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**SECURING ANIMAL  
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GLOBAL CHALLENGES****PRELIMINARY OBSERVATION ON RABBIT'S RESPONSE TO DIET CONTAINING POULTRY WASTE BIOSLURRY**

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**ABSTRACT**

*The study was conducted to determine rabbit's response to diets containing poultry waste bioslurry. Thirty-six growing rabbits of mixed breeds were allotted to 6 groups (T1-T6) in a completely randomized design with 2 replicates of 3 animals in each treatment. Animals in T1 served as the blank control while T6 served as the positive control. For seven weeks animals in T1 – T5 were fed experimental diets that contained 0, 5, 10, 20 and 40% of dried bioslurry, respectively, while those in T6 were fed commercial diet. The result showed that final body weight, total feed intake, average daily gain and feed conversion ratio of rabbits decreased as the inclusion level of dried bioslurry increased. The PCV was not significantly ( $P < 0.05$ ) affected by the diet but the WBC was significantly higher in rabbits fed the 20 % level of bioslurry. The same group also had the lowest RBC value. The study confirmed the potential suitability of poultry waste bioslurry as feed ingredient for rabbits, possibly up to 20 % level of inclusion..*

**Key words:** Bioslurry, Rabbits, Growth performance, Haematology.

**INTRODUCTION**

The ever increasing cost of conventional feedstuffs is adversely affecting commercial rabbit production in Nigeria. This necessitates sourcing for diverse alternative feedstuffs that are not in competition with human as food. Luckily, the post-gastric digestion in rabbit enables them to utilize wide range of feed resources (Onifade *et al.*, 1999). However such feedstuff must support the growth of the animals without any negative health implication. Biogas and bioslurry are outputs of anaerobic degradation of bio-materials such as crop residue, animal or human waste (Groot and Brogdansk, 2013). Although, bioslurry has been used mainly as organic fertilizer for crop production, its potential as animal feed ingredient has also been reported (Wang *et al.*, 2008; Zhang *et al.*, 2009). This study therefore, examined the effects of dietary inclusion of bioslurry produced by anaerobic biodegradation of fresh poultry faecal wastes, on the growth and health status of growing rabbits. The overall aim of the study was to turn wet poultry faeces into feed ingredient as a sustainable, economic and environmentally friendly way to dispose the large quantities of poultry faeces produced daily on commercial poultry farms in the country.

**MATERIALS AND METHODS**

The study was carried out at the Rabbit unit of the Teaching and Research Farm of Obafemi Awolowo University, Ile Ife, Nigeria. Thirty-six growing rabbits of mixed breeds with weights range of 0.85 -1.70 kg were randomly allotted into 6 treatment groups (T1-T6) to balance the liveweights. T1 served as the blank control while T6 served as the positive control, whereas T2 – T5 contained the Dry Poultry-waste Bioslurry (DPB) in geometrical proportion. Each treatment contained 6 animals in two replicates of 3 animals housed together in galvanized iron cubicles provided with concrete feeders and nipple drinkers.

Bioslurry obtained from biodigester fed with wet untreated poultry droppings was sun dried for about 5 days to obtain the Dry Poultry-waste Bioslurry (DPB), which was then analyzed for proximate nutrient composition. Five standard rabbit grower rations (T1-T5) containing 0, 5, 10, 20 and 40 percent DPB, respectively, were formulated (Table 1) while the rabbits in T6 were fed commercial grower diet (CGD). The formulated diets were pelletized (T5 proved very difficult to pelletize as a result of the high inclusion level of DPB). Feeding trial lasted for eight weeks but was preceded by one week during which the animals were adapted to the cages and control diet (T1). Each diet was offered in excess of daily requirement while drinking water flowed continuously from the nipple drinkers.



Feed intake and body weight gains were monitored on weekly basis. In the last week of the study, blood samples were collected through the ear vein from four randomly selected animals from each treatment into tubes coated with ethylene diamine tetra-acetic acid (EDTA) for haematological analysis (Packed Cell Volume PCV, Erythrocyte count RBC and Leukocyte count WBC). Data collected by weighing (feed intake and liveweight), analysis (PCV, RBC and WBC), and calculation (Feed conversion ratio, FCR and Average daily weight gain, ADG) were subjected to Analysis of Variance procedure and the means separated by Duncan Multiple Range Test of SAS, 2003.

Table 1: Percentage composition of experimental diets

| Ingredient                         | 0%<br>DPB<br>(T1) | 5%<br>DPB<br>(T2) | 10%<br>DPB<br>(T3) | 20%<br>DPB<br>(T4) | 40%<br>DPB<br>(T5) | CGD (T6)                                      |
|------------------------------------|-------------------|-------------------|--------------------|--------------------|--------------------|-----------------------------------------------|
| Maize                              | 10                | 10                | 10                 | 10                 | 10                 | Commercial feed with ingredients not provided |
| Groundnut cake                     | 10                | 10                | 8                  | 8                  | 8                  |                                               |
| Palm kernel cake                   | 68                | 63                | 60                 | 52                 | 30                 |                                               |
| Wheat offal                        | 10                | 10                | 10                 | 8                  | 10                 |                                               |
| Poultry Bioslurry                  | 0                 | 5                 | 10                 | 20                 | 40                 |                                               |
| Limestone                          | 0.7               | 0.7               | 0.7                | 0.7                | 0.7                |                                               |
| G. premix                          | 0.5               | 0.5               | 0.5                | 0.5                | 0.5                |                                               |
| Lysine                             | 0.25              | 0.25              | 0.25               | 0.25               | 0.25               |                                               |
| Methionine                         | 0.25              | 0.25              | 0.25               | 0.25               | 0.25               |                                               |
| Salt                               | 0.3               | 0.3               | 0.3                | 0.3                | 0.3                |                                               |
| Total                              | 100.0             | 100.0             | 100.0              | 100.0              | 100.0              |                                               |
| <b>Calculated Nutrient values:</b> |                   |                   |                    |                    |                    |                                               |
| Crude Protein (%)                  | 19.25             | 19.09             | 18.4               | 18.12              | 17.50              | 15-16                                         |
| Crude Fibre (%)                    | 9.71              | 9.31              | 9.05               | 8.32               | 6.65               | 5-6                                           |

DPB – Dry Poultry-waste Bioslurry; CGD – Commercial grower diet.

## RESULTS AND DISCUSSION

Table 2 shows that there was significant difference ( $P < 0.05$ ) in the final weight, average daily gain, total feed intake and feed conversion ratio between rabbits fed different inclusion level of DPB in the diets. The rabbits on blank control diet had the highest final body weight, although similar to positive control, 5% and 10% DPB groups. Body weight and daily weight gain were significantly reduced in the groups fed 20 and 40 % DPB diets, which was accompanied by reduced feed intake in these groups. Expectedly, these groups also had the poorest FCR. The low final body weight and average daily gain of the rabbits on 40% DPB may be partly explained by the slightly lower crude protein and fibre in the diet. The crude protein levels recommended for growing rabbits is 18-20% while the crude fibre is 10-12% (Omole and Onwudike, 1982). The crude protein and fibre content of a feed determines its nutritive value by influencing the proportion of chemically available nutrients for animal growth when consumed. Low fibre diets predispose rabbits to caecal-colonic hypomotility and diarrhea due to proliferation of pathogens because of carbohydrate overload of the hindgut (Lebas *et al.*, 1984). In the course of this study, rabbits on 40% DPB showed signs of diarrhea which was not seen in rabbits of other groups. Similarly, Zhang *et al.* (2009) also reported diarrhea in piglets due to increased level of bioslurry in their diet. However rabbits fed CGD with similarly low crude fibre performed well like 0% DPB. This tends to point attention to other possible reason(s) for the poor performance of 40% DPB group. We assumed low feed intake could be caused by poor palatability and possibly high microorganism load. However these assumption require confirmation from further studies



It is important to state that the average daily gain obtained in rabbit fed 5 and 10% DPB diets (12.86 and 11.43 g/d, respectively) were similar to 11.27 - 14.18 g/d by Onimisi and Omege (2006) and 11.0 -16.0 g/d by Ogunsipe (2014), who fed graded levels of poultry litter (not bioslurry) to growing rabbits.

Table 2: Growth parameters of growing rabbit fed varying inclusion levels of DPB over 8 week period

| Parameters               | 0%DPB               | 5%DPB               | 10%DPB              | 20%DPB             | 40%DPB             | CGD                | SEM   | P value |
|--------------------------|---------------------|---------------------|---------------------|--------------------|--------------------|--------------------|-------|---------|
| Initial Body Weight (kg) | 1.18                | 1.16                | 1.12                | 1.25               | 1.10               | 1.06               | 0.041 | 0.088   |
| Final Body Weight (kg)   | 2.05 <sup>a</sup>   | 1.90 <sup>ab</sup>  | 1.86 <sup>ab</sup>  | 1.62 <sup>bc</sup> | 1.42 <sup>c</sup>  | 1.91 <sup>ab</sup> | 0.060 | 0.004   |
| Total Feed Intake (kg)   | 4.41 <sup>ab</sup>  | 4.62 <sup>ab</sup>  | 5.18 <sup>a</sup>   | 4.06 <sup>bc</sup> | 3.55 <sup>c</sup>  | 5.36 <sup>a</sup>  | 0.022 | 0.0079  |
| Av. Daily Gain (g)       | 15.71 <sup>ab</sup> | 12.86 <sup>ab</sup> | 11.43 <sup>ab</sup> | 8.57 <sup>bc</sup> | 7.14 <sup>c</sup>  | 17.14 <sup>a</sup> | 0.007 | 0.0283  |
| Feed Conversion Ratio    | 6.82 <sup>b</sup>   | 8.57 <sup>ab</sup>  | 11.61 <sup>a</sup>  | 13.57 <sup>a</sup> | 13.12 <sup>a</sup> | 6.25 <sup>b</sup>  | 0.971 | 0.0384  |
| Mortality                | 0                   | 0                   | 0                   | 2                  | 0                  | 0                  | -     | -       |

<sup>a, b, c</sup> Means in a row with common superscript do not differ ( $P > 0.05$ ); CGD – Commercial grower diet; SEM - Standard Error of Mean

Table 3: Haematological parameters of growing rabbits after 7 weeks of feeding trial with DPB

| Parameters                                      | 0%DPB             | 5%DPB              | 10%DPB             | 20%DPB            | 40%DPB             | CGD               | SEM  | P value |
|-------------------------------------------------|-------------------|--------------------|--------------------|-------------------|--------------------|-------------------|------|---------|
| Packed cell volume (%)                          | 32.3 <sup>a</sup> | 32.8 <sup>a</sup>  | 31.5 <sup>a</sup>  | 30.3 <sup>a</sup> | 34.8 <sup>a</sup>  | 30.5 <sup>a</sup> | 1.00 | 0.031   |
| Red blood cell ( $\times 10^6/\text{mm}^3$ )    | 6.10 <sup>a</sup> | 4.25 <sup>ab</sup> | 5.20 <sup>ab</sup> | 3.60 <sup>b</sup> | 5.45 <sup>ab</sup> | 6.10 <sup>a</sup> | 0.30 | 0.063   |
| White blood cells ( $\times 10^3/\text{mm}^3$ ) | 2.75 <sup>b</sup> | 2.90 <sup>b</sup>  | 3.55 <sup>b</sup>  | 6.30 <sup>a</sup> | 2.43 <sup>b</sup>  | 2.75 <sup>b</sup> | 0.39 | 0.021   |

<sup>a, b, c</sup> Means in a row with common superscript do not differ ( $P > 0.05$ ); CGD – Commercial grower diet; SEM - Standard Error of Mean

Data on the haematological parameters as presented in Table 3 show there was no significant difference ( $p > 0.05$ ) in the PCV among rabbits in the different treatment groups. However RBC tended to be higher in the blank and positive control groups while WBC was significantly higher in the 20% DPB compared to the other treatments. Although the haematological values obtained in this study fell within the normal ranges quoted for rabbits (PCV, 30-50%; RBC,  $4.0\text{--}8.6 \times 10^6/\text{mm}^3$ ; WBC,  $2.5\text{--}12.5 \times 10^3/\text{mm}^3$ ) by Mitruka and Rawnsley (1977) and Isaac *et al.* (2013), it may be assumed that DPB has a potential to inhibit erythropoiesis while also inducing leukocytosis in the rabbits. It was noted that the 20% DPB group with elevated WBC also recorded two mortalities. The white blood cell primarily defends the body against invasion by foreign organisms; when animals have WBC below the standard values or high counts above the standard values, it is an indication of the presence of exogenous substances and foreign bodies (Jenkins, 2008).

## CONCLUSION

The results obtained in this study indicate that poultry waste bioslurry can be included in rabbit's diets without any deleterious effect, expectedly up to 20% level of inclusion. However it is strongly suggested that further studies need to be carried out on the microbial level of the dry bioslurry to confirm its safety status.

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