# HAEMATOLOGY AND SERUM CHEMISTRY OF GROWING PIGS FED CASSAVA PEEL-MEAL BASED DIET SUPPLEMENTED WITH GARLIC POWDER

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**Abstract**

*This study was carried out to determine the haematology and serum chemistry of growing pigs fed diets supplemented with garlic powder. Twenty four (24) growing pigs of average weight of 17.41kg were randomly allotted to three treatments comprising of 0.0, 2.5 and 5.0g/kg dietary inclusion of garlic powder. Each treatment was replicated four times and contained 2 pigs per replicate. Blood sample (5ml) was collected from one pig in each replicate per treatment via the jugular vein puncture using sterilized needle and syringe. Equal half of each sample was emptied into 2 different sets of bottles. One containing Ethylene Diamine Tetracetic Acid (EDTA) anticoagulant to determine haemoglobin (Hb), red blood cells (RBC), packed cell volume (PCV) and white blood cells (WBC) contents while the other without anticoagulant for serum biochemical parameters (serum protein, globulin, albumin, creatinine and urea). Data obtained were analysed using ANOVA. Result revealed that inclusion of garlic powder had no influence (P>0.05) on Hb, RBC, PCV and WBC contents of growing pigs. Result also indicated that inclusion of garlic powder had no significant (P>0.05) influence on total protein, albumin, globulin, creatinine and urea of growing pigs. The study concluded that garlic could be included in the diets of growing pigs without any detrimental effect on general wellbeing of pigs.*

**Keywords:** pig, garlic, haematology, serum chemistry

## Introdction

Feed is the most important factor that influences the profit of a swine enterprise. To obtain satisfactory performance, pig must be supplied with all the feed nutrient essential for its well-being and like other farm animals, require energy, protein, mineral, vitamin and water (Eusebio, 1980). Feed cost constitutes large percentage of the cost of raising livestock especially monogastrics (pigs and poultry in particular) because of the nature of their digestive system and their nutrient requirements. Meanwhile, the major feed ingredients are often scarce and very expensive. In Nigeria today, production of feed for livestock including pigs has not been encouraged due to inadequate supply of feedstuff at moderate and affordable prices. Nonetheless, agro-based by-products such as plantain and cassava peels amongst others are being explored as alternatives to the expensive conventional feed ingredients.

Cassava peel is readily available in countries where cassava is cultivated and processed into food for man. It accounts for between 10% and 13% of tuber by weight (Tewe, 2004) and contains about 5 – 5.98% crude protein (Tewe and Kasali, 1986). The limitation on the use of cassava peel in swine diet formulation include its high fibre content, reduced feed intake and an appreciable content of an anti-nutritional factor, specifically hydrocyanic acid-HCN (Salami, 1999, Salami and Odunsi, 2003; Tewe, 2004). However, Oladunjoye *et al*, (2010) reported several processing methods to enhance the feeding value while Onyimonyi and Omeje (2013) reported the use of non-antibiotics feed additives such as turmeric, ginger, garlic etc. Similarly, there is a paradigm shift from antibiotic to use of probiotics and herbal remedies that equally promote growth with no consequent effect on humans (Onyimonyi and Omeje, 2013). Garlic (*Allium sativum*) has been shown to increase feed palatability and intake and engender growth which has been determined through many direct and indirect assessments, aside from its antimicrobial activities (Horton *et al*., 1991; Reuter *et al*., 1996; Adibmoradi *et al*., 2006). Use of blood profile as indirect form of assessment of feedstuff utilization has been widely acknowledged (Duncan and Prasse, 1986; Igene and Arijeniwa, 2004; Adeyemo, 2006; Adepoju and Odubena, 2009).

There is a paucity of information on the use of cassava peel supplemented with garlic in pig production. This study therefore sought to determine the effect of dietary garlic on growth performance of growing pigs fed cassava peel

meal based diets.

**Materials and Methods**

The study was conducted at the piggery unit of the Directorate of University Farms (DUFARMS), Federal University of Agriculture Abeokuta, Ogun state, Nigeria. Three (3) experimental diets were formulated with garlic powder supplementation at 0.00, 2.50 and 5.0g/kg diet as indicated in Table 1. Twenty-four (24) pigs with average weight of 17.41kg were randomly allotted to the experimental diets on a basis of 4 replicates per diet and 2 pigs per replicate. The pigs were fed *ad libitum*. Fresh clean water was supplied throughout the 8-week feeding period. All recommended medications were administered as at when due.

At the end of the feeding period, blood sample (5ml) was collected from one pig per replicate per treatment via the jugular vein puncture using sterilized needle and syringe. Each sample was emptied into 2 sets of bottles with or without Ethylene Diamine Tetracetic Acid (EDTA) anticoagulant for haematological and serum chemical parameters, respectively. Haematological parameters determined were haemoglobin (Hb), red blood cells (RBC), packed cell volume (PCV) and white blood cells (WBC) contents while the serum chemical parameters were serum protein, globulin, albumin, creatinine and urea using standard procedures. Data obtained were analysed using ANOVA. Significant means were separated using Duncan Multiple Range Test as contained in SAS (2002).

**Results and Discussion**

The results of garlic supplementation on haematology of pigs are presented in Tables 2. Dietary garlic supplementation had no influence ($P>0.05$) on the Hb, RBC, PCV and WBC of pigs fed diets supplemented with garlic powder. The PCV ranged, though insignificantly ($P>0.05$), from 31.00% for pigs on diet without garlic supplementation to 34.33% for pigs on diets with 5g/kg garlic supplementation. Variations observed in the values across the treatments are therefore not traceable to garlic supplementation. The PCV values were within the range of 26 - 43% given by Duncan and Prasse (1986). The RBC values ranged from $5.30 - 5.73 \times 10^{12}$/l, the white blood cell (WBC) values ranged between 9.93 and $10.60 \times 10^{9}$/l while the haemoglobin values were between 10.33 and 11.44g/dl. These results are similar to those obtained by Onyimonyi and Omeje (2013) who reported no significant variations in the PVC, RBC, WBC and Hb of growing pigs on supplemental levels of 100g and 200g garlic/100kg diet.

The result of the serum chemistry of pigs fed cassava peel based diet supplemented garlic powder is also shown in Table 2. The serum total protein of the pigs ranged from 6.47 – 7.01mg/dl with no significant ($P>0.05$) variation. The report of Boyd (1984) which indicated that normal range of serum protein from 5.8 to 8.3mg/dl gave credence to this result. Serum albumin of the pigs ranged ($P>0.05$) from 3.33 to 3.93(mg/dl), all within the normal range of 2.3 – 4mg/dl (Boyd, 1984) and 2.26 to 4.04mg/dl (Merck, 1998). However, Marieb and Hoehn (2007) reported the normal concentration of albumin to be 2.10-3.45g/d1. This result is in tandem with the report of Bush, (1991) that albumin accounts for 35 to 50% of the total protein. Albumin plays an important role in maintaining the homeostasis within the body and also facilitates transport of substances as well as helps in detoxifying and inactivating toxic materials in the animal's body (Coles, 1986). Therefore inclusion of garlic helps maintain homeostasis in pigs.

Values for globulin of the pigs ranged from 3.13 to 3.23mg/dl. This agrees with the view of Marieb and Hoehn (2007) that normal globulin value should be between 2 and 3.5g/d1. However, according to Merck (1998), the normal range between 3.95 and 6.00mg/dl. Meanwhile, globulin serves as antibodies and transport substances in the blood and is primarily involved in defense mechanism of the body and high levels cause advanced liver disease and a number of multiple chronic infections (Marieb and Hoehn, 2007). This result is a pointer to the fact that the animals could be free of liver and multiple chronic infections and have strong immunity. Therefore, cassava peel with or without garlic supplementation could be fed to pigs.

Values recorded for creatinine were between 0.83 to 1.07mg/dl. Normal serum creatinine ranges from 0.66 – 4.89mg/dl (Boyd, 1984). Creatine is a chemical waste molecule that is generated from muscle metabolism and shows quality of the diet. High creatinine could result from impairment of protein utilization and as an indirect measure of protein inadequacy in animals could indicate muscle wastage. The experimental diets could therefore be adjudged to be of good quality.

Pigs' serum urea was also not significantly ($P>0.05$) influenced by dietary garlic supplementation though it ranged from 9.40 to 10.20mg/dl. Urea serves an important role in the

metabolism of nitrogen containing compounds by animals and is the main nitrogen containing substance in the urine of animals. High levels of urea could mean that the kidney is not functioning properly while low values are less frequent and it could be due to low protein intake or severe liver failure. Normal value of urea in blood is 7-21mg/dl (Am met laboratory, 2001) or 8.2 to 24.6mg/dl (Boyd, 1984). Cassava peel meal based diets supplemented with garlic powder were able to meet the nutrient requirements of the pigs without impairment of kidney and liver functions.

**Conclusion**

From the findings of this study it could be concluded that garlic could be included in the diets of growing pigs without detrimental effect on the general wellbeing of pigs.

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**Table 1:** Percent composition of cassava peel meal based diets supplemented with garlic

| | Diets | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| Cassava peel meal | 40.00 | 40.00 | 40.00 |
| Soybean Meal | 10.00 | 10.00 | 10.00 |
| Groundnut cake | 15.00 | 15.00 | 15.00 |
| Wheat offal | 15.00 | 15.00 | 15.00 |
| Palm kernel cake | 15.60 | 15.60 | 15.60 |
| Bone meal | 2.50 | 2.50 | 2.50 |
| Oyster meal | 1.00 | 1.00 | 1.00 |
| Salt | 1.00 | 1.00 | 1.00 |
| | 0.40 | 0.40 | 0.40 |
| Total | 100.00 | 100.00 | 100.00 |
| **Garlic Supplementation(g/kg)** | **0.00** | **2.50** | **5.00** |

**Table 2** : Haematology and serum biochemistry of growing pigs fed cassava peel -meal based diets supplemented with garlic

| | Garlic inclusion (g/kg) | | | |
|---|---|---|---|---|
| Parameters | 0.00 | 2.50 | 5.00 | SEM |
| Haematology | | | | |
| Packed Cell Volume (%) | 31.00 | 34.33 | 33.33 | 1.46 |
| Red Blood Cells ($x10^{12}$/l) | 5.30 | 5.73 | 5.70 | 0.24 |
| White Blood Cells ($10^9$/l) | 9.93 | 10.45 | 10.60 | 0.32 |
| Haemoglobin ( g/dl) | 10.33 | 11.44 | 11.11 | 0.49 |
| **Serum biochemistry** | | | | |
| Total Protein(mg/dl) | 6.47 | 7.10 | 6.67 | 0.30 |
| Albumin (mg/dl) | 3.33 | 3.93 | 3.43 | 0.16 |
| Globulin (mg/dl) | 3.13 | 3.17 | 3.23 | 0.17 |
| Creatinine (mg/dl) | 0.83 | 1.03 | 1.07 | 0.11 |
| Urea (mg/dl) | 9.40 | 9.73 | 10.20 | 0.29 |

SEM: Standard Error of Mean