MONOGASTRIC NUTRITION **MPN 077**

GROWTH PATTERN OF BROILER CHICKENS FED UNTREATED AND ENZYME TREATED FEATHER MEAL BASED DIETS

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ABSTRACT

The experiment was carried out to investigate the growth pattern of broiler chickens fed untreated and keratinase enzyme treated feather meal based diets. A single phase experiment with an iso-nitrogenous diet of 22% CP and iso-caloric diet of 3100 ME kcal/kg was adopted. A total of one thousand and fifty (1050) Ross 308 broiler chickens were used for the experiment. In a completely randomized design, the birds were randomly allotted into seven dietary treatments and six replicates with twenty five birds per replicate: T_1: diet without feather meal (control), T_2: (diet containing 8% untreated feather meal), T_3: (diet containing 16% untreated feather meal), T_4: (diet containing 24% untreated feather meal), T_5: (diet containing 8% treated feather meal), T_6: (diet containing 16% treated feather meal), T_7: (diet containing 24% treated feather meal). The experiment lasted for eight weeks and data was collected on weekly growth performance. The results showed that there were significant ($P<0.05$) differences in the weekly growth of birds across the seven dietary treatments. Treatment six had the highest value (2113.30g) while treatment one had the lowest (1935.70g). Birds fed treated feather meal based diet performed better than those fed untreated feather meal based diet and also, birds fed untreated feather meal based diet performed better than the control (0% feather meal). In conclusion, feather meal could be used up to 24% inclusion (nutrient for nutrient) substitution for conventional protein feeding stuffs in broiler chicken production without any adverse effect on growth performance.

Keywords: growth pattern, broiler, enzyme treated, untreated, feather meal

INTRODUCTION

Broilers production is gaining high monument in Nigeria because of its quick returns on investment, short production period and provision of highly palatable and good quality meat. The popularity of poultry has resulted from the comparative advantages of poultry over other livestock.

The cost of poultry feed has increased due to shortages and high cost of feed ingredients, particularly the protein supplements (1). Conventional protein sources are becoming costly due to high demand from humans and animals. In Nigeria, poultry feed is based primarily on corn and soybean meals that constitute the most expensive components of the diets. The scarcity and high cost of these feed ingredients are the major drawbacks to the sustainability and development of poultry industry in the country.

This has led to increased cost of poultry production; hence 70 – 80 % of production cost is attributable to feed (2).The continued increase in the price of poultry feed ingredients is a compelling reason for alternative protein feed resource that not only have good nutritive value, but is also cheap and readily available (3).

Feather is a by-product of poultry production which is generally considered as a waste in many parts of the World (4). Feathers can be converted to feather meal which is a potential alternative to expensive protein feedstuffs for animal feeding. Feather meal is high in crude protein. It is also

rich in a keratinous protein, which is a fibrous and insoluble (5).

Keratinase is one of the most important class of commercial enzymes that displays the capability of degrading insoluble keratin substrates (6). They possess several potential applications associated with the hydrolysis of keratinous substrates such as the conversion of insoluble feather keratins after enzymatic hydrolysis to feedstuffs, fertilizers, glues, and films (7).

MATERIALS AND METHODS

Experimental site

The research was conducted at the poultry unit of the Department of Animal Production Teaching and Research Farm, Gidan Kwano, Federal University of Technology Minna, Niger State. Minna is located within latitude 09º 30' and 06º 45' north and longitude 06º 30' and 06º 45' east of the equator. It falls within the Southern Guinea Savanna agro-ecological zone of Nigeria. The mean rainfall varies from 1100 to1600 mm and mean temperature of between 21ºC and 35ºC (8).

Preparation of untreated feather meal

Feathers were collected from the chicken slaughtering unit, Kure international market, Minna. The feathers collected were washed and sundried. The dried feathers were then milled and incorporated into the diet.

Preparation of treated feather meal

A bio- reactor of 50 litre capacity was designed for this experiment. The bio-reactor functioned as a heater, stirrer and a pH reader. The feathers were pre-treated with 1% NaOH for 30 minutes with a maintained pH of 8.5-9.0 and a temperature of 40 ºC for 30 minutes. During the process of pre-treatment, the stirrer was put on every five minutes for proper circulation of NaOH solution through the feather. After pre-treatment, the NaOH solutions were discharged and the feathers were continuously washed with ordinary water till a neutral pH was observed.

After maintaining a neutral pH, the washed feathers were returned back into the bio-reactor and enzyme keratinase of 5 litres was poured and make up with water. The stirrer was put on every five minutes for proper enzymatic reaction and the feathers were treated with enzyme keratinase for 1 hour.

The treated feathers were properly drained and oven dried at a temperature of 80 ºC till it got dried. The dried feathers were then milled and incorporated into the diets.

Preparation of the experimental diet

A single phase experiment with an iso-nitrogenous diet of 22 % CP and iso-caloric diet of 3100 ME kcal/kg was adopted. The experimental diets were prepared using enzyme treated and untreated feather meal at different inclusion rates. Seven diets were formulated and designated as follows; **diet 1**: (control) normal formulated feed without feather meal; **diet 2** contained feed with 8 % enzyme treated feather; **diet 3** contained feed with 16 % enzyme treated feather; **diet 4** contained feed with 24 % enzyme treated feather; **diet 5** contained feed with 8 % untreated feather; **diet 6**: contained feed with 16 % untreated feather while **diet 7** contained feed with 24 % untreated feather.

Management of experimental birds

One thousand and fifty (1050) Ross 308 broiler chicks of mixed sexes were used for the experiment. Before arrival of the birds, the experimental house was washed and fully disinfected. The chicks were randomly shared into seven (7) nutritional treatments in a Completely Randomized Design (CRD). Each treatment had six replicates with twenty five (25) chicks per replicate. Birds were reared on deep litter system for 56 days. Vaccinations and medications were strictly followed and feed and water were supplied *ad-libitum.*

RESULTS AND DISCUSSIONS

Figure one shows the growth pattern from week one to week eight of broiler chickens fed untreated and enzyme treated feather meal diet. The result shows that there were no significant ($p>0.05$) differences between the growth of the chickens observed at week one and two for the seven dietary treatment. However, there were significant ($p<0.05$) differences in the values obtained for the birds between week three to week eight.

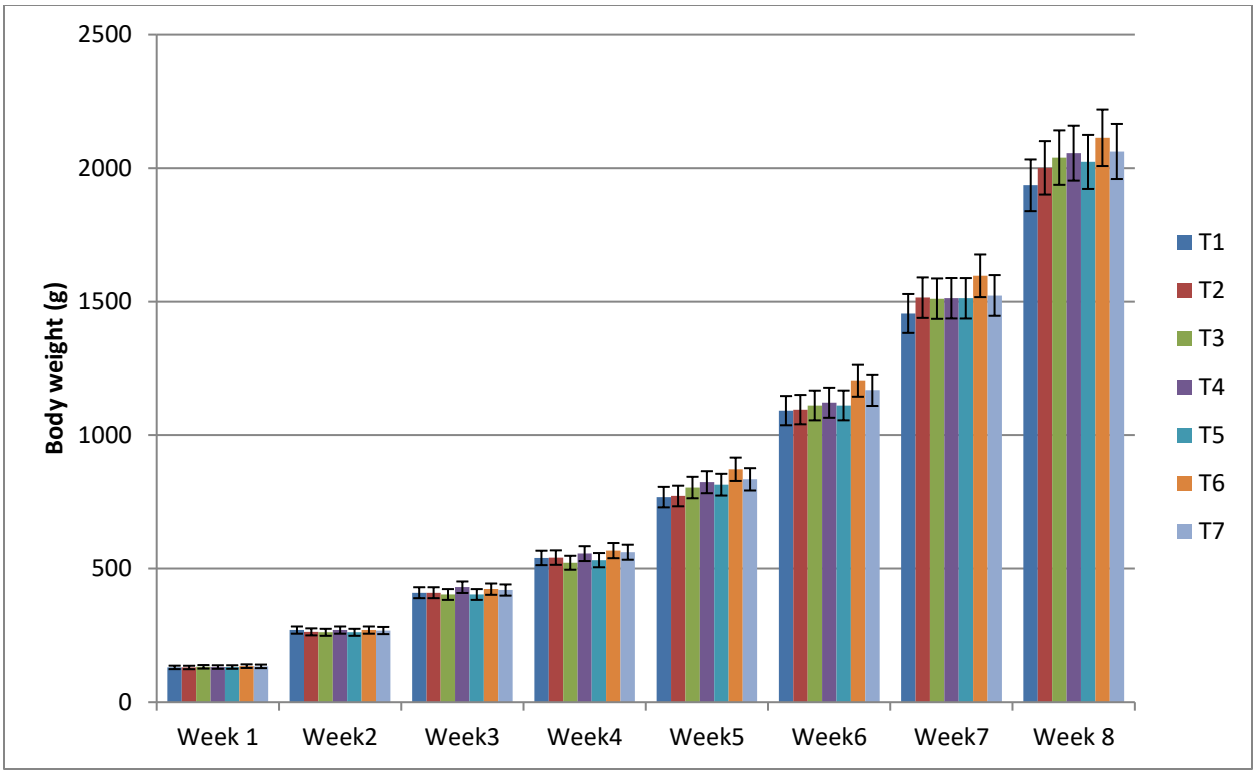

Figure 1: Bar chart comparing the weekly growth Pattern of broiler chickens fed enzyme treated and untreated feather meal based diets.

Keys: T1: normal formulated feed without feather meal, **T2**: contains feed with 8% untreated feather, **T3**: contains feed with 16% untreated feather, **T4**: contains feed with 24% untreated feather, **T5**: contains feed with 8% enzyme treated feather, **T6**: contains feed with 16% enzyme treated feather, **T7**: contains feed with 24% enzyme treated feather.

At week three, birds fed 24 % untreated feather meal based died had the highest value (430.50 g) while birds fed 16 % untreated feather meal based diet had the lowest (403.33 g). The values obtained for week four showed that birds fed 16 % enzyme treated feather meal based diet had the highest value (567.67 g) while birds fed 16 % untreated feather meal based diet had the lowest (522.17 g). From week five to week eight, birds fed 16 % enzyme treated feather meal based diet (T6) had the highest value (2113.30 g) while birds fed diet containing 0 % treated and untreated feather meal based diet (T1) had the lowest value (1935.70 g).

The result of this study negates that of (9), who recorded a reduced growth rate as compared to the control when broiler chickens diets were supplemented with 2 % hydrolyzed feather meal without enzyme treatment.

The final body weights obtained in this study are comparable with the reports of (10) and (11). However, there were no significant differences in their final body weight when they fed feather meal to broiler chicken.

CONCLUSIONS

Birds fed treated feather meal based diet performed better than those fed untreated feather meal based diet and also, birds fed untreated feather meal based diet performed better than the control (0 % feather meal)**.** Enzyme treated or untreated feather meal can be used up to 24 % inclusion level (nutrient for nutrient) substitution for conventional protein feeding stuffs in broiler chickens production without any adverse effect on growth performance.

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