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### Blood Profile of West African Dwarf Goat Fed Graded Levels of Dried Poultry Waste in Fermented Cassava Peel Based Diet

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#### Abstract

The blood profiles of West African Dwarf (WAD) goats fed graded levels of dried poultry waste (DPW) in fermented cassava peel meal based diets were evaluated. Four diets designated A, B, C, and D were formulated to contain 0, 10, 20, and 30% DPW respectively. The diets were offered to the WAD goats in a 4×4 Latin square design during a 28-day feeding trial. Result obtained from the study shows that the Dry matter (%) and crude protein of the diets were 90.27, 19.71%; 90.22, 19.81%, 89.54; 20.47% and 89.37; 22.4% respectively for A, B, C and D while the metabolizable energy were 1.59, 1.54, 1.49 and 1.51 MJ/kgDM. Average feed intakes (kg/d) were statically ( $p < 0.05$ ) significant for the four diets. Diets A, B, C, and D recorded 0.87 (kg/d, 0.84, 0.88 and 1.25kg/dl respectively. The PCV, WBC, MCV, MCHC, were statically ( $p < 0.05$ ) influenced ( $p < 0.05$ ) influenced by the dietary treatments while Hb, RBC, and MCH, were unaffected statically ( $P > 0.05$ ). Apart from the blood urea (mg/dl) values, all the other serum biochemical components varied statically ( $p > 0.05$ ). Total protein (g/dl) values were; 4.20g/dl, 5.10g/dl, 4.58g/dl, 4.39g/dl, and Globulin values were; 2.40g/dl, 3.19g/dl, 2.44g/dl and 4.25g/dl respectively for diets A, B, C, and D. It was observed from this result that the addition of DPW in FCP based diets did not have any negative effect on both the blood profiles evaluated and the health of the WAD goats; hence these feed resources should be harnessed for efficient goat production.

**Keywords:** Goat, poultry waste, cassava peel, blood profile

#### Introduction

Majority of the population of Nigeria live in rural areas (Farinu, 2009), with varying degrees of poverty. This problem has generally been attributed to a shortage of animal protein products which is responsible for the existing high price of animal products making them out of reach to an average Nigerian. One of the ways of solving this problem is by directing efforts at promoting and encouraging production and products of prolific, indigenous animal species (Ahamefule and Ibeawuchi, 2005).

Nutrition has been identified as one of the major factors responsible for poor performance of this indigenous breed (Adamu *et al.*, 2010, Garba *et al.*, 2010). The animals are exposed to severe nutritional stress especially during the dry season when forage is scarce and of low quality (Lamido *et al.*, 2010). This leads to weight loss, mortality, decreased reproductive performance and kid mortality (Ahamefule, 2005) and as a result reflected on the quality and quantity of animal protein available for human consumption. Although poultry waste is mainly used as a fertilizer, it has been shown to be a potential source of both nitrogen and energy for ruminants in providing low-cost feed components.

The use of poultry waste in feeding ruminant livestock decreases the cost of feeding and also minimizes the effects of its contribution to environmental pollution in areas of intensive poultry production. More importantly, it solves partially the shortage of the animals' requirement of protein and/or energy during the dry season. Poultry waste is a rich source of nitrogen (Jordan, 2004; Ndubueze, 2004; Lanyasunya *et al.*, 2006). Except for research purposes, its uses in practical cattle and sheep and goat production in Nigeria is still not commonplace (Belewu and Adeneye, 1996; Ibeawuchi *et al.*, 1993, Adebawale and Taiwo, 1990; Ndubueze, 2004).

In this study, the blood profiles of West African Dwarf (WAD) goats fed graded levels of dried poultry waste in fermented cassava peel meal based diets were evaluated.

#### Materials and Methods

The experiment was carried out at the Sheep and Goat Unit of Teaching and Research Farm of Michael Okpara University of Agriculture, Umudike, Abia state, Nigeria. A total of four (4) West African goats all bucks aged 1-2 years with the average weight of 8kg was selected from the sheep and goat unit of the Teaching and Research Farm, Michael Okpara University of Agriculture, Umudike. The management system was intensive

wherein each buck was housed in separate metabolic cages. Each of the animals received one of four treatment diets (shown in table 1) in a 4 x 4 Latin square design. The experiment lasted for four periods. Each of the periods lasted for 7 days. Diet A served as the control, while the other diets differed from the control in having different levels of DPW and FCP.

Haematological and serum constituents measured are:packed cell volume,haemoglobin,Red blood cell, white blood cell, mean corpuscular volume, mean corpuscular haemoglobin,Red Blood Cell,MeanCorpsucularvolume,Mean corpuscular Heamoglobin,Mean Corpuscular haemogloin concentration, blood urea nitrogen, creatinine, albumin, globulin and the bilirubin (TB, DB).The data obtained were subjected to analysis of variance (ANOVA) according to Steel and Torrie (1980) and the difference between means separated using Duncan (1955).

Table 1: Composition of Experimental Diet

| Ingredient %   | A (Control) | B     | C     | D     |
|----------------|-------------|-------|-------|-------|
| FCP            | 56.5        | 53.5  | 45.5  | 33.5  |
| DPW            | 0.0         | 10.0  | 20.0  | 30.0  |
| PKC            | 35.0        | 28.0  | 28.0  | 28.0  |
| Molasses       | 5.0         | 5.0   | 5.0   | 5.0   |
| Bone Meal      | 2.5         | 2.5   | 2.5   | 2.5   |
| Common Salt    | 1.0         | 1.0   | 1.0   | 1.0   |
| Total          | 100         | 100   | 100   | 100   |
| Crude Protein  | 19.71       | 19.81 | 20.47 | 22.41 |
| *ME (Mj/Kg DM) | 1.59        | 1.54  | 1.49  | 1.51  |
| Dry Matter     | 90.27       | 90.22 | 89.54 | 89.37 |

FCP= Fermented cassava peel, DPW= Dried poultry waste, PKC= Palm kernel cake, \*ME=Calculated metabolizable energy ( $ME = 0.0226CP + 0.0407EE + 0.0192CF + 0.0177NFE$ , where: CP=crude protein, EE=ether extract, CF=crude fibre, NFE=Nitrogen Free Extract).

## Results and Discussion

Table 2 shows the haematological and biochemical values gotten from goats fed experimental diets. The PCV, WBC, MCV, MCHC, were statically ( $p < 0.05$ ) influenced by the dietary treatments while Hb, RBC, and MCH, were unaffected statically ( $p > 0.05$ ). Apart from the blood urea (mg/dl) values, all the other serum biochemical components varied statically ( $p < 0.05$ ) Mean Corpuscular Volume (MCV) differed significantly ( $p < 0.05$ ) among treatment diets. Diet A and D were similar ( $p > 0.05$ ) whereas A, differed ( $p < 0.05$ ) significantly from diet B. where B varied statistically ( $p < 0.05$ ) from C. The mean values obtained in this study fell within the range of 27.22-32.02  $\mu m^3$  reported for goats by Marck (1979). The mean value (29.37 $\mu m^3$ ) in this study is higher than 3.57 $\mu^3$  reported by Addasset *et al.* (2010). The result of the study had shown that the experimental diet had no adverse effect on the MCV. Elevation in MCV is an indication of macrocytic (regenerative) anaemia emanating from increased destruction and subsequently enhanced erythropoietin of liver, spleen and kidneys. Mean corpuscular haemoglobin concentration (MCHC) values obtained in this study differed significantly ( $p < 0.05$ ) among treatment diets. Diet C (20% DPW) with the highest MCHC value (28.15mg/dl) differed significantly ( $p < 0.05$ ) from other treatment groups.

The control diet (A) recorded the least value (20.00mg/dl) and was similar ( $p > 0.05$ ) to diet B (22.05mg/dl). The MCHC values in this study range between 20.00-28.18mg/dl. These values were within the normal range of 30.0-36% for goats (Swenson, 1977) and 32.0-36% reported for WAD goats (Daramola *et al.*, 2005). Total protein in this study differed significantly ( $p > 0.05$ ) among the treatment diets. Diet B (10% DPW) recorded the highest total protein (8.37g/dl) and was similar ( $p > 0.05$ ) to diet D (30% DPW) which had the value of 8.15 g/dl. While diets C and D are similar ( $p > 0.05$ ), diet A differed ( $p < 0.05$ ) from the rest of the diet. Values gotten are within the normal range of 6.3-8.5g/100 ml reported for WAD goats (Daramola *et al.*, 2003). The values obtained in this study is an indication that the protein in the diets was well utilized and retained in the animal's body (Akinola and Abiola, 1999; Esonu *et al.*, 2001;Ukpabi, 2007).

Table 2: Haematological and serum biochemical values of WAD goats fed dried poultry waste (DPW) in fermented cassava peel based diets (FCPBD).

| Parameters                        | Diets               |                     |                    |                     |      |
|-----------------------------------|---------------------|---------------------|--------------------|---------------------|------|
| Hematological                     | A                   | B                   | C                  | D                   | SEM  |
| PCV (%)                           | 28.00 <sup>c</sup>  | 39.00 <sup>a</sup>  | 27.00 <sup>c</sup> | 33.00 <sup>b</sup>  | 0.91 |
| Hb (g/dl)                         | 5.60 <sup>b</sup>   | 8.60 <sup>a</sup>   | 7.60 <sup>b</sup>  | 7.83 <sup>b</sup>   | 0.92 |
| WBC ( $\times 10^3/\mu\text{l}$ ) | 10.00 <sup>a</sup>  | 11.38 <sup>a</sup>  | 10.00 <sup>a</sup> | 6.40 <sup>b</sup>   | 0.91 |
| RBC ( $\times 10^6/\text{ml}$ )   | 10.06               | 12.18               | 9.92               | 10.86               | 0.92 |
| MCV (FL)                          | 27.83 <sup>bc</sup> | 32.02 <sup>a</sup>  | 27.22 <sup>c</sup> | 30.39 <sup>ab</sup> | 0.92 |
| MCH (Pg)                          | 5.57                | 7.06                | 7.66               | 7.27                | 0.92 |
| MCHC (g/dl)                       | 20.00 <sup>c</sup>  | 22.05 <sup>bc</sup> | 28.15 <sup>a</sup> | 23.94 <sup>b</sup>  | 0.92 |
| Serum Biochemical                 |                     |                     |                    |                     |      |
| Total protein (g/dl)              | 6.57 <sup>c</sup>   | 8.37 <sup>a</sup>   | 7.48 <sup>b</sup>  | 8.15 <sup>ab</sup>  | 0.30 |
| Albumin (g/dl)                    | 4.20 <sup>b</sup>   | 5.10 <sup>a</sup>   | 4.58 <sup>ab</sup> | 4.39 <sup>ab</sup>  | 0.30 |
| Globulin (g/dl)                   | 2.40 <sup>c</sup>   | 3.19 <sup>b</sup>   | 2.44 <sup>c</sup>  | 4.25 <sup>a</sup>   | 0.10 |
| Creatinine (mg/dl)                | 0.92 <sup>b</sup>   | 1.27 <sup>a</sup>   | 1.04 <sup>ab</sup> | 1.20 <sup>a</sup>   | 0.03 |
| Urea (mg/dl)                      | 17.47               | 16.69               | 19.49              | 17.22               | 1.20 |
| Glucose (mg/dl)                   | 46.00 <sup>c</sup>  | 59.33 <sup>b</sup>  | 49.00 <sup>c</sup> | 73.33 <sup>a</sup>  | 1.84 |
| Total bilirubin (mg/dl)           | 0.55 <sup>a</sup>   | 0.46 <sup>b</sup>   | 0.47 <sup>b</sup>  | 0.54 <sup>ab</sup>  | 0.02 |
| Direct bilirubin (mg/dl)          | 0.24                | 0.28 <sup>a</sup>   | 0.27 <sup>ab</sup> | 0.22 <sup>b</sup>   | 0.01 |

<sup>abc</sup>Means on the same row with different superscripts differ significantly ( $p < 0.05$ ) MCV=Mean corpuscular volume, MCH= Meancorpuscular hemoglobin, MCHC= Mean corpuscular hemoglobin concentration.

### Conclusion and Recommendation

Result obtained from the study showed that the inclusion of Dry Poultry Waste (DPW) in fermented cassava meal (FCPM) based diets did not have negative effects on the blood profile of WAD goats and on the health status of the goats. As the level of inclusion of DPW in fermented cassava peel meal (FCPM) based diets increased, the nutrient constituents of the diets improved, thereby providing the animal with the essential nutrient elements that enhanced their performance in terms of the haematological and serum biochemical parameters evaluated.

Given the fact that DPW as a feed resource is readily available and the fermentation process cassava peels were subjected to must have reduced potential toxins in the raw peels of cassava, it is therefore advocated to harness these feed resources for improved goat production.

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