

EFFECT OF GROUND BLACK PEPPER (*Piper nigrum*) AS FEED ADDITIVE ON THE PERFORMANCE OF BROILERS

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ABSTRACT

This study evaluated the effect of ground black pepper as feed additive on the weight gain, feed conversion ratio, feed cost to produce a kg gain in weight and morbidity and mortality rate of broilers. A total of 160 straight-run day-old broiler chicks were randomly distributed to four treatments using the Completely Randomized Design (CRD). Each treatment was replicated four times with ten birds per replicate. The birds were fed with the same basal diets (chick booster, starter and finisher). Black pepper (BP) was mixed to the basal diets at different levels: 0g (T₀), 5g (T₁), 10g (T₂) and 15g (T₃) per kilogram of commercial feed. The dietary treatments were fed for 35 days from day old.

There were no significant differences among treatments in the initial and final weights and gain in weight of broilers. However, highly significant differences were observed in the feed intake, feed conversion ratio (FCR) and feed cost per kilogram of broiler produced. The birds given 15g of ground black pepper per kg of commercial ration had the best feed conversion efficiency of 1.68 and least cost of feeds (Php 45.46) to produce a kilogram of weight. Apparently, no morbidity and mortality were incurred in the birds receiving this dietary treatment.

This study shows that the inclusion of ground black pepper at a rate of 15g/kg of commercial ration in broiler diet resulted in reduced feed intake, improved feed efficiency of broilers, lower feed cost per kilogram of broiler produced and better health performance.

Keywords: *broilers, ground black pepper, body weight, feed intake, gain in weight, feed conversion ratio, morbidity, mortality*

INTRODUCTION

There has been a growing concern in recent years that the continued use of antibiotics in animal agriculture may have an adverse effect on human as well as animal health. This concern centers on the use of antibiotics at sub therapeutic levels in livestock feeding. It is feared that the continuous low-level use of antibiotics might result in the development of resistant strains of microorganisms that could not be effectively treated with antibiotics. Bacteria resistance to drugs has been observed almost from the time antibiotics were first used in animal feeding (Gillespie, 2002). The use of sub

therapeutic levels of antibiotics in poultry feed improves performance and reduces morbidity in broiler chickens. However, consumer pressure related to the potential development of antibiotic-resistant bacteria has resulted in the search for feed additives that may improve broiler performance, but not cause the development of resistant strains of microorganisms (Buchanan *et al.*, 2008). Because of this, the use of herbs, spices and other natural products with similar antibiotic properties is being explored.

Black pepper (*Piper nigrum*) which is referred to as “king of spices”, contains an impressive list of

plant derived chemical compounds that are known to have disease preventing and health promoting properties. An example of many benefits one can obtain from this plant is the improvement of digestion and promotion of intestinal health due to its antibacterial effects. Cohen (2009) mentioned that black pepper contains good amount of minerals like potassium, calcium, zinc, manganese, iron and magnesium. It is also a very good source of vitamin K, dietary fiber and copper.

The properties, medicinal value and relative abundance of black pepper in the locality spurred the interest to study its effect on the growth performance of broilers.

Hence, this study was conducted specifically to evaluate the effect of ground black pepper on the gain in weight, feed intake, feed conversion ratio, morbidity and mortality and economic efficiency of broilers.

MATERIALS AND

METHODS Materials

A total of 160 day-old unsexed white broiler chicks were used in the study. Other materials used included commercial feeds, ground black pepper, grinder, feeding troughs, waterers, weighing scale, electric bulbs, old newspaper, disinfectant, cleaning materials and recording materials.

Methods

A week before the arrival of the chicks, cages including all necessary materials were prepared, cleaned and disinfected. Brooders were provided with 100-watt electric bulbs. The floor was covered with newspaper sheets to help conserve heat during the brooding period and to prevent birds from slipping through the mesh wire holes during the first few days of brooding.

Upon arrival, the chicks were randomly distributed into four treatments with four replicates in each treatment following the Completely Randomized Design (CRD). Each replicate was composed of 10 birds.

The dietary treatments used in this study were as follows:

T₀= 0 g black pepper

T₁= 5 g ground black pepper /
kg commercial feeds

T₂= 10 g ground black pepper /
kg commercial feeds

T₃= 15 g ground black pepper /
kg commercial feeds

Birds under the control diet (T₀) were given commercial feed only. On the other hand, the birds under the experimental diets (T₁, T₂ and T₃) were given commercial feed mixed with ground black pepper. This scheme was followed from day-old until the 35th day of the birds at rates depending on the treatment where the birds were assigned.

Whole black pepper was bought at the local market and was ground into powder form using grinder.

Ad libitum feeding was employed from the start of the study up to the last day. Chick booster was given to the birds for the first two weeks (14 days) and was shifted to feed starter crumbles on their third week (21 days) until the fourth week (28 days). On the fifth week up to the 35th day, finisher crumbles were given. Clean water was made available at all times.

There were no vaccinations administered to all treatment groups.

Lighting was provided for twenty-four hours from day-old until 20 days of age. Thereafter, lights were turned off for three hours from 12nn to 3pm to prevent heat stress. This time was observed to be the hottest part of the day during the last two weeks of the experimental period.

Data gathered in the experiment included weights of birds at day-old and at 35 days, feed offered and feed residue in feeding troughs and the number of sick and dead birds. The costs of commercial ration and black pepper were also recorded. These data collected were utilized to calculate average values for gain in weight, feed intake, feed conversion ratio (FCR), feed cost to produce a kilogram of weight and morbidity and

mortality rates.

All data were analyzed using Analysis of Variance (ANOVA) appropriate for Completely Randomized Design (CRD) and treatment means were compared using the Duncan's Multiple Range Test (DMRT).

RESULTS AND DISCUSSION

Body Weights and Gain in Weight

There were no significant differences in the initial weight, final weight and gain in weight of broilers among treatment means (Table 1). Result of gain in weight was similar to the findings of Akbarian *et al.* (2012) where body weight gain of broilers was not affected by the inclusion of black pepper at 1g/kg of commercial ration.

However, this did not concur with the findings of Abou-Elkhair *et al.* (2014) and El Tazi *et al.* (2014) at inclusion levels of 0.5g and 1g ground black pepper per kg of commercial ration, respectively. Broilers given black pepper had significantly higher final body weight and gain in weight compared to the group without black pepper. These significant results were also consistent to the study of Ghaedi *et al.* (2013) where black pepper extract was included at 2 ml per liter of drinking water.

Insignificant result in weight gain could be attributed to the reduced feed intake (Table 2) of broilers as the amount of black pepper was increased in the diet.

Feed Intake

Table 2 shows that the total and daily feed intakes of the broilers were significantly reduced as the level of ground black pepper was increased. Birds in the control group had the highest feed consumption. As the amount of ground black pepper was increased, the feed intake of the broilers was reduced. Apparently, the level of inclusion at 10g to 15g per kg commercial ration is high making the ration less palatable instead of improving it. Abou-Elkhair *et al.* (2014) cited that phytogetic feed additives such as herbs and spices are commonly incorporated into the diets

of agricultural livestock, particularly swine and poultry, to improve flavor and palatability, therefore enhancing productive performance.

Shaverdi *et al.* (2013) and El Tazi *et al.* (2014) found that black pepper significantly increased the feed intake of broilers. However, inclusions were at relatively low levels of 0.2g and 0.5g, respectively.

Table 1. Mean initial weight at day old and final weights at 35 days of age *

Treatments	Initial (kg)	Final (kg)	Total Gain in WT (kg)
0 black pepper	0.047	1.580	1.533
5g black pepper/kg CF	0.047	1.608	1.562
10g black pepper/kg CF	0.047	1.639	1.593
15g black pepper/kg CF	0.047	1.723	1.677

*Means without superscripts are not significantly different at 5% level by DMRT

Table 2. Total and average daily feed intake of the birds*

Treatments	Total Feed Intake (kg)	Average Daily Feed Intake (kg)
0 black pepper	3.399a	0.097a
5g black pepper/kg CF	3.283a	0.093a
10g black pepper/kg CF	3.028b	0.086b
15g black pepper/kg CF	2.823b	0.080b

*Means with different superscripts in a column are significantly different at 5% level by DMRT



Feed Conversion Ratio (FCR) and Feed Cost The birds given the highest level (15g/kg CF) of black pepper in the ration were the most efficient in converting feed to a kilogram gain in weight, thus the least cost of feed incurred (Table 3). Feed efficiency has a direct relationship to the cost of feed to produce a kilogram gain in weight. Result on feed efficiency coincides with the findings of Abou-Elkhair *et al.* (2014), El Tazi *et al.* (2014) and Ghaedi *et al.* (2013) where addition of black pepper significantly improved feed efficiency of broilers.

Acker (1983) stated that feed additives serves as catalysts in digestion and metabolism of nutrients even if given in small amounts. Herbs like black pepper improves digestibility.

Piperine present in pepper has a major pharmacological impact on the nervous and neuromuscular system; it can help in digestion and can dramatically increase absorption of selenium, vitamin B complex, beta carotene and curcumin as well as other nutrients (Moorthy *et al.*, 2009) and El Tazi *et al.*, 2014).

Table 3. Feed conversion ratio and feed cost to produce a kg of weight*

Treatments	Feed Conversion Ratio	Feed Cost to Produce a Kg WT (Php)
0 black pepper	2.23a	60.71a
5g black pepper/kg CF	2.12a	57.11a
10g black pepper/kg CF	1.90b	51.34b
15g black pepper/kg CF	1.68c	45.46c

*Means with different superscripts in a column are significantly different at 5% level by DMRT

Morbidity and Mortality Rate

Birds not given black pepper registered highest morbidity and mortality rates while there were no cases in birds given 15g BP/ kg CF (Table 4). Apparently, these incidences cannot be attributed to the absence of black pepper in the diet of the control group. Morbidity incurred was due to cannibalism and heat stress, which resulted to the deaths of some birds.

Table 4. Morbidity and mortality rate*

Treatments	Morbidity Rate (%)	Mortality Rate (%)
0 black pepper	10	5
5g black pepper/kg CF	2.5	2.5
10g black pepper/kg CF	5	2.5
15g black pepper/kg CF	0	0

*Means without superscripts are not significantly different at 5% level by DMRT

CONCLUSIONS AND RECOMMENDATIONS

The inclusion of ground black pepper at 15g/kg CF in broiler diet reduces feed intake of broilers, improves feed conversion ratio and reduces feed cost per kilogram of broiler produced without affecting weight gain.

Ground black pepper (15g/kg CF) in broiler ration is recommended for better feed and economic efficiency. However, it is important that related studies using the same levels of black pepper be conducted to verify the effect on the palatability of the ration.

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