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Performance of Guinea Fowl Numida Meleagris Fed Varying Levels of Poultry Droppings

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Abstract: Six hundred guinea fowl pullets, 5 week old, were used for a 30 week feeding trial to test the replacement value of poultry droppings (PD) for blood meal, a conventional protein ingredient, in animal feed. Guinea fowl is a wild bird found in the savanna forests of West Africa. There were four dietary treatments namely, 0, 20, 40 and 60% PD replacement of blood meal. The birds were kept in deep litter houses for 20 weeks. Feed and water were offered *ad libitum*. At the 20th week, 10 birds were randomly selected from each of the four dietary treatments and starved for one day. They were killed in the slaughter house by cutting the neck through the jugular vein. This was used to determine the carcass parameters. The remaining birds were transferred into the layers house, where the following parameters were determined: body weight gain, feed intake, feed conversion, age at first lay, Percentage hen day production, egg weight, shell thickness and yolk colour. Results show that body weight gain and feed conversion decreased with the level of PD in the diet. There was no significant difference between the birds in carcass parameters in all the treatments except in oviduct length where its values decreased with the level of PD in the diet and significant differences ($P<0.05$) were observed among the birds raised on 0 and 60% PD. The birds on 0% PD attained point of lay two weeks earlier than those on 60% PD. And there was a significant difference ($P<0.05$) between the birds on 0% PD and those on 60% PD diets in age at first lay. However, there was no significant difference among birds raised on diets with PD below 60% PD. Feed intake increased with the level of PD and there was a significant difference ($P0<0.05$) between those raised on 0 and 60% PD diets. Mortality was very low as only two birds were recorded dead in the 60% PD diet throughout the experimental period. It was concluded that PD can be used to replace blood meal in the diet of guinea fowl up to 40% without any adverse effect on its performance.

Key words: Guinea fowl, poultry droppings, replacement, performance

Introduction

Animal production in the tropics is adversely affected by high cost and inadequate feed supply (Raviundran *et al*., 1982). Feed contribute substantially to the cost of animal production and it is about 60% of total cost of production. The high cost of animal production results in low yield and high prices of its products in the market. This made them unaffordable by majority of consumers in Africa. This results in many nutritional problems emanating from low consumption of animal protein in this part of the world. The long term growth of animal production in Nigeria is dependent on a better utilization of farm waste products which attract little or no monetary values (Tewe, 1997). Therefore use of non-conventional feed ingredients is daily gaining ground in Africa. For instance, Agbede and Aletor (2003) reported that leucaena leaf concentrate can easily replace fish meal up to 25% without any adverse effect on performance, carcass characteristics, muscle development or hemoglobin and serum metabolites. Similarly, Awoniyi *et al*. (2003) reported that maggot meal could successfully replace blood meal in the diet of broilers without any adverse effects on performance. Similarly, Pesti and Fletcher (1993) reported that laying chicken can be reared intensively to improve production and that egg production can improve if fed on non conventional fee ingredients layers.

Nigeria is the highest producer of products in Africa. Poultry droppings are produced in large quantities in different poultry farms in the country. In fact, about 5000 tons of these products are produced annually in Nigerian poultry industries (Olusi and Agbasi, 2000). A continuous accumulation of this product is dangerous as it releases ammonia into the atmosphere thereby polluting the environment. Therefore, every process that will lead to a reduction in its accumulation in the environment should be encouraged. It is a very important source of non-protein nitrogen compound. It does not contain any anti nutritional substance (Biobaku, 1984) PD is a good source of protein and can compete favorably with any other protein source in animal diet (Douglas, 1990). Since, it is wasteful and risky to test new feed ingredients on livestock or human beings, the use of wild animals is a better alternative (Ajayi and Ayodele, 1995). When use of such ingredients has been confirmed safe, they can then be recommended for livestock use. Accordingly, in the past, wild animals such as primates, rodents and birds have been successfully

used in nutritional research. For instance, the Japanese quail had been found to tolerate many unconventional feed ingredients such as cassava leaf meal (Raviundran *et al.*, 1982).

Guinea fowl Numida meleagris is a wild bird found in the savanna forests of West Africa. Local farmers continuously hunt them for their meat and eggs, which provide a ready source of animal protein for the rural duelers. They scavenge around the farmsteads and villages for food scarps, worms and insects (Ayeni, 1980). Moreover in the wild, guinea fowl feeds on seeds, grasses and insects. Similarly, in south Africa, guinea fowl were found to feed on various kinds of leaves, fruits, seeds and insects, in the open field (Little *et al.*, 1995). It has a high capacity for egg laying and its meat yield compares favorably with those of domestic hen. However, little studies have been carried out on its nutrient requirement in captivity (Ayeni and Ajayi, 1983). The present study was conducted in the poultry producing areas of Nigeria to evaluate the nutritive value of PD, in guinea fowl diet with the hope that information obtained from this could be extrapolated to livestock production at low cost with the aim of increasing animal protein consumption by the populace.

Materials and Methods

Six hundreds guinea fowl pullets aged 5 weeks, were randomly divided into groups on average equal body weights. There were four experimental diets in which blood meal was replaced by Poultry droppings (PD) at 0, 20, 40 and 60%. There were three replicates. The birds were fed *ad libitum* throughout the experimental period. They were raised on deep litter system for twenty weeks for the growing phase. The deep litter floor was made of concrete and covered with wood shavings. The litters were changed every fortnight. The birds were weighed individually at the beginning of the experiment and every week thereafter, for twenty weeks at the growing phase. They were given all the necessary vaccination from day old. The drinkers and the feeding troughs were thoroughly washed daily. Feed intake was determined weekly using a weighing balance. Body weight changes were determined using a measuring scale. Mortality was recorded as they occurred.

At 10 weeks, 10 birds were randomly selected from each treatment, weighed and after being starved for 18 hours were killed by neck dislocation in the slaughter house. Each bird was plugged, visceral organs, head, and wings were removed. The carcasses were eviscerated to determine the dressing percentage, heart, kidney, and spleen weights. The length of the oviduct and intestine were determined by using a meter rule.

Moreover, 40 birds from each of the experimental diets were randomly selected and transferred into the layers house and raised in the battery cages (one bird per cage) for the laying phase experiment. They were fed the layers diet for 10 weeks. The following parameters were determined: age at first lay, percentage hen day production, egg weight, egg shell thickness, yolk colour. Egg weight was determined by using a measuring scale, while the egg shell thickness, and yolk colour were determined by using a micrometer screw gauge and Roche yolk colour fan respectively. The proximate analysis of the diet and the PD were carried out as per A.O.A.C. (1990).

The data were subjected to analysis of variance and significant differences among the means were determined using LSD test.

Results and Discussion

The determined crude protein content of PD is lower than that of blood meal (Table 1), but the value in PD is high enough to supply the needed protein requirement in animal diet. There was a significant difference ($P<0.05$) in feed intake with increase in the level of PD in the diet (Table 2). This might be due to the differences in the percentage crude protein content of the two ingredients which might have compelled the animals to eat more to meet their body protein requirement (Tewe, 1997). Body weight gain increased in all the treatments with age. At lower intake of PD, there was no significant difference in body weight among the treatments However there was a significant difference ($P<0.05$). Between the birds raise on 60% PD and those raised on 0% PD diet at the growing phase. This might imply that at high intake of PD, growth is partially impaired. In a similar study, Douglas (1990) reported significant differences in the body weight gain of broilers fed on ingredients of varying percentage crude protein levels. At the growing phase, there was no record of mortality in all the treatments except on the 60 PD diet at the 3rd week. When two birds were found dead in the morning. This is an indication that the consumption of PD is not seriously injurious to the birds. (Raviundran *et al.*, 1982).

Table 3 shows the result of the carcass parameters of the birds on the different treatments. Dressing percentage decreased with the level of PD in the diet. There was a significant difference ($P<0.05$) in dressing percentage between the birds on 0 and 60% PD diets. This was a reflection of the effects of the treatment on the birds (Adeyemo, 2000) The weight of the various tissues was directly related to the live weight of the birds. There was no significant difference in the weights of the internal organs among the treatments. This implies that the replacement of blood meal a conventional protein ingredient, did not adversely affect the birds, during the growing period. However, the significant difference ($P0<0.05$) observed in the liver size between birds on 0 and 60% PD diet is an indication that liver is affected, that is there was an atrophy of the liver at higher intake of PD and a further intake of the ingredient might result in death (Douglas, 1990).

Table 1: Composition and proximate Analysis of experimental Diets

Parameters	0%	20%	40%	60%
Maize	65.5	52.48	39.36	26.24
Palm kernel cake	25	20	18	28.4
Poultry droppings	0	1.6	3.2	4.8
Blood meal	8	6.4	4.8	3.2
Proximate analysis				
Dry matter	86.9	86.3	86.18	86.15
Crude protein	18.06	17.56	17.30	16.79
Ether extract	36.0	35.44	35.50	36.31
Crude fibre	11.10	11.36	11.60	11.89
Ash	14.61	14.23	14.15	14.07
Nitrogen free extract	20.74	21.85	21.95	20.83

Each diet had 0.8% oyster shell, 0.3% bone meal, 0.3% common salt.

Table 2: Performance of guinea fowl fed graded levels of (PD) during the growing phase

Parameters	0%	20%	40%	60%
Feed intake (kg)	5.28^{a}	5.49^{ab}	5.68^{bc}	6.04^{c}
Average body weight gain(g)	834^{a}	828^{a}	802^{ab}	775^{b}
Average feed gain ratio	2.56^{a}	2.33^{a}	2.75^{ab}	2.86^{b}
% Mortality	0	0	2	0

Mean bearing different superscripts are significantly different (P< 0.05) from each other.

Table 3: Effects of carcass parameters of guinea fowl fed varying levels PD

Parameters	0%	20%	40%	60%
Body live wt (Kg)	1.10^{a}	1.07^{a}	0.95^{b}	0.89^{b}
Dressing percentage (%)	87.4^{a}	86.9^{a}	86.7^{a}	85.6^{a}
Heart weight/kg live wt	3.87^{a}	3.63^{a}	3.55^{a}	3.33^{a}
Spleen weight/kg live wt (g)	1.97^{a}	1.75^{a}	1.46^{a}	1.39^{a}
Empty gizzard wt (kg) live wt	22.45^{a}	21.79^{a}	21.05^{a}	20.91^{b}
Liver wt g/kg live wt	21.88^{a}	20.77^{a}	20.21^{a}	20.06^{a}
Abdominal fat g /kg live wt	20.12^{a}	20.34^{a}	20.52^{a}	20.63^{a}
Small intestine (cm)	125.22^{a}	124.45^{a}	124.28^{a}	123.19^{a}
Oviduct length (cm)	9.88^{a}	9.66^{a}	8.65^{b}	8.54^{b}
Kidney g/kg live wt	4.06^{a}	4.06^{a}	2.05^{a}	4.03^{a}

Means bearing different superscripts within a row are significantly different(P<0.05) from other.

Table 4: Performance of guinea fowl Fed varying levels of PD at laying phase

Parameters	0%	20%	40%	60%
Age at first lay (day)	164^{a}	164^{a}	167^{ab}	171^{ab}
Feed intake (Kg)	9.01^{a}	9.01^{a}	8.99^{ab}	8.67^{b}
Percentage hen day production	65.4^{a}	65.02^{a}	63.62^{ab}	60.72^{b}
Egg weight (g)	58.7^{a}	56.3^{a}	56.5^{a}	56.1^{a}
Egg shell thickness (mm)	0.30^{a}	0.30^{a}	0.30^{a}	0.30^{a}
Yolk colour	6.25^{a}	6.25^{a}	6.25^{a}	6.25^{a}

Means bearing different superscript n the same row are significantly different (P<0.05) from each other.

There was a gradual decrease in oviduct length with increase intake of PD the diets in, however there was no significant difference except on the 60% PD where there was a significant difference (P<0.05) between the birds on this and those raised on 0% PD diet. Oviduct is an important organ in egg formation therefore, the significant differences observed at 60% level of PD substitution is an indication that egg production might be adversely affected as from this level (Thomas, 1998). At the laying phase, feed intake followed the same order as recorded in the growing phase. Puberty becomes apparent in a female bird when it lays its first egg (Cowan and Michie, 1983). Sexual maturity or puberty was slightly delayed with the level of PD intake by the birds. This was not affected up to the 40% PD. It took birds on 60% PD extra 12 days after those on 0% PD to

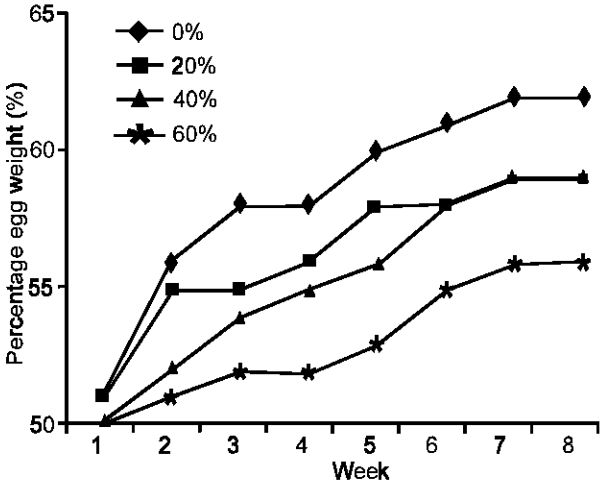

Fig. 1: Effect of varying levels of poultry droppings on percentage egg weight of guinea fowl

produce their first egg. A delay in sexual maturity might be an indication that the level of protein supplied by the PD was too low to support an early development of reproductive organs in the birds (Adeyemo, 2000). Values for yolk colour, egg weight, and egg shell thickness, followed the same order in all the diets as there was no significant difference among the treatments. This implies that PD substitution does not seriously affect the yolk colour, weight, and the thickness of the egg of guinea fowl (Tewe and Egbunike, 1992).

The general rise in percentage hen day production with age is an indication that efficiency in egg production is directly affected by age of the hen (Cowan and Michie, 1983). The overall result of this study is that PD can replace blood meal in the diets of guinea fowl up to 40% level of substitution without any adverse effect on its performance. Further increase in PD intake might be injurious to the birds as it adversely affects some vital organs and reduce its productivity.

Fig. 1 shows the graphical representation of egg weight with age. It was apparent that egg weight increased with age in all the dietary treatments. This is expected with egg production, the oviduct becomes bigger and more efficient with age and this results in a correspondent increase in egg production. However, this process might be reversed at old age (Olusi and Agbasi, 2000).

IT was concluded that poultry droppings (PD) could be used as a protein source in animal diet in place of blood meal which is rather very expensive and scarce, at moderate levels as a means of reducing cost in animal production for human consumption.

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