BIBLIOGRAPHY

CHUPARAN, AMELIA L. APRIL 2013. Growth Performance of Broilers Given Commercial Ration Supplemented with Black Pepper (*Piper nigrum*). Benguet State University, La Trinidad, Benguet.

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ABSTRACT

This study was conducted at the Benguet State University Poultry Experimental House, Balili, La Trinidad, Benguet from October to November 2012.

One hundred sixty (160) day old broiler chicks were distributed to four treatments following the Completely Randomized Design. The four treatments were replicated four times with ten birds per replication. The different treatments used were Pure Commercial feeds (T_0), 5g Black pepper + Commercial feeds (T_1), 10g Black pepper + Commercial feeds (T_2) and 15g Black pepper + Commercial feeds (T_3).

This study was conducted to determine the effect of black pepper as feed supplement on the growth performance of broilers. Specifically, the study aimed to determine the daily gain in weight, feed consumption and feed efficiency of broilers given black pepper as feed supplement on the morbidity and mortality of broilers, and to determine the best level of black pepper that could be added on the ration of broilers without producing undesirable responses on growth.

Result showed no significant differences among the treatments in the initial weight, final weight, total gain in weight and average daily gain in weight of broilers. However, highly significant differences were observed in the total feed intake, average daily feed intake, feed conversion ratio and feed cost per kilogram of broiler produced. The average initial weight of the birds was 0.047 kg and the final weight at 35 days of age was 1.638 kg. The total and average daily gain of birds at 35 days of age was 1.591 kg and 0.045 kg respectively. Birds given no black pepper had the highest average daily feed intake of 0.097 kg, highest feed conversion ratio of 2.226 kg and highest feed cost to produce a kg in weight of Php 60.710.

The higher average feed intake was obtained from the birds given no black pepper (0.097 kg), followed by the birds fed with 5g of black pepper (0.093 kg), and by those birds given 10g (0.086 kg) and 15g (0.080 kg) of black pepper mixed with commercial feeds.

The return on investment was not subjected to statistical analysis but a higher ROI was obtained from the birds given diets supplemented with 15g of black pepper which was 8.90%. No morbidity and mortality was noted in the birds given 15g of black pepper.

It is therefore concluded that inclusion of black pepper in broilers diet resulted in reduced feed intake, improved of feed efficiency and reduced feed cost per kilogram of broiler produce.

It is recommended that 15g of black pepper can be added in the broilers ration to reduce feed cost.

INTRODUCTION

Poultry raising is one of the common and practical business in our country today. It is a good source of livelihood for family subsistence because it requires less capital investment compared to other domesticated animals. Specifically, broiler chicken is what most poultry farmers prefer to raise since it grows faster than other types of chicken or fowls.

As mentioned by the Department of Agriculture in its website, *ldc.da.gov.ph*, chicken broiler and egg production are the most progressive animal enterprises in the Philippines today. However, the government agency also stated that although the growth of tile poultry industry in the Philippines has indeed impressive, problems like inefficient management and the prevalence of many destructive poultry diseases and parasites prevail.

Chickens eat feed supplement with antibiotics and vitamins to prevent and cure poultry diseases respectively and consequently accelerate their growth. However, the continuous rise in the cost of these feed supplements and antibiotics affect local broiler production. This has led some of poultry and plant experts to think of alternative sources to solve this problem.

Among alternatives being tested by poultry experts, herbal and other natural products are given significant considerations since these alternatives are already proven effective not only in treating diseases and making them healthy but also to some animals.

Black pepper for instance which 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. As mentioned by Sahu (2012), black pepper is known to have a great amount of antioxidant properties and also has benefits against bacterial growth, particularly in the intestinal tract.

With this properties and medicinal value of black pepper, it is of great importance to study it with broilers because it might be helpful on the growth performance of broilers.

Information gathered from this study will serve as basis for students and future researchers most especially for poultry raisers to use black pepper as feed supplement.

It can also help raisers to improve their income and at the same time it will lead to the utilization of black pepper.

Result of this study cannot only be used by farmers and other researchers in animal production but also can be added to the body of knowledge already generated from other experiments in the field of Agriculture.

The study generally aimed to determine the growth performance of broilers as affected by black pepper as feed supplement. Specifically, this study aimed to:

1.determine the daily gain weight, feed consumption and feed efficiency of broilers fed with black pepper;

2. determine the effect of black pepper on the morbidity and mortality of broilers; and

3. determine the best level of black pepper that could be added to the ration of broilers without producing undesirable responses on growth.

This study were conducted at the Poultry Experimental Station of Benguet State University, La Trinidad Benguet from October to December 2012.

REVIEW OF LITERATURE

Francisco (1998) reported that the reason why poultry and livestock farmers practiced the giving of daily feed supplement and other substances to the ration of animals is to maximize productivity. The practice of adding feed supplement to the animal diet is aimed at improving efficiency, animal appetite and to lessen production expenses.

Ensminger (1980) stated that primary purpose of raising poultry is to transform feed into meat and eggs, but the conversion of feed to these uses must be done efficiently and economically. Thus, there is basic need in improving the birds through breeding, good health and competent management.

Acker (1983) said that the wide acceptance of feed additives in poultry is attributed to their well-established benefits of improving growth rate, feed conversion and reducing mortality and morbidity. He also stated that feed additives serves as catalysts in digestion and metabolism of nutrients even if given in small amounts.Vitamin A and D are essential for increase production of chicken. As stated in an online article, the discovery of vitamins A and D allowed farmers to raise chickens year- round indoors.

Card and Nesheim (1972) said that the addition of additives in poultry feeds will often improve the rate of weight gain and feed efficiency of growing chicks and provides all the essential nutrients in adequate amount. Likewise, Pond *et al.* (1995) pointed out that feed additives will improve growth rate, feed efficiency, and those of more specific nature that are used for other purposes such as control of internal and external parasites, insects, pest or a wide variety of infectious diseases.

Cunha (1981) said that higher levels of nutrients and feed additives should be fed with caution since some nutrients can cause harmful effects is used at too high level.

Fronda (1972) mentioned that using feed additives do not only make the production of animals economical but also help in the control of diseases.

Growth promoters or feed additives are molecules that are added at low rate to animal ration without changing considerably their composition. They speed up growth and consequently increase the body size and weight of animals (Biovet SA Laboratories, 2005).

Black pepper (*Piper nigrum*) comes from the pepper plant, a smooth woody vine that can grow up to 33 feet in hot and tropical climates. It is the most pungent and most flavourful of all types of peppers. It contains good amount of minerals like potassium, calcium, zinc, manganese, iron and magnesium. It is also a very good source of vitamin K, dietary fibre and copper (Cohen, 2009).

The fruit contains between 4.6% to 9.7% piperine which is thought to have anticonvulsant and antimicrobial properties. It stimulates both the digestive and circulatory system and apart from this, has insecticidal properties. It is about one percent as hot as the capsaicin in the chilli peppers. Capsaicin is a component of chilli peppers that stimulates the circulation and alters temperature regulation. The seed contains capsicidins which are thought to have antibiotic properties (Anonymous, 2000).

Piper nigrum effectively controls blood pressure and heart rate with its high level of potassium. It is also high in iron which is essential in the production of healthy blood cells. It contains vitamin A and C and is also rich in antioxidants such as carotene which work to help the body fight cancers and other diseases (Cohen, 2009).

Pepper fruits are very popular due to their health promoting properties associated with their high content of vitamin C and A that are present in high concentration in various pepper types (Howard *et al.*, 2000).

Piper nigrum was believed to cure illness such as constipation, diarrhea, gangrene, heart disease, hernia, hoarseness, indigestion, insect bites, insomnia, joint pain, liver problems, lung disease, sunburn, tooth decay, toothaches and other unknown diseases (Harpers, 2005).

Antibiotics are substances added to the feeds that are not included for their nutritional values, but are one way or another improves animal performances or efficiency of animal production. However, overuse of antibiotics in animals is causing more strains of drug- resistant bacteria, which is affecting the treatment of various life- treating diseases in humans (Cheeke, 1990).

Many plants have health giving properties that enable the system to clean itself, expelling the toxins and controlling the acidity of the blood. Plants also supply certain elements that are vital for health including vitamins and minerals, so that the organ may be stimulated or brought to normal activity (SAS, 1990).

Piperine is a pungent compound found in the fruit of the plants in the piperaceae family, the most famous members which is black pepper (*Piper nigrum*). It inhibits several enzymes responsible for metabolizing nutritional substances, stimulates amino- acid transporters in the intestinal lining, inhibits removal of substances from cells so they continue to be available for use, and decreases the intestinal activity allowing more of the substances reach, enter and remain within their target cells for longer periods of time than would normally be one case. Adding black pepper to foods and beverages for humans leads to increase nutrient absorption (Barbara,2008).

Piper nigrum (black pepper) is rich in antioxidants, and effectively controls blood pressure and heart rate with its high level of potassium. Pepper is also high in iron which

is essential in the production of healthy blood cells. It contains vitamin A and vitamin C and is also rich in antioxidants such as carotene which work to help the body fight cancers and other diseases (Cohen, 2009). In addition, Cohen enumerated the nutritional contents as shown in Appendix Table 12.

Phytogenic feed additives are plant-derived products used in animal feeding to improve the performance of agricultural livestock. This class of feed additives has recently gained increasing interest specially, for use in swine and poultry, as can be derived from a significant increase in the number of scientific publications since 2000. This appears to be strongly driven by the ban on most of the antibiotic feed additives within the European Union in 1999, a complete ban enforced in 2006, and ongoing discussions to restrict their use outside the European Union because of speculated risk for generating antibiotic resistance in phytogenic microbiata (Windisch *et al*.,2011).

Phytogenic feed additive include herbs, which are non-woody flowering plants known to have medicinal properties; spices which are herbs with intensive smell or taste, commonly added to human food; essential oils, which are aromatic oily liquids derived from plant materials such as flowers, leaves, fruits and roots; and oleoresins which are extracts derived by non-aqueous solvents from plant materials (Jacenta *et al*, 2010).

MATERIALS AND METHODS

Materials

The materials used in the study are the following: brooding-rearing pens, 160 day-old chicks (DOC'S), disinfectant, weighing scale, commercial feeds, feeding troughs, waterers, old newspaper, stick brooms, pails, dust pan, record book.

Methods

Preparation of brooding-rearing pens. The brooding-rearing pens were divided into sixteen compartments to accommodate sixteen groups of birds (four replicates by four treatments).

The brooding-rearing pens as well as other facilities used such as feeders and waterers were thoroughly cleaned and disinfected to prevent or minimize the growth of microorganisms that may cause birds to get sick. The floor was covered overlaid with newspaper to prevent chicks from tipping over the holes of the meshed wire flooring and was changed daily for a period of two weeks and removed thereafter. Electric bulbs were installed to each pen as source of heat. The sides of brooding-rearing pens will be covered with cleaned used sacks to maintain temperature requirement and minimized draft during experimental study.

Preparation of black pepper. Whole black pepper was bought at the market. After purchasing it, the black pepper was ground.

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

The treatments were the following:

T_0- No black pepper

T_1- 5 g ground black pepper /kg commercial feeds

T_2- 10 g ground black pepper / kg commercial feeds

T_3-15 g ground black pepper / kg commercial feeds

Each chick was weighed individually to get their respective initial weight and was done subsequently and starts giving the black pepper at day old until their thirty-five days of age.

Feeding and watering. *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, finisher crumbles were given. Clean water was available at all times until they are 35 days of age.

Data Gathered

The following parameters were gathered from the study:

1. Initial weight (g). This was the weight of the broiler chicks at day old.
2. Final weight (g). This was the weight of the birds thirty-five days or at the end of the study.
3. Feed offered (kg). This was the amount of the feeds given to the birds in a day.
4. Feed left-over (kg). This was the amount of feeds left in the feeders.
5. Feed cost (Php). This was the prevailing cost of feeds at the time of the study.
6. Number of dead birds. This was the number of birds that will die during the study.
7. Number of sick birds. This was the number of birds that show signs of diseases.

Data Computed

From the data gathered above, the following were computed:

1. Total gain in weight (kg). This was obtained by subtracting the initial weight from the final weight of the bird.

2. Average daily gain in weight (kg). This was obtained by dividing the total gain in weight by the number of experimental days.

3. Feed consumption (kg). The feeds consumed by the birds for thirty-five days were obtained by subtracting the feed left-over from the feeds offered.

4. Average daily consumption (kg). This was obtained by dividing the total feed intake by the number of experimental days.

5. Feed conversion ratio (FCR). This measure the quantity of feed used to produce a kilogram of broiler meat. It was computed by dividing the total kilogram of feeds consumed by total gain in weight of broilers.

6. Feed cost per kilogram of boiler produce (Php). This was obtained by multiplying the feed conversion ratio by the cost per kilogram of feeds.

7. Total cost per kilogram of broiler produce (Php). This was computed by dividing the total cost of production by the number of kilogram of live broiler produced.

8. Mortality rate (%). This parameter was the quotient of the number of dead birds by initial number multiplied by one hundred.

9. Morbidity rate (%). This was the quotient of the number of sick birds by their initial number multiplied by one hundred.

Data Analysis

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

Initial and Final Weight

Table 1 presents the average initial and final weights of birds in all treatments. In terms of initial weight, statistical analysis revealed no significant differences among treatment means. This indicates that experimental units were homogenous at the start of the study. The average initial weight of the chicks at day old was 0.047.

In terms of final weight, no significant differences were observed in the final weights of birds at thirty-five days of age between treatments. The final weight of birds ranged from 1.580 to 1.723 with an average of 1.638 from day 1 to 35 days of age. It was observed that inclusion of 5-15g of black pepper on the diets of birds did not cause any variation in the final weight. Card and Nesheim (1972) stated that addition of feed additives in poultry diets will improve the rate of weight gain of growing chicks. However, this was not observed in the study. The result of this study is similar to that of Cipriano (2012) where she reported no significant differences in the final weight of birds with the addition of 5g, 10g and 15g of ginger in broiler diets.

Table 1.Mean initial and final weight of the birds at day old to 35 days of age

TREATMENTS	INITIAL (kg)	FINAL (kg)
No Black pepper	0.047[a]	1.580[a]
5g Black pepper /kg CF	0.047[a]	1.608[a]
10g Black pepper /kg CF	0.047[a]	1.639[b]
15g Black pepper /kg CF	0.047[a]	1.723[b]

Means with the same superscript are not significantly different (P≥0.05) DMRT

Gain in Weight

Total gain and average gain in weight of birds was presented in Table 2. Statistical analysis revealed no significant differences among treatments. Birds fed with pure commercial feeds and those given commercial ration supplemented with 5g, 10g and 15g of black pepper during day old to thirty-five days gained an average of 1.591 kg for thirty-five days with an average daily gain of 0.045 kg. This implies that the addition of black pepper in the feeds of birds neither reduced nor improved the gain in weight of broilers.

The same result was observed in terms of average daily gain in weight of the birds. Statistical analysis revealed no significant difference among treatment means that despite gradual increase level of black pepper with commercial feeds, there is very minimal difference that can be observed on the average daily gain of the birds. The birds fed with 15g of black pepper/ kg commercial feeds had an average daily gain of 0.048 followed by the birds given 10g of black pepper of 0.045, and by those birds given 5g of black pepper and pure commercial feeds having the same mean of 0.044.

Table 2. Total and average daily gain in weight of birds

TREATMENTS	TOTAL GAIN (kg)	AVERAGE DAILY GAIN (kg)
No Black pepper	1.533[a]	0.044[a]
5g Black pepper/kg CF	1.526[a]	0.044[a]
10g Black pepper/kg CF	1.593[ab]	0.045[ab]
15g Black pepper/kg CF	1.677a	0.048[a]

Means with the same superscript are not significantly different (P≥0.05) DMRT

While there are slight differences in the gain in weights of the experimental birds, such difference were very minimal to cause a significant difference among treatments.

Feed Intake

Table 3 presents the total and average daily feed intake of birds under the different treatments from day old to thirty-five days feeding. Statistical analysis revealed a highly significant difference on the total and daily feed intake among treatment means. Birds given pure commercial feeds had the highest feed consumption of 3.399 kg followed by the birds given 5g of black pepper + commercial feeds with a mean of 3.283 kg, and by those bird given10g and 15g of black pepper mixed with commercial feeds with a mean of 3.028 kg and 2.823 kg respectively. This indicates that the addition of black pepper on the feeds reduces the feed intake of the birds.

It was shown in the table that the birds given pure commercial feeds and those birds given 5g of black pepper obtained a highest mean of 0.097 and 0.093 respectivelyas compared to the birds given 10g and 15g of black pepper which had a lowest mean of 0.086 and 0.080.

Table 3. Total and average daily feed intake of the birds

TREATMENTS	TOTAL FEED INTAKE (kg)	AVERAGE DAILY FEED INTAKE (kg)
No Black pepper	3.399[a]	0.097[a]
5g Black pepper + CF	3.283[a]	0.093[a]
10g Black pepper +CF	3.028[b]	0.086[b]
15g Black pepper + CF	2.823[b]	0.080[b]

Means with the same superscript are not significantly different (P≥0.05) DMRT

This reveals that the feeds without a mixture of black pepper appears more palatable compared to the feed with a mixture of black pepper resulting to higher feed consumption of birds fed with it. The overall mean daily feed intake of the birds was 0.089 kg. The reduced feed intake is maybe due to the pungent taste, smell and other phytogenic feed additives which black pepper possess.

Feed Conversion Ratio (FCR)

Table 4 contains the feed conversion ratio of the birds fed with different levels of black pepper. Statistical analysis revealed highly significant differences in terms of feed conversion ratio between treatments. The above result showed that birds given diets supplemented with 5g, 10g and 15g of black pepper had a better feed conversion ratio of 2.115, 1.902, and 1.684, respectively compared to the birds given no black pepper of 2.226.

Statistical analysis revealed that broilers fed with pure commercial feeds and broilers fed with 5g of black pepper mixed with commercial feeds have very minimal difference. It can be inferred from this analysis that the amounts of feeds consumed by the broilers are almost similar because 5g of black pepper did not produce much different

Table 4. Feed conversion ratio

TREATMENTS	FEED CONVERSION RATIO
No Black pepper	2.226[a]
5g Black pepper / kg CF	2.115[a]
10g Black pepper / kg CF	1.902[b]
15g Black pepper / kg CF	1.684[c]

Means with the same superscript are not significantly different (P≥0.05) DMRT

taste with that of a commercial feeds.

Whereas, broilers fed with commercial feeds mixed with 10g of black pepper and broilers fed with commercial feeds mixed with 15g of black pepper has significant differences in terms of feed conversion ratio, they are efficient in converting feeds. This indicates that with gradual increase of black pepper added to the birds diet will improve feed conversion ratio.

The result of this study is similar to that of Cipriano (2012) where she reported that with an increase level of ginger added to the birds diet feed conversion ratio decreased.

This could possibly cause by the high level of energy, vitamin A and K, calcium, phosphorus, iron, zinc, carotene-b and lutein zenxanthin, a component of black pepper which improved feed conversion ratio in broiler chickens (Cohen, 2009).

Feed Cost per kg of Broiler

Table 5 shows the different treatment means as affected by the different levels of black pepper. Statistical analysis revealed a highly significant difference among treatment means. As shown in the table, birds given pure commercial feeds and 5g of black pepper mixed with commercial feeds had the highest mean cost of feed to produce a kg in weight of Php 60.710 and Php 57.112, followed by the birds given diet supplemented with 10g and 15g of black pepper with a means of Php 51.341 and Php 45.455, respectively. The higher feed cost was obtained from the birds given no black pepper, which was brought about by the fact that they had consumed more feeds to produce a kg in weight. This implies that the addition of black pepper to the broilers diet reduces feed cost.

Table 5. Feed cost per kg of broiler

TREATMENTS	FEED COST/kg (Php)
No Black pepper	60.710[a]
5g Black pepper / kg CF	57.112[a]
10g Black pepper kg CF	51.341[b]
15g Black pepper /kg CF	45.455[c]

Means with the same superscript are not significantly different (P≥0.05) DMRT

Morbidity Rate

Presented in Table 6 is the percent morbidity of the birds in the different treatments. Seven (7) birds got sick out of 160 birds composing the four treatments. Furthermore, birds given no black pepper had a higher morbidity rate of 10% (4 birds). No morbidity was observed in birds given 15g black pepper/ kg of the commercial ration. This may prove the beneficial effect of black pepper to disease prevention. Black pepper is rich in antioxidants, has insecticidal and health promoting properties, anticonvulsant and has antimicrobial effect (Cohen, 2009). As Acker (1983) opined that the acceptance

Table 6. Morbidity rate

TREATMENTS	MORBIDITY RATE (%)
No Black pepper	10
5g Black pepper / kg CF	2.5
10g Black pepper / kg CF	5
15g Black pepper / kg CF	0

Means with the same superscript are not significantly different (P≥0.05) DMRT

of feed additives in poultry is attributed to their well-established benefits of reducing mortality and morbidity rate.

Mortality Rate

The percentage of mortality in the different treatment is presented in Table 7. Four (4) birds died out of 160 birds composing the four treatments during the duration of the study. The first 2 birds (5%) that died were from the group given no black pepper at 20 days old. Their death was attributed to cannibalism. The other 2 birds that died were from the birds given 5g (2.5%) and 10g (2.5%) of black pepper mixed with commercial feeds at 24 days of age. These two birds died when the bulbs used as source of light and heats were not turned off during a very hot day.

Since the case was isolated to these cages and no apparent disease was observed in the flock, it can only be assumed that these birds were unable to adjust to the increased in temperature.

Similarly, Fronda (1972) reported that using feed additives do not only make the production economical but also help in the control of diseases.

Table 7. Mortality rate

TREATMENTS	MORTALITY RATE (%)
No Black pepper	5
5g Black pepper / kg CF	2.5
10g Black pepper / kg CF	2.5
15g Black pepper / kg CF	0

Means with the same superscript are not significantly different (P≥0.05) DMRT

Return On Investment

Return on Investment of the different treatments is presented in Table 8. Birds given 5g of black pepper had the least ROI of 2.70% followed by 10g of black pepper, 3.23%, pure commercial feeds, 6.98% and the birds supplemented with 15g of black pepper had the highest ROI of 8.90%.

The ROI increases when the addition of black pepper was increased to 15g. Though this parameter was not subjected to statistical analysis, the result shows that the birds fed with 15g of black pepper had higher ROI than of the other treatments.

Table 8. Return on investment

	COST OF PRODUCTOIN (Php)	TOTAL SALES (Php)	NET PROFIT (Php)	ROI (%)
No black pepper	7088.67	7584	495.33	6.98%
5g black pepper/kg CF	7321.83	7519.8	197.97	2.70%
10g black pepper/kg CF	7432.805	7673.4	240.595	3.23%
15g black pepper/kg CF	7594.648	8271	676.352	8.90%

SUMMARY, CONCLUSION AND RECOMMENDATION

Summary

This study was conducted to determine the growth performance of broilers given commercial ration supplemented with black pepper. This was conducted at the Benguet State University Poultry Experimental House, Balili, La Trinidad, Benguet from October to December 2012.

One hundred sixty (160) day old broiler chicks were used in the study. This was divided into four treatments following the Completely Randomized Design. The four treatments were replicated four times with ten birds per replication. The different treatments used were as follows: Pure commercial feeds(T_0), 5g Black pepper + Commercial feeds(T_1), 10g Black pepper + Commercial feeds (T_2)and 15g Black pepper + Commercial feeds(T_3).

Result of the study found that there were no significant differences in terms of initial weight, final weight, total gain in weight and average daily gain in weight. The overall mean of initial weight, final weight, total gain in weight and average daily gain in weight of birds were 0.047 kg, 1.638 kg, 1.591 kg and 0.045 kg. On the other hand, feed intake, average daily feed intake, feed cost per kg of broiler produce and feed conversion ratio had highly significant differences among treatment means. In terms of feed intake, the birds given pure commercial feeds had the highest feed intake with a mean of 3.399, followed by the birds given 5g, 10g and 15g of black pepper with a mean of 3.283, 3.028 and 2.283. On the average feed intake, the birds given no black pepper had the highest average mean of 0.097 as compared to the birds given 5g, 10g and 15g of black pepper which have an average feed intake of 0.093, 0.086 and 0.080. The same result was observed

in terms of FCR, the birds given no black pepper had the highest FCR of 2.226 compared to the birds given 15g of black pepper which had a lowest mean of 1.684. Higher cost of feeds was observed in the birds given no black pepper with a mean of Php 60.710, the birds given 5g of black pepper Php 57.112, 10g of black pepper Php 51.341 and the birds given 15g of black pepper which gained a lowest cost of Php 45.455. No mortality and morbidity were noted on the birds given diet supplemented with 15g of black pepper.

The findings were that commercial feeds supplemented with different levels of black pepper did not significantly affect the growth performance of broilers. Although net profits and ROI were not subjected to statistical analysis, the study shows that the higher net profits and ROI was observed from the birds given the level of 15g black pepper add-on to commercial feeds. On economic basis, the most economical ration is the ration formulated with 15g of black pepper / kg commercial feeds.

Conclusion

It is therefore concluded that inclusion of black pepper in broilers diet reduces feed intake and average daily feed intake of the birds, improve feed conversion ratio and reduces feed cost per kilogram of broiler produced without affecting the gain in weight.

Recommendation

Based on the results showed in the study, it is therefore recommended that farmers can use 15g black pepper in broilers ration without detrimental effect on the growth performance of the birds. It is also recommended that further studies on higher level of black pepper as feed supplement for broilers should be made, however, it does not only the growth performance but also on carcass quality.

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