmental temperature was gradually decreased from 33°C to 25°C on day 21 and was then kept constant. Body weight, feed intake and feed conversion were determined weekly on bird bases. Mortality was also recorded. At 42 days of age, two birds from each replicate randomly chosen based on the average weight of the group and sacrificed.

The data were subjected to analysis of variance procedures appropriate for a completely randomized design using the General Linear Model procedures of SAS Institute (2005). Means were compared using the Duncan multiple range test. Differences were considered significant at $P<0.05$.

RESULTS

The effects of different levels of barley on broilers performance are summarized in Table 1. There were significant differences between treatments. Inclusion of barley levels in broiler diets had adverse effects on broiler performance ($P<0.05$).

Data showed that the treatment with 0% barley have high feed intake and weight gain ($P<0.05$). However increasing 25% barley have no significant effect on weight gain and decrease feed intake and FCR ($P<0.05$). Decreasing of feed intake perhaps at the results of decreasing ration palatability and this parameter due to low weight gain.

Decreasing of poultry performance may be at the result of Non-starch polysaccharides (NSP) amount of barley, and this parameter decrease digestion of ration in the poultry.

Table 1. The effects of using different levels of barley on broiler performance (0-42 days)

Barley	Mean of weight (g)	Mean of feed intake (g)	FCR
0	1829.80^{a}	144.66^{a}	2.211^{b}
25	1819.23^{a}	113.92^{b}	2.020^{b}
50	1511.67^{b}	113.81^{b}	2.001^{b}
75	1258.02^{c}	105.60^{b}	2.001^{b}
100	936.31^{d}	90.00^{c}	2.927^{a}
Mean	1471.0 ± 24	113.598 ± 41	2.23 ± 0.26

^{a,b,c}: Means within a column with different subscripts differ ($P<0.05$).

In treatment with 100% barley grain, in contrast with decreasing feed intake, FCR increased. That it can resulted of reducing of weight gain of broilers that received high barley ration. Perhaps high NSP of barley decreased digestion and absorption of nutritive materials of ration.

CONCLUSION

The overall results indicated that in broilers adding barley until 25% without any adverse effects on performance, but we should increase enzyme in the ration to decrease NSP in the barley.

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