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EFFECTS OF REPLACING WHEAT OFFAL WITH VARYING LEVELS OF PINEAPPLE WASTE MEAL ON THE GROWTH CHARACTERISTICS OF BROILER CHICKENS

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ABSTRACT

The study was undertaken to determine the effects of replacing wheat offal with varied levels of pineapple waste meal on the growth characteristics of broiler chickens. This research was conducted in the Poultry Unit of the Teaching and Research Farm, Osun State College of Education Ila-Orangun. Research results showed that replacement of wheat offal with pineapple waste meal (PWM) increased the fibre quantity of the treatments (diets). Birds fed 50% PWM performed better than others in growth performance both in starter and finisher phases. With respect to carcass characteristics, birds fed with control diet performed better in starter and finisher phases. Also, results of the study revealed that relative internal organ weights especially liver and gizzard were significantly higher in the birds fed 100% PWM at starter and finisher phases. It could be concluded that at both starter and finisher phases, performance of broiler was maximum at 50% PWM. Thus, farmers could include pineapple waste meal (PWM) up to 50% for the replacement of wheat offal in the diet of broiler chicken as alternative source of fibre without any deleterious effect.

Keywords: Effects, Replacing, Wheat Offal, Pineapple Waste Meal, Growth and Broiler Chickens

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INTRODUCTION

It is believed that 70 to 75% of total cost on broiler production is incurred on feed (Adegbaju, 2004). Therefore, any improvement in the performance of broilers due to diet can inevitably have a deep effect on broilers farming and consumption of poultry products. Efforts ought to be geared towards looking for cheap and easily available alternative feedstuff that are of no industrial use, which at the equal time could help meet the dietary requirements of the birds. Therefore, animal nutritionists in Nigeria have over the decades engaged in various researches toward finding cheaper alternative feedstuff for poultry (Oladunjoye *et al.*, 2005; Otokumefor and Olumu, 2000). The search has been promoted by the ever escalating cost of the conventional feedstuffs which has resulted in the increasing cost of poultry production and consequent amplify in the cost of poultry products (Iyayi, 2007). To oppose this increase in the price of conventional feedstuffs and produce poultry product at reasonable prices, the use of agro-industrial by-product in poultry feeding is most exploited in Nigeria (Coppens d'Eeckenbrugge *et al.*, 2003). Such feedstuffs include by-products of agricultural products known to be dietary fibre sources. One of such readily accessible agro-industrial by-products is pineapple waste (PW). Hinged on the above, this research will be undertake to determine the effects of replacing wheat offal with varying levels of pineapple waste meal (PWM) on the growth characteristics and blood profiles of broiler chickens with a view to meeting the animal protein needs of the Nigerian populace using available alternative feedstuff that are of no industrial use. Two hundred (200) day old broiler chickens will be used for the experiment. They will be purchased from a reputable commercial hatchery. The birds will be randomly separated into five (5) treatments of 40 birds each with ten (10) birds serving as a replicate. The brooder house will be thoroughly cleaned and disinfected with Morigad (R) a week before the arrival of the birds.

Despite these enormous resources, a broad space still exists between demand and supply. It is reported that the daily animal protein intake per caput in Nigeria is about 8g which is far below the required 35g of protein intake requirement of animal basis out of the 70g daily recommended total protein intake (Obioha, 1992). One of the core reasons for the stumpy level of animal protein ingestion in the tropics and in Nigeria in particular is because livestock production is not keeping pace with human being inhabitants growth rate put at 3.2% (NPC, 2006).

Animal proteins source like mutton are very costly whereas beef has a narrow use due to its elevated cholesterol contents. Broiler meat, therefore, may help in bridging the opening between demand and supply of animal proteins because it matures fast, very high conversion of feed ingestion to meat (NCC, 2012) and reasonable source of human food of high biological value (Barbato, 1994; Siegel, 1993).

Broiler chickens (Gallus gallus domesticus) are a gallinaceous domesticated fowl, bred and raised specifically for meat production (Kruchen, 2012). The gauge depicts the global broiler meat production in 2017 broken down by country, United States were the world leading country with an amount of about 18.7 million metric tonnes, followed by Brazil (13.4) and European Union of about 11.5 million metric tonnes (statista, 2018). Typical broilers have white feather and yellowish coat. Most profit-making broilers reach slaughter-weight at between five and seven weeks of age. They are usually grown as mixed-sex flock in large sheds under concentrated conditions but some breeds can be grown as free-range flocks (The Economist, 2011). Broilers clearly control the world poultry consumption

contributing about 70 percent to the world poultry market (Van der Sluis, 1999).

The world broiler business has been and continues to be an active trade. It has been typified with exceptional growth in terms of production. In 1961, the broiler production estimate was put at 6.5 billion. By 1990, the total yearly production was a little over 27 billion and by 1996, total global production had grown to 35.3 billion (Van der Sluis, 1999). In 2004, sum number of meat chicken produced in the globe was nearly 47 billion, of these; approximately 19% was produced within US, 15% in China, 13% in Europe and 11% inside Brazil (Turner *et al.*, 2005). As at 2014, 86.6 million tonnes of broiler meat was produced (www.fas), however, efficient and economical broiler production depends upon an integer of conditions such as genetic makeup of the birds, housing, environmental and climatic consideration, disease prevention and marketing system and feed (Mahmood *et al.*, 2005).

Based on this, Makinde and Sonaiya, (2010) developed a quick, faster method which takes maximum of four hours drying period to convert them to animal feed such as wet by products of pineapple using absorbents. The pineapple waste is mixed with an absorbent because PW are difficult to ensile due to their acidity and high moisture content (Chloopehng *et al.*, 2005). Other efforts to reduce their water content previous to time they are given to the animal are to apply methods such as sun-drying, oven-drying, or air-drying. The PW are usually discarded because they has no direct feeding value for humans and in most places, they are dumped indiscriminately thus causing environmental problems. Babatunde (1988) classified PW as an alternative feed ingredient to conventional wheat offal.

Wheat offal is a derivative of wheat after obtaining flour for human use. Wheat offal is made up of wheat germ, bran (greatest proportion of the wheat offal), coarse middling and fine middling (Alawa and Umunna, 1993). Wheat offal contains 14.80-17.60% crude protein, 3.6-6.4% crude ash (Olomu, 1995; Yin *et al.*, 1993 and Maisari, 1986) and about 10% crude fibre (Olomu, 1995). The lower crude fibre content when compared to Brewers Dried Grain and Palm Karnel Meal makes wheat offal suitable for feeding monogastric animals (Alawa and Umunna, 1993). Agro-industrial by-products may have undergone changes in their proximate and nutrient symphony with time due to changes in the selection of crops used in producing them and methods of industrial processing.

Objectives of the Study

The study determined the effects of replacing wheat offal with varied levels of pineapple waste meal on the growth characteristics of broiler chickens.

EXPERIMENTAL SITE.

This research was conducted in the Poultry Unit of the Teaching and Research Farm, Osun State College of Education Ila-Orangun,. The mean yearly rainfall is 1,247mm and the comparative humidity is between 75 and 95%. The altitude is between 300m and 600m above the sea level while the mean temperature is 27^0C. The site is located within the derived savannah of Nigeria.

PREPARATION OF TEST INGREDIENT.

Fresh pineapple waste (skins, peeling and the pulp peeling) were collected from Moor Plantation, Ibadan, Nigeria. The pineapple wastes were sundried for 30 days at above 500C to have constant weight and milled to obtain pineapple waste meal (PWM).

PREPARATION OF EXPERIMENTAL DIETS.

Five (5) experimental treatments were formulated at different replacement levels of 0, 25, 50, 75 and 100% pineapple wastes meal (PWM) respectively for wheat offal in the diets.
Treatment 1 (T1): 0% pineapple wastes meal replacement for wheat offal.
Treatment 2 (T2): 25% pineapple wastes meal replacement for wheat offal.
Treatment 3 (T3): 50% pineapple wastes meal replacement for wheat offal.
Treatment 4 (T4): 75% pineapple wastes meal replacement for wheat offal.
Treatment 5 (T5): 100% pineapple wastes meal replacement for wheat offal

EXPERIMENTAL ANIMALS AND MANAGEMENT.

Two hundred (200) day old broiler chickens will be used for the experiment. They were purchased from a reputable commercial hatchery. The birds will be randomly separated into five (5) treatments of 40 birds each with ten (10) birds serving as a replicate. The brooder house will be thoroughly cleaned and disinfected with Morigad (R) a week before the arrival of the birds.

Heat will be provided by monitored charcoal pots for 21 days. Birds will be given glucose, multivitamins and antibiotic in fresh drinkable water on the day of arrival. They will be then subjected to broiler management (expatiate) and preventive medications will be administered accordingly. The first body weight per replicate will be taken at the beginning of the experiment and thereafter on weekly basis. The birds will be supplied with feed and water. Feeding will be given twice per day at 7:30 am and 2:00 pm. The birds will be subjected to 8 weeks of feeding trial.

DATA COLLECTION AND ANALYSIS

Data were obtained for the following parameters:

Growth Parameters:

Initial weight (g) were taken at the beginning (1st week and 5th week) of the experiment.
Final weight (g) will be taken on termination (4th and 8th week) of the experiment.
Daily feed intake (g) = Quantity feed supplied - Left over from the previous day.
Feed conversion ratio = Average daily feed intake / Average daily weight gain.
Average daily weight gain, were computed from the difference between the final weight and initial weight relative to the duration of the experiment.

Digestibility Trial.

On the 7th week of the experiment, 2 birds per replicate were randomly chosen and transferred to metabolic cages. The birds were acclimatized for 3 days and the next 5 days for the collection of faecal samples. Two hundred gram (200g) of the feed were given to each bird per day and left over were deducted from 200g to know feed consumption. Droppings were also collected every day and air dried.

Experimental Design.

The experiments were laid out in a completely randomized design (CRD).

Chemical Analysis.

Samples of test ingredient, experimental diets and faecal samples were analyzed for proximate composition according to A.O.A.C (2000) methods.

Statistical Analysis.
Data obtained were subjected to one-way analysis of variance (ANOVA) at 5% probability test using SPSS 13.00 computer software of SAS package. Means with significant differences were separated using Duncan Multiple Range Test of the same statistical package.

RESULTS AND DISCUSSION

Carcass and organs parameters (starter phase).
Table 1 showed the carcass and relative organs weight of broiler starter chicken fed pineapple wastes diets. Bled weight, defeathered weight, eviscerated weight, dressing percent, breast, back, drumstick, wing, shanks, head, liver, and gizzard were significantly ($p < 0.05$) different across the treatments.

Birds fed T1 (0% PWM) had significantly ($p < 0.05$) higher value in bled weight than other treatments. Birds fed T3 (50% PWM), T4 (75% PWM) and T5 (100% PWM) had similar bled weight. Starters fed T3 (50% PWM) had defeathered weight which was significantly ($p < 0.05$) elevated than those on other treatments. Birds placed on T1 (control) and T4 (75% PWM) had similar eviscerated weight which were significantly ($p < 0.05$) higher than those on other treatments. Dressing percentage of birds fed T3 (50% PWM) was significantly ($p < 0.05$) higher than others. Serious depression was seen in the values of eviscerated weight in birds fed T3 (50% PWM) and dressing percentage in birds fed T4 (75% PWM).

Carcass characteristics revealed that the values of breast, back, drumstick and wings were comparable between birds fed the control diet and those fed T2 (25% PWM) and T3 (50% PWM). However, this similarity was appreciably ($p < 0.05$) higher than birds fed T4 (75% PWM). Values of the head also had similar presentation i.e. birds on the control diet and T4 had similar values which were superior than other treatments. Birds fed T4 had significantly ($p < 0.05$) depressed value (2.73%) of liver when compared with other treatments.

Table 1: Growth performance of broiler starter chicken fed with varying levels of pineapple wastes based diets.

Parameters	T1(0% PWM)	T2 (25% PWM)	T3 (50% PWM)	T4 (75% PWM)	T5 (100% PWM)	SEM±
Initial weight (g)	39.12	37.64	38.73	37.65	38.28	0.13
Final live weight (g)	731.00	708.24	705.13	672.69	666.60	11.71
Weight gain (g/day)	24.71	23.95	23.80	22.68	22.44	0.42
Feed intake (g/day)	119.15^{b}	114.44^{b}	105.61^{c}	126.64^{a}	113.80^{b}	1.84
Feed gain ratio(g)	4.83^{ab}	4.78^{ab}	4.44^{b}	5.58^{a}	5.07^{ab}	0.13

^{abc} means in the same row with different superscripts are significantly different ($p < 0.05$).
S.E.M. = Standard error of mean.

Table 2: Carcass and relative organs weight of broiler starter chicken fed with dietary varying levels of pineapple wastes meal.

Parameters	T1(0% PWM)	T2 (25% PWM)	T3 (50% PWM)	T4 (75% PWM)	T5 (100% PWM)	SEM±
Bled weight (g)	698.99^{a}	660.51^{c}	666.79^{b}	641.32^{c}	649.96^{c}	65.78
Defeathered weight (g)	677.43^{a}	662.80^{a}	633.80^{b}	612.45^{c}	615.19^{c}	0.77
Eviscerated weight (g)	494.81^{a}	464.27^{b}	452.05^{c}	459.29^{c}	440.61^{c}	0.41
Dressing (%)	59.30^{a}	58.79^{a}	58.19^{b}	55.41^{c}	56.30^{c}	0.36
Breast (%)	15.02^{a}	14.80^{a}	14.57^{ab}	13.74^{b}	13.68^{b}	0.18
Back (%)	12.32^{a}	12.73^{a}	12.42^{a}	11.36^{b}	11.30^{b}	0.15
Thigh (%)	9.82	9.69	9.53	9.29	9.78	0.13
Drumstick (%)	9.02^{a}	8.90^{ab}	8.97^{a}	7.98^{c}	8.35^{bc}	0.12
Neck (%)	5.06	4.72	4.42	4.67	4.39	0.11
Wing (%)	9.17^{a}	8.80^{ab}	8.24^{c}	7.55^{c}	8.15^{bc}	0.18
Shank (%)	4.86^{b}	5.32^{a}	4.89^{b}	5.15^{ab}	4.95^{b}	0.05
Head (%)	4.04^{a}	3.62^{b}	3.82^{b}	4.10^{a}	3.76^{b}	0.05
ORGANS						
Heart (%)	0.55	0.51	0.41	0.49	0.52	0.02
Lung (%)	0.75	0.62	0.63	0.63	0.58	0.04
Kidney (%)	0.86	0.61	0.72	0.74	0.74	0.04
Liver (%)	2.94^{b}	2.93^{b}	3.03^{a}	2.73^{c}	3.05^{a}	0.03
Gizzard (%)	4.35^{ab}	4.41^{ab}	4.48^{ab}	3.92^{b}	4.61^{a}	0.09
Proventiculus (%)	0.58	0.55	0.64	0.42	0.51	0.04

^{abc} means in the same row with different superscripts are significantly different ($p < 0.05$). S.E.M. = standard error of mean.

CONCLUSION AND RECOMMENDATIONS

Conclusion

The study concludes that replacement of wheat offal with pineapple waste meal (PWM) increased the fibre quantity of the treatments (diets). Birds fed 50% PWM performed better than others in growth performance both in starter and finisher phases. For carcass characteristics, birds fed with control diet performed better in starter and finisher phases. Relative internal organ weights especially liver and gizzard were significantly higher in the birds fed 100% PWM at starter and finisher phases.

Recommendations

It could be concluded that at both starter and finisher phases, performance of broiler was maximum at 50% PWM. Thus, farmers could include pineapple waste meal (PWM) up to 50% for the replacement of wheat offal in the diet of broiler chicken as alternative source of fibre without any deleterious effect.

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