

Monogastric Production/Nutrition

GROWTH PERFORMANCE OF BROILER CHICKENS FED DIETS CONTAINING FOUR DIFFERENT OIL TYPES AT STARTER PHASE

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Abstract

The growth performance of broiler chickens fed diets containing four different oil types at starter phase was investigated. One hundred and eighty (180) day old ROSS 308 chicks of mixed sexes were allotted into five (5) treatments, replicated three times, with twelve (12) birds per replicate, in a Completely Randomized Design (CRD). Five diets were formulated as T1 (0% oil), T2 (4 % Palm oil), T3 (4% Palm kernel oil), T4 (4% Groundnut oil) and T5 (4% Shear butter oil) and fed to the broiler chicks throughout the experimental duration of four (4) weeks. The results showed that final body weight, body weight gains and weekly feed intake were significantly different ($P < 0.05$) between treatments. Initial body weight, feed conversion ratio, protein and energy efficiency ratios were not significantly different ($P > 0.05$) between treatments. The highest final body weight (237.43 g), body weight gain (189.70 g) and weekly feed intake (155.45 g) were recorded in T5. The range of values of 46.47 g (T1) – 47.73 g (T5), 3.19 (T1) - 3.47 (T3), 1.39 (T3) – 1.49 (T2) and 0.09 (T3 and T4) – 0.10 (T1, T2 and T5) were recorded for initial body weight, feed conversion ratio, protein and energy efficiency ratios, respectively. The study concluded that the four types of oil do not have equal effect on the various growth parameters of the broilers in spite of the fact that the oil types were added at the same levels in the diet. However, it is right to suggest that shear butter oil inclusion will produce better growth performance without any deleterious effect.

Keywords: Growth, Performance, Broilers, Oils and Starter-phase

DESCRIPTION OF PROBLEM

In Nigeria, grains (specifically maize, millet and guinea corn) has been the primary energy sources for poultry diets. The intense use of these ingredients as staple food by humans and utilization in ethanol production, have resulted to increased demand and resultant high prices. One of the closest alternative to these ingredients therefore is the use of oils to increase dietary energy content. This thus would allow for continued performance and give the most flexibility to poultry producers when pricing ingredients. Oils are generally used in poultry diets to increase energy concentration. Oil-enhanced feeds increase the efficiency of

the feed energy and productivity in poultry (1). Moreover, oil improves the absorption of fat-soluble vitamins, the palatability of diets, decreases the dustiness of feeds, and reduces the passage rate of feed in the gut, which provides more time for the sufficient absorption of nutrients (5). Observations were made by (3) that the inclusion of oils in starter diets increased the fat digestibility in broiler chicks during the first week of life and resulted in better performance through 21 days of age, compared to chicks that received rations without oil. Furthermore, chicks utilized metabolizable energy more efficiently for growth if part of the carbohydrate portion of the diet was replaced isocalorically with corn oil (7).

The author speculated the possibility of the efficiency of utilization to be influenced by the type of oil used, as different oil have different composition. It is on the basis of this argument that this study investigated the performance of broiler chickens fed diets containing four different oil types at starter phase. Growth parameters such as initial body weight, final body weight, body weight gains, feed intake, feed conversion ratio, protein and energy efficiency ratios of the chicks were determined at the end of the study.

MATERIALS AND METHODS

Study Location

The study was carried out at the Teaching and Research Farm of the Federal University of Technology Minna, Niger state, located within latitude 09°31' 18.2''N and longitude 6° 27' 40 'E with an elevation ranging from 230-250 m. The area is within the Southern guinea savanna of Nigeria with sub humid climate having a mean annual rainfall of 1338mm, dry season of about 5 months and mean temperature of about 30°C (4).

Experimental materials and Design

The ingredients used in formulating the diets were maize, groundnut cake (GNC), maize bran, fish meal, bone meal, lime stone, methionine, lysine, dry sweet orange peel, premix, and salt, all sourced at accredited feed Mill within Minna. Red red oil, palm kernel oil, groundnut oil and shear butter oil used in this study were all bought at Minna central area market while day old broiler chicks (mixed sex/Ross 308 strain) were bought from Agrited hatchery, Ibadan, Oyo state. A total of 180-day old broiler chicks were allotted into five (5) dietary treatment, replicated three times, with twelve (12) birds per replicate, in a Completely Randomized Design (CRD) arrangement.

Management of experimental birds

Before the arrival of the birds, the pen was cleaned, washed with detergent and disinfected using Vincokill. Wood shavings (litter material) was spread on the floor to

protect the chicks from direct contact with the floor and cold from the floor. A charcoal pot was lit up as source of heat during the one week period of brooding of the chicks. Vaccinations that were carried out include; first dose of Gomboro vaccine for Gomboro disease at week one, then at second week, Lasota vaccine for New castle disease, second dose of Gomboro vaccine at third week and second dose of Lasota vaccine at fourth week. Multivitamin was administered on the day of arrival and the second day. On the third, fourth, and fifth day, coccidiostat was administered. Then it was followed by multivitamin administered on the sixth day. Exactly on the seventh day, gumboro vaccine was administered early in that morning. Feed and water were provided for the chicks' *ad libitum* throughout the experimental duration which lasted for twenty eight (28) days. Remnants of feed and water, dirt and wet litters were removed from the pen on daily basis. Data collected were subjected to analysis of variance (ANOVA) of (6). Means were separated using Duncan multiple range test at 5% level of significance.

Experimental diets

The gross composition and calculated nutrient values of the five different experimental diets formulated are as shown in Table 1. The diets were T1 (Control with 0% oil), T2 (4 % Palm oil), T3 (4% Palm kernel oil), T4 (4% Groundnut oil), T5 (4% Shear butter oil). More so, the proximate composition of the experimental diets fed to the chicks at starter phase is presented in Table 2.

RESULTS

Growth Performance of broiler chickens fed diets containing four different oil types at starter phase

The results of growth performance of broiler chickens fed diets containing dried sweet orange peel meal and four different oil types at starter phase is presented in Table.3. The average final body weight,

body weight gain, average weekly body weight gain, average daily body weight gain and average weekly feed intake were significantly different ($P < 0.05$) between treatment groups. However, Initial body weight, feed conversion ratio, protein efficiency ratio and energy efficiency ratio were not significantly different ($P > 0.05$) between treatment groups. The highest final body weight was recorded in T5 (237.43 g) while T3 (203.0 g) recorded the least. T5 (189.70 g) recorded the highest body weight gain while T3 (155.9 g) recorded the

least body weight gain. The range of values of 38.99 g (T3) – 47.43 g (T5), 5.57 g (T3) – 6.77 g (T5) and 135.02 g (T3) – 155.45 g (T5) were recorded for average weekly body weight gain, average daily body weight gain and average weekly feed intake, respectively. The range of values of 46.47 g (T1)– 47.73 g (T5), 3.19 (T1) - 3.47 (T3), 1.39 (T3) – 1.49 (T2) and 0.09 (T3 and T4) – 0.10 (T1, T2 and T5) were recorded for initial body weight, feed conversion ratio, protein efficiency ratio and energy efficiency ratio, respectively.

Table 1: Gross composition and calculated nutrients values of experimental diets at starter phase

| Ingredients(g) | Treatments | | | | |
|-------------------|------------|---------|---------|---------|---------|
| | T1 | T2 | T3 | T4 | T5 |
| Maize | 56.20 | 52.20 | 52.20 | 52.20 | 52.20 |
| GNC | 28.80 | 27.80 | 27.80 | 27.80 | 27.80 |
| Maize bran | 10.00 | 11.00 | 11.00 | 11.00 | 11.00 |
| Bone meal | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 |
| Lime stone | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| Methionine | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| Lysine | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| Salt | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 |
| *Premix | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 |
| DSOP | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Oil | 0.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| Total | 100 | 100 | 100 | 100 | 100 |
| Calculated values | | | | | |
| ME(kcal/kg) | 3193.63 | 3123.85 | 3118.73 | 3123.57 | 3123.07 |
| CP (%) | 23.24 | 23.21 | 23.42 | 23.71 | 23.63 |
| CF (%) | 3.52 | 3.66 | 3.66 | 3.66 | 3.66 |
| Calcium (%) | 1.56 | 1.65 | 1.65 | 1.65 | 1.65 |
| Phosphorus (%) | 0.72 | 0.81 | 0.75 | 0.83 | 0.78 |

*Biomix chick premix provided per kg of diet; Vit A, 1000IU; VIT D3, 2000IU; Vit E, 23mg; Vit K, 2mg; calcium pantothenate, 7.5mg; B12, 0.015 mg; folic acid, 0.75mg; Choline chloride, 300 mg; Vit B1, 1.8mg; Vit B2, 5 mg; Vit B6, 37mg; Manganese, 40 mg; Iron, 20mg; Zinc 53.34 mg; Copper, 3mg; Iodine 1mg; Cobalt 0.2mg, Selenium 0.2mg, Zinc 30mg, T1 – 0% inclusion level of oil, T2 4% inclusion level of Palm oil, T3, 4% inclusion level of palm kernel oil, T4 4% inclusion of groundnut oil, T5 4% inclusion level of shear butter oil. DSOP – Dried sweet orange peel

Table 2: Proximate Composition of the Experimental Diets at Starter Phase

| Parameters (%) | Treatments | | | | |
|-----------------------|------------|---------|---------|---------|---------|
| | T1 | T2 | T3 | T4 | T5 |
| Dry matter | 92.40 | 92.20 | 92.20 | 92.60 | 92.20 |
| Crude protein | 22.03 | 20.65 | 22.30 | 21.45 | 22.50 |
| Crude fibre | 4.50 | 3.50 | 6.00 | 8.00 | 4.00 |
| Lipid | 16.50 | 30.00 | 17.00 | 17.50 | 19.00 |
| Ash | 10.00 | 4.50 | 8.00 | 9.00 | 8.50 |
| Nitrogen free extract | 39.37 | 33.55 | 40.90 | 36.65 | 38.20 |
| ME/kcal/kg | 3377.90 | 3414.03 | 3376.13 | 3394.68 | 3332.58 |

T1 – (control group), T2 - 4% inclusion level of Red oil, T3 - 4% inclusion level of Palm kernel oil

T4 - 4% inclusion level of Groundnut oil, T5 - 4% inclusion level of Shear butter oil, ME: Metabolisable energy.

Table 3: Growth Performance of Broiler at Starter Phase Fed Different Types of Oil

| PARAMETERS | Treatments | | | | | SEM | LS |
|---------------|----------------------|----------------------|---------------------|----------------------|---------------------|------|----|
| | T1 | T2 | T3 | T4 | T5 | | |
| INI BWT (g) | 46.47 | 46.77 | 47.53 | 46.90 | 47.73 | 0.28 | NS |
| FINAL BWT (g) | 229.74 ^{ab} | 217.70 ^{ab} | 203.0 ^b | 214.10 ^{ab} | 237.43 ^a | 4.46 | * |
| BWG (g) | 183.28 ^a | 170.93 ^{ab} | 155.97 ^b | 167.20 ^{ab} | 189.70 ^a | 4.39 | * |
| ABWG (g) | 45.82 ^a | 42.73 ^{ab} | 38.99 ^b | 41.80 ^{ab} | 47.43 ^a | 1.10 | * |
| ADBWG (g) | 6.55 ^a | 6.11 ^{ab} | 5.57 ^b | 5.97 ^{ab} | 6.77 ^a | 0.16 | * |
| AWFI (g) | 146.06 ^b | 138.80 ^{bc} | 135.02 ^c | 138.02 ^c | 155.45 ^a | 2.21 | * |
| FCR | 3.19 | 3.25 | 3.47 | 3.32 | 3.30 | 0.05 | NS |
| PER | 1.48 | 1.49 | 1.39 | 1.46 | 1.47 | 0.02 | NS |
| EER | 0.10 | 0.10 | 0.09 | 0.09 | 0.10 | 0.00 | NS |

Key: a, b, c means in the same row with different superscript are significantly different, T1 – (control group), T2 - 4% inclusion level of Palm oil, T3 - 4% inclusion level of Palm kernel oil, T4 - 4% inclusion level of Groundnut oil, T5 - 4% inclusion level of Shea butter oil, INI BWT= Initial body weight, FINAL BWT= Final body weight, BWG= Body weight gain, ABWG= Average body weight gain, AWFI= Average weekly feed intake, FCR= Feed conversion ratio, ADBWG= Average daily body weight gain, PER=Protein efficiency ratio, EER=Energy efficiency ratio, SEM = Standard error of the mean, LS= Level of significance, NS= No significance, *= Significance difference

DISCUSSION

The significant differences in final body weight, body weight gain, average weekly body weight gain, average daily body weight gain and average weekly feed intake in the broiler fed four different oil types at

starter phase observed in this study indicated that the use of these oil types did not have any adverse effect on these growth performance parameters. This agree with the report of (2) on effect of oil supplemented diet on growth performance

and meat quality of broiler chickens. However, data from this study indicated that birds fed diets containing shear butter oil had significantly higher performance, indicating the influence of dietary fatty acid composition in shear butter oil on the performance of the broilers at this stage. The increase body weight gain recorded in bird fed shear butter oil could have been due to the increased average weekly feed intake occasioned by the possible improved palatability and digestibility of the feed.

This report is in line with that of (3) on oils and fat in broiler nutrition who stated that Day-old broiler chicks had increased apparent fat digestibility when fed with soy oil at a dietary inclusion level of 3.5%. The Feed conversion ratio and efficiency of protein and energy utilization though not significant different between treatment groups further confirms that using these oils types did not pose any adverse effect on the growth performance of broiler birds at starter phase.

CONCLUSION

Based on the results obtained from this study it can be concluded that the four types of oil do not have equal effect on the various growth parameters of the broilers in spite of the fact that the oil types were added at the same levels in the diet. However, it is right to suggest that shear butter oil inclusion will produce better performance parameters.

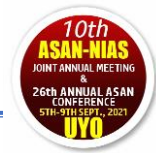
RECOMMENDATIONS

Based on the results obtained from the experiment, I therefore recommend that;

- (i) Palm oil, palm kernel oil, groundnut oil and shear butter oil are excellent feed ingredients for broiler birds as an energy source. However, shear butter oil has better impact on the growth performance so farmers should be educated and be encouraged on the use of shear butter oil in formulating their poultry feed.
- (ii) More research should be carried out on these oil types to determine their optimum inclusion level in broiler diets.

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