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Development and Evaluation of Chicken Feedstuff using Banana (*Musa Acuminata* X *Balbisiana*) Peel

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ABSTRACT

This study aimed to determine the level of development in the gain in weight of broiler chickens after four weeks or twenty-eight days when they have been subjected to the following treatments: 100% commercial feed, 50% commercial feed - 50% banana peel, and 75% banana peel - 25% commercial feed. The goal of this study was to identify which among the treatments yields a better growth rate and final weight for chickens. A quantitative-experimental approach was utilized in this study which investigated the growth differences between chickens fed with banana peel and chickens fed with commercial diets only. The study utilized twenty-one broiler chickens. Findings showed that Treatment 1 (100% commercial feeds) has the highest average weight among the varying feed diets and at the same time gained the highest final weight in the fourth week. Treatments 2 and 3 showed significant differences in the average and final weight of the broiler chickens. Therefore, the null hypothesis is rejected. With the results, we recommended further research to be done for the improvement of organic feed supplements in broiler chicken feed diets. Additionally, the determination of the nutritional components of banana peel and the other substitute feed supplements that may contribute to better weight gain in broilers was proposed. Furthermore, this work should be replicated on native chickens and layer chickens for additional testing of effectiveness and new research areas.

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1. INTRODUCTION

Feeds are an important part of livestock and poultry care because they ensure proper growth development and animal health (Xiong *et al.*, 2007). Because protein is one of the most expensive feed ingredients, the industry uses targeted rations and reduces the amount of protein in the diet as the birds grow (chickens require less and less protein as they age); however, different diets for starters, growers, and finishers may not be cost-effective for small-scale producers.

To supply the demand for quality meat to be consumed worldwide, a variety of nutrient intake by chickens is required. The banana, which is widely grown in Africa, is high in potassium and calcium but low in salt. However, while the banana pulp is utilized as food or feed for different types of livestock, little research has been done on the nutritional potential of banana peel meal as an alternative feedstuff in chicken production (Abel *et al.*, 2015).

A lot of studies have been conducted in regards to the nutritional value of bananas as food supplements for animals but only a few have emphasized the effects of using the fruit's outer covering in the growth and development of chickens. We decided to conduct a study in which the evaluation of the growth and development of broiler chickens, which are widely consumed nationwide, when fed with banana peels was emphasized. The objective of this study is to define and evaluate the differences in growth between chickens fed with banana peel and chickens fed only with commercial feed.

2. METHODS

A quantitative-experimental approach was utilized in this study which investigated the growth differences between chickens fed with banana peel and chickens fed with commercial diets only. The involvement of twenty-one (21) chickens in this study were observed and evaluated for four (4) weeks with the use of the three (3) treatments replicated thrice.

The experiment was set up following the experimental layout of the study. The banana peels were boiled until they softened, chopped, and dried under the heat of the sun. The broiler chickens were fed following their treatments. In treatment 1, 300 g of commercial feed was given. In treatment 2, chickens were fed with a mixture of 150 g of commercial feed and 150 g of banana peel, and in treatment 3, 225 g of banana peel supplemented with 75 g of commercial feed was provided. This feeding experiment lasted for four (4) weeks, and the chickens were weighed every Friday since the conduct of the study to determine variations in growth rate and final weight. This study used the Completely Randomized Design (CRD) with three (3) treatments replicated three (3) times. The treatments were as follows: T1 - 100% commercial feeds (control group), T2 - 50% commercial feeds and 50% finely chopped and dried banana peel (experimental group), and T3 - 75% finely chopped and dried banana peel and 25% commercial feed (experimental group).

The data gathered in this study were the following: (1) Measurement of each treatment. The measurements of each treatment were calculated and recorded; (2) Weekly weight of the chicken. The weight of the chickens every week was weighed using a weighing scale and was recorded; (3) The weight gain. The weight gain was calculated by subtracting the initial and final weights; and (4) The growth rate. It refers to the weight gain per week. The growth rate of chickens was monitored weekly. Data gathered were collated, tabulated, and subjected to statistical treatment to answer the problems of the study. The study was subjected to Analysis of Variance (ANOVA) in Completely Randomized Design (CRD) at a 0.05 level of significance. Tests for the significant differences among treatment means will be subjected to the Duncan Multiple Range Test (DMRT).

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Figure 1. Preparation of banana peels.

3. RESULTS AND DISCUSSION

3.1 Mass of Broiler Chickens under Treatment 1 (100% Commercial Feeds)

Replication 1 gained the highest mean weight value of 2116.25 g followed by replication 3, which accumulated a mean value of 2093.75 g. Lastly, replication acquired the lowest mean of 1915 g (see **Table 1**). Since variation in weight gained among replications was observed during the four weeks of the experiment, it is evident that broiler chickens' response to the given diet varies. Clarified that genetic potential, feed, and water consumption are the most important determinants in broiler performance and weight gain. It is evident because as observed, although replication 3 had the highest initial weight of 1500 g since the start of the study, replication 1 appeared to obtain the highest mean weight value of 2116.25 g. Whereas, replication 3 only had 2093.75 g as its mean value and 1915 g on replication 2. He also added that the intimidation felt by the other broilers in the same cage could affect the feed intake of the birds, thus, resulting in a variation in weights due to the increase or decrease in feed conversion. All in all, treatment 1 acquired a weighted mean of 2041.67 g.

Table 1. Mass per week of broiler chickens under treatment 1 (control group).

Replication	Initial Weight	Week 1	Week 2	Week 3	Week 4	Mean
1	1490 g	1770 g	1980 g	2320 g	2395 g	2116.25 g
2	1488 g	1570 g	1860 g	2005 g	2225 g	1915.00 g
3	1500 g	1790 g	1805 g	2205 g	2575 g	2093.75 g
Weighted Mean						**2041.67 g**

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3.2 Mass of Broiler Chickens under Treatment 2 (50% Commercial Feeds - 50% Banana Peel)

From highest to lowest, replication 3 had a mean weight value of 1599 g, followed by replication 2 (1491 g) and replication 1 (1353 g) (see **Table 2**). Since there was a sudden change in the feed diet of the broiler chickens, their body reacted in a way that during the first weeks of the experiment, weight loss among replications was recorded. Chicken diet can affect weight and should be taken into account if the birds are losing weight (Hasam *et al.*, 2007). She also added that weight loss might be a healthy by-product of improving the chickens' diet.

Also, in terms of growth, chickens do not respond to diets in the same way. Some grow relatively slower when young and make relatively great weight increases as they approach maturity. It is evident that during the first 3 weeks of observation, the weight of chickens was unstable because some lost weight while others gained weight. However, on the fourth week of the experiment, upon reaching eight weeks of age, all replications fluctuated greatly in terms of weight gain. Treatment 2 had the lowest records of weight gain and final weight among all treatments. This is the result of lower feed intake. Chickens adapt their feed intake for energy, and feed intake is associated with growth rate (Ferket & Gernat, 2006).

Table 2. Mass per week of broiler chickens under treatment 2 (50% Commercial feeds - 50% Banana peel).

Replication	Initial Weight	Week 1	Week 2	Week 3	Week 4	Mean
1	1496 g	1365 g	1205 g	1245 g	1595 g	1353 g
2	1499 g	1365 g	1380 g	1410 g	1810 g	1491 g
3	1498 g	1395 g	1485 g	1555 g	1960 g	1599 g
Weighted Mean						1480.83 g

3.3 Mass of Broiler Chickens under Treatment 3 (75% Banana Peel - 25% Commercial Feeds)

In Treatment 3 (see **Table 3**), replication 3 gained the highest mean weight value of 1659 g. It was followed by replication 2, which accumulated the second-highest mean weight value of 1616 g, and replication 3, with the lowest mean of 1401 g. Weight loss was noticeable during the experiment's first two (2) weeks. Same with treatment 2, the broilers' bodies reacted to the sudden change in their feed diet, resulting in weight reduction. However, the birds in treatment 3 were able to adjust way faster than those in treatment 2. According to Rivadeneira (2020), six (6) of the nutritional requirements for broiler chickens were provided by the banana peel, and these proteins contributed to the building up of body tissues in the birds, which resulted in weight gain.

Table 3. Mass per week of broiler chickens under treatment 3 (75% banana peel - 25% commercial feeds).

Replication	Initial Weight	Week 1	Week 2	Week 3	Week 4	Mean
1	1503 g	1210 g	1230 g	1435 g	1730 g	1401 g
2	1495 g	1440 g	1535 g	1605 g	1885 g	1616 g
3	1497 g	1395 g	1490 g	1780 g	1970 g	1659 g
Weighted Mean						**1558.75 g**

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3.4 Overall Result of the Analysis of Variance (ANOVA) for the Significant Difference between Treatments

Table 4 shows the result of the Analysis of Variance (ANOVA) for the significant difference between treatment 1 (commercial feeds), treatment 2 (50% commercial feed - 50% banana peel), and treatment 3 (75% banana peel - 25% commercial feed) at 0.05 level of significance. The data revealed that the P value calculated is smaller than the significance level of 0.05 (0.003<0.05). This implies that the null hypothesis is rejected, there is a significant difference between the three (3) treatments, and the three (3) treatments possessed different means.

Table 4. Overall result of the ANOVA for the significant difference between treatments.

Source of Variation	Sum of Square	Df	Mean Square	F Value	P-value	Decision
Between Groups	0.554	2	0.277	17.881	0.003	Reject Null
Within Groups	0.093	6	0.015			
Total	0.647	8				

Significant at 0.05 level of significance

4. CONCLUSION

Based on the findings of the study, it is concluded that all the given treatments had a significant difference in terms of the growth rate and final weight of the chickens. Treatment 1 (100% commercial feeds) had the highest average weight gain among the varying feed diets and, at the same time, gained the highest final weight at week four (4). Even though there is a significant difference between the control and experimental group, treatments 2 and 3 showed no significant difference in their effects on the broiler chickens, signifying either of these two treatments can be given as the birds' diet since they brought the same effects. Therefore, the null hypothesis is rejected.

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6. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

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