

## HAEMATOLOGY AND SERUM BIOCHEMICAL INDICES OF WEANER RABBITS FED FERMENTED – BOILED ACKEE APPLE SEEDMEAL

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### Abstract

A four-week study was conducted to evaluate the haematology and serum biochemical indices of weaner rabbits fed graded levels of fermented-boiled ackee apple seed meal (FBAASM). Four experimental diets were formulated with diet 1 (control) containing 0% FBAASM, while diets 2 to 4 contained 5%, 10% and 15% inclusion levels of FBAASM respectively. A total of 16 weaner rabbits were allotted into four dietary treatments. Each treatment consisted of 2 replicates of 4 rabbits in a completely randomized design. The experiment lasted 28 days. The result of the experiment showed that there were no significant ( $P > 0.05$ ) differences in all the haematological parameters measured. However, the experimental diet had significant effect ( $P < 0.005$ ) on Globulin and Glucose. It was concluded that inclusion of fermented-boiled ackee apple seed meal in weaners rabbit diet up to 15% did not any deleterious effect on blood parameters of weaner rabbit

**Keywords:** Haematology, serum, weaner rabbits, fermentation, boiling, ackee apple seed

### Introduction

Blood examination can be used to detect nutritional disorder since it provides information on animal health, nutritional deficiency and changes in growth with time. The routine collection and processing of blood samples allow the evaluation of haematological and serum biochemical response to nutrition and disease (Howlet and Jaime, 2008). Rabbits are efficient converter of feed to meat and utilized up to 30% crude fibre as against 10% by most poultry species (Egbo *et al.*, 2001). The quest for alternative feed ingredients for livestock feeding especially non-ruminants has continued to attract the attention of researchers especially in the developing nations of the world. One of such non – conventional feed resource that could be used to reduce the problem of high cost of conventional feedstuff is the ackee apple. The proximate analysis of fermented – boiled ackee apple seed meal revealed dry matter 89.52%, crude protein 15.40%, crude fibre 6.00%, ether extract 8.00%, ash 9.00%, nitrogen free extract 51.12% and metabolizable energy 3647.14Kcal/kg.

### Materials and Methods

The experiment was carried out at the Rabbitary Unit of the Teaching and Research Farm, Oyo State College of Agriculture and Technology, Igboora, Nigeria. The experimental areas lies in savanna forest zone on latitude 7°43'N and longitude 3°28'E in an elevation of 140m above the sea level. The average minimum temperature

is above 21° 5°C and maximum average temperature is about 32° 5°C (Worldatlas, 2015). A total of sixteen weaned rabbits weighing an average of 400-500g were used for the experiment. They were obtained from reputable rabbit farm in Osogbo. The rabbits were randomly allotted to four diets made of four rabbits per treatment. The animals were acclimatized for a period of three days using commercial diet after which they were placed on respective experimental treatments made of 5%, 10%, and 15% fermented-boiled ackee apple seed meal. The design of the experiment was completely randomised design. The weaner rabbits were housed in pen equipped with individual feeding and drinking facilities. Ackee apple seeds were obtained from ripened fruit harvested from tree grown within Igboora metropolis. The seeds were sundried to ease crushing and grinding using hammer mill before subjecting the meal to fermentation. Fermentation was carried out by first soaking the ground ackee apple seed meal in water after decanting to eliminate the leached chemical in solution and packed in airtight nylon bag to prevent air from entering. The materials prepared in this way were fermented for twenty-one days as described by (Annongu, 1996) after which it was removed for sun drying. The fermented ackee apple seed meal were added to boiling water at 100°C in a cooking pot and heated by naked fire from dried wood for 90 minutes. Boiled seeds were then strained off the boiling water sundried for five days, ground and packaged in polythene bag labelled fermented-

boiled ackee apple seed meal for laboratory analysis. At the end of the four weeks, two rabbits per treatment were randomly selected for haematology and serum analysis. 3ml of blood sample were collected using sterilized needle and syringe through the heart (left side) of the animal into bottles containing Ethylene Diamine Tetra Acetic acid (EDTA) for haematological and another 3ml of blood were collected for serological analysis into the vials which contain no anti-coagulant. Computer analysis using the Statistical Package for Social Science (SPSS) window 10.0 versions was employed to analyse the data generated.

### Results and Discussion

Table 2.0 summarised the effects of feeding fermented-boiled ackee apple seed on haematological indices of weaner rabbits. Rabbits fed diet  $T_4$  had the highest value (30.14%) of packed cell volume while the least value (25.00%) was recorded in rabbit fed diet  $T_1$ . The highest value of haemoglobin (11.05%) was recorded in rabbit fed diet  $T_4$  while the least value of (8.05%) was recorded in rabbit fed diet  $T_2$ . Rabbits on diet  $T_4$  recorded the highest value of ( $5.00 \times 10^3$ ) for Red blood cell while the least value of ( $4.02 \times 10^3/u/l$ ) was obtained in diet  $T_2$ . The highest value ( $8.00 \times 10^3$ ) for White blood cell was recorded in the rabbit fed diet  $T_4$  while the lowest value of ( $5.20 \times 10^3$ ) was obtained in the diet  $T_1$ . There were no significant difference among the treatment means for all haematological parameters of weaned rabbits fed fermented-boiled ackee apple seed meal. The values of haemoglobin ranged from 8.05-11.05g/dl in rabbits fed the experimental diets respectively. The values obtained in this study fell within the normal value range 9.4-17.4g/dl reported by (Mitruka and Rawnsley, 1977). Haemoglobin is involved in the transportation of oxygen from respiratory organ to peripheral tissues (Robbert *et al.*, 2003). It can therefore be inferred that the fermented-boiled ackee apple seed meal influenced transportation of oxygen and hence the normal values obtained. Packed cell volume values fell below the normal range (33-50%) but higher than the values (19.6-28.5%) reported by Ahmafuele *et al.* (2008). PVC is an index of toxicity and its distribution vary with breeds. Reduction in the concentration of packed cell volume in the blood usually suggests the presence of a toxic factor (e.g hypoglycin) which had adverse effect on blood formation (Oyawoye and

Ogunkunle, 1998). The values of Red blood cell (RBC) obtained in this study did not differ significantly. It ranged from  $4.02-5.00 \times 10^3$  in rabbits fed diet 2 to diet 4 in rabbit fed 15% inclusion of fermented-boiled ackee apple seed meal. The values obtained in this study are within normal range of  $3.8-7.9 \times 10^3$  reported for rabbits (Bruke, 1994). Red blood cell values were similar for all treatments and shows that the blood level and immunity status of rabbits were not negatively affected by experimental diets. It has been reported that the higher the value of White blood cell the better phagocytosis and hence the ability to fight diseases (Robberts *et al.*, 2003). The values obtained in this study are within the normal range ( $5.00-8.00 \times 10^3$ ) reported for rabbits (Mitruka and Rawnsley, 1977) indicating that the experimental animals were not challenged by any disease condition. Table 3.0 shows the result of the experimental diet on the serum metabolites of weaner rabbit. The highest value of total protein (7.33g/dl) was recorded in diet  $T_1$  while the least value (4.45g/dl) was obtained in the rabbit fed diet  $T_4$ . The albumin content of the blood of rabbit fed diet  $T_1$ ,  $T_2$ ,  $T_3$  and  $T_4$  (2.93, 2.82, 2.40 and 2.20g/dl respectively) were not significantly different ( $P > 0.05$ ). Rabbit on the control diet had the highest value (4.30g/dl) of globulin while the least value (3.15g/dl) was obtained in rabbit fed diet  $T_4$ . Glucose was highest (157.08mg/dl) in the rabbit fed diet  $T_4$  and lowest in those fed diet  $T_2$  (57.82mg/dl). The values obtain for total protein fell within the normal range (5.4-7.5g/dl). Rabbit fed 0% fermented-boiled ackee apple seed meal gave the highest blood total protein, this suggest good quality protein of 0% dietary level of inclusion for the test feedstuff since the higher the value of protein, the better the quality of test feedstuff (Eggum, 1970). Serum albumin is a strong predictor of health, a low albumin concentration is a sign of poor health (Gbore and Akele, 2010). The values obtained fell within normal range of (2.5-4.0g/dl) and this indicated that rabbits on fermented-boiled ackee apple seed meal based diets will not be prone to excessive haemorrhage as the diets promoted adequate serum albumin. Globulin results shows significantly ( $P < 0.05$ ) different. The values were above the normal range of (1.5-3.3g/dl) and it had been reported that low levels of globulin affects the ability of the animal to fight diseases (Akinmutimi, 2004). The values for glucose ranged from 57.82-150.08mg/dl and these were significantly different among the treatments groups. The values were however below the reference values of 215-778mg/dl reported for

normal healthy rabbit.

**Table 1.0** Gross Composition of experiment diets fed to weaner rabbits

| Ingredients                | T <sub>1</sub> (0%) | T <sub>2</sub> (5%) | T <sub>3</sub> (10%) | T <sub>4</sub> (15%) |
|----------------------------|---------------------|---------------------|----------------------|----------------------|
| Maize                      | 55.80               | 56.81               | 54.57                | 53.95                |
| Soyabean                   | 23.00               | 21.84               | 20.70                | 19.55                |
| FBAPSM                     | 0.00                | 0.15                | 3.55                 | 5.30                 |
| Wheat offal                | 10.80               | 10.80               | 10.80                | 10.80                |
| Fishmeal                   | 2.00                | 2.00                | 2.00                 | 2.00                 |
| Bonemeal                   | 3.00                | 3.00                | 3.00                 | 3.00                 |
| Limestone                  | 4.45                | 4.45                | 4.45                 | 4.45                 |
| Salt                       | 0.50                | 0.50                | 0.50                 | 0.50                 |
| Lysine                     | 0.10                | 0.10                | 0.10                 | 0.10                 |
| Methionine                 | 0.10                | 0.10                | 0.10                 | 0.10                 |
| Vitamin-mineral premix     | 0.25                | 0.25                | 0.25                 | 0.25                 |
| <b>Total</b>               | <b>100.00</b>       | <b>100.00</b>       | <b>100.00</b>        | <b>100.00</b>        |
| <b>Determined Analysis</b> |                     |                     |                      |                      |
| Dry Matter (%)             | 92.91               | 91.98               | 92.44                | 92.13                |
| Crude Protein (%)          | 17.15               | 15.00               | 15.00                | 15.00                |
| Crude fibre (%)            | 4.00                | 4.00                | 4.00                 | 4.00                 |
| Ether extract (%)          | 6.80                | 6.50                | 7.00                 | 6.50                 |
| Ash (%)                    | 11.00               | 9.00                | 7.00                 | 9.00                 |
| ME (kcal/kg)               | 3390.04             | 3419.90             | 3514.05              | 3413.02              |

**Table 2.** Effects of fermented-boiled ackee apple seed meal on haematological parameters of weaner rabbits.

| Parameters              | T1(0%) | T2(5%) | T3(10%) | T4(15%) | SEM  |
|-------------------------|--------|--------|---------|---------|------|
| PCV (%)                 | 26.50  | 25.00  | 28.00   | 30.14   | 1.15 |
| Hb (g/dl)               | 8.65   | 8.05   | 9.20    | 11.05   | 0.33 |
| RBC (x10 <sup>3</sup> ) | 4.32   | 4.02   | 4.75    | 5.00    | 0.20 |
| WBC (x10 <sup>3</sup> ) | 5.20   | 5.72   | 6.30    | 8.00    | 0.38 |

PCV: Packed Cell Volume, Hb: Haemoglobin, WBC: White Blood Cell, RBC: Red Blood Cell

**Table 3:** Effects of fermented-boiled ackee apple seed meal on serum biochemical indices of weaner rabbits.

| Parameters           | T1(0%)            | T2(5%)            | T3(10%)           | T4(15%)           | SEM   |
|----------------------|-------------------|-------------------|-------------------|-------------------|-------|
| Total protein (g/dl) | 7.33 <sup>d</sup> | 6.49 <sup>c</sup> | 5.74 <sup>b</sup> | 4.45 <sup>a</sup> | 1.10  |
| Albumin (g/dl)       | 2.93              | 2.82              | 2.40              | 2.20              | 0.28  |
| Globulin (g/dl)      | 4.30              | 3.67              | 3.34              | 3.15              | 0.96  |
| Glucose (mg/dl)      | 82.40             | 57.82             | 132.69            | 157.08            | 38.43 |

<sup>a,b</sup> means on the same row with different superscript differ significantly (P<0.05)

### Conclusion

The feeding of weaner rabbits with fermented-boiled ackee apple seed meal had no deleterious effect on the haematological parameters of the animals. All the parameters investigated fell within the normal range. However, the test feedstuff had significant (p>0.05) effect on the serum indices of the weaner rabbits examined

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