Performance and Haemato-Biochemical Parameters of Weaner Rabbits Fed Diets Supplemented with Dried Water Melon Peel (Rind) Meal

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Abstract

A study was carried out to investigate the performance, hematological and serum biochemistry of weaner rabbits given feed formulated with dried water melon peel meal (WMR). Thirty rabbits of mixed breed aged 7-8 weeks with initial weight of 602-616g were used in a completely randomized design (CRD) with six replicates per treatment. The animals were fed varied levels of WMR at 0%, 2.0%, 4.0%, 6.0% and 8.0% to obtain five diets. The control diet was prepared to meet the nutritional standards of growing rabbits and it lasted for 12 weeks. Results revealed that there was no significant (p>0.05) differences in the values obtained for the growth performance among the treatments. Hematological and all the blood serum biochemical traits measured were not a significantly different by the dietary inclusion of WMR. It was concluded that dried water melon peels (WMR) can be included up to 8.0% in the diets of weaner rabbits without deleterious effect on the performance, hematological and serum biochemical parameters of rabbits.

Keywords: Water melon peels; Performance; Hematology; Blood; Weaner rabbits


Introduction

Protein is the basic structural material from which all body tissues are formed and it has been reported its intake of most developing countries including Nigeria is very low due to the high cost of victual; With the rapid increase in the population rate, there have additionally been an increase in competition among feed stuffs which are also used in feed making with human beings, sundry efforts are been made by Animal nutritionist in order to provide solution to the low protein intake especially from animals to increment the caliber of animal protein intake of the populace by probing for alternatives that are more frugal sources of feed ingredients to procure prosperity in livestock management. The utilization of unconventional feedstuffs and forages which are not consumed by humans can be used to produce animal feeds [1]. Among such alternatives is the use of water melon peels which is found abundant in minerals/vitamins and can be used to feed animals like rabbits due to fast growing characteristics and their ability to convert tropical forages and agricultural by products to human food (meat).

Water melon belongs to the family to the family Cucurbitaceae and the species Citrullus landaus. They are widely distributed in the tropics and subtropics [2,3]. It contains low energy and high level of micronutrients such as carotene, vitamin k, ascorbic acid, riboflavin, iron, iodine and other mineral elements. It has been established that water melon peels are found in many places in Nigeria Gin et al. [4]. Watermelon rinds may have additional medical benefits. Research by the Agricultural Research Service discovered that watermelon rinds contain citrulline. Citrulline creates arginine, an amino acid that makes proteins for the body and plays a role in the relaxation of blood vessels [5].

Rabbits (Oryctolagus cuniculus meat are rich in protein and other nutrients which are safe for human consumption [6]. It has a feeding habits with no appreciable competition with man, this is because it can subsist on green as basal diet. Rabbits can easily utilize waste to produce meat giving it an advantage over other animal species like poultry. Although extensive studies had shown that WMR had an appreciable quantity of phytochemical and antioxidant, proximate components and anti-nutritional factors of water Johnson et al. [7], on effect of water melon rinds on the nutrient composition, performance and carcass characteristics of albino rats [8], but there are no information on supplementing dried water melon rinds on the general performance and blood profile of rabbits. An experiment on WMR inclusion in animals (rabbits) will give a clue on its safety margin during dietary supplementation and as an alternative...
unconventional agricultural feed stuff. The main aim of this study was to investigate the growth performance and haemato-biochemical parameters of growing rabbits fed varying inclusion levels of dried water melon peel (rind) meal (Figure 1).

Methodology

Experimental Site

This study was carried out at the Livestock Teaching and Research Farm of University of Abuja, Gwagwalada, Abuja-Nigeria. Collection and processing of water melon rinds (WMR) Fresh healthy water melon fruit were collected from Gwagwalada, Abuja. The fruit was thoroughly cleaned remove sand particles after which they were sliced with cleaned knife to separate the rind from the pulp. The rind was cut into pieces and sundried for 6 days, the dried rinds were then milled in a hammer mill to form water melon rind meal (WMR).

Pre-experimental operations

A total of thirty, 7-8 weeks bucks cross breed rabbits (Chinchilla × New Zealand White) with an average weight of 602g and 616g were used for this experiment. They were individually housed in a an all wire cages measuring 50cm×35cm×40cm (width × length × height) and equipped with feeding and watering troughs. The cages were cleaned and disinfected before the arrival of the animals. The rabbits were allowed two week adjustment period during which they were fed with control diet and given prophylactic treatment of Oralmectin against endo and ecto-parasites before they were placed on the experimental diets.

Animal management, experimental diets and design

Five diets were formulated to meet the nutritional requirements of growing rabbits. Control diet (T1) did not contain WMR, while diets T2, T3, T4 and T5 contained WMR at 2.0%, 4.0%, 6.0% and 8.0% respectively. Experimental design used was a completely randomized design. The animals were fed twice daily at 7:30 hour and 14:30 hour; feed and clean water was supplied the performance of the rabbits in terms of feed intake and mortality were recorded daily and all management practices were strictly observed throughout the experiment which lasted for 12 weeks.

Blood Analysis

On the 12th week of the experiment, blood samples were collected from the marginal vein of three randomly selected rabbits per treatment. The blood samples were analyzed for some hematological and serum biochemical parameters; blood samples for hematology were collected into bottles containing Ethylene Diamine Tetra Acetate (EDTA). The hematological parameters such as Pack cell volume (PCV), Red blood cell (RBC), White blood cell (WBC), Haemoglobin concentration (Hb) and absolute counts of neutrophils, lymphocytes, monocytes and eosinophils were computed according to the method. The Mean corpuscular volumes (MCV), mean corpuscular haemoglobin (MCH), Mean corpuscular haemoglobin concentration (MCHC) were calculated according to Bush [9]. Blood samples that were meant for serum biochemistry were collected into other bottles free from any anticoagulant. The serum total protein, Albumin and Globulin were computed according to, Uric acid, Creatinine, Glutamic oxaloacetate transaminase (SGOT) and Glutamic phosphatase transaminase (SGPT) was determined according to Scott [10].

Laboratory Analysis

The proximate composition of experimental diets and WMR were analyzed according to AOAC (2000), while phytochemical analysis was determined according to Harbone [11]. The mineral analysis were carried out using Atomic Absorption Spectrophotometer (AAS). Vitamin content of WMR were analyzed using method reported by Onwuka [12].

Statistical Analysis

Data were analyzed using the general linear model procedures of Statistical Analysis Systems software with the model containing treatments. Differences between treatment means were separated using (SAS, 2009). Significant differences were declared at (p<0.05)

Results and Discussion

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Table 3 reveals the phytochemical analysis of water melon rinds (WMR), the phytochemical components are 1.03% flavonoids, 1.01% alkaloids, 0.79% tannin, 2.12% saponins and 1.23% phytate respectively while those of minerals are 0.47mg copper, 1.31mg iron, 1.02mg zinc, 30.02mg calcium, 1.44mg magnesium, 1.12mg potassium, 0.77mg sodium, 131.1mg phosphorus, 1.18mg manganese and 0.13 mg selenium respectively as presented in Table 4. The trend of mineral concentration in WMR in decreasing order is P>Ca>Mg>Fe<K>Mn>Zn>Na>Cu>Se, this mineral trend agrees with the report of Gladvin et al. [2]; Olayinka & Etejere [18], on the mineral and vitamin content in water melon peel.

Onwuka [12] and Adeyeye [19], reported that Minerals is always required for efficient metabolic processes. Calcium and phosphorus are major components of the skeletal system, magnesium is a component of the bone, a cofactor of several enzyme activity and is involved in the transmission of nerve impulses, copper is significant in iron and energy metabolism while sodium and potassium play key roles in the acid-base regulation of the blood and other body fluids Amy E Halls [20].
vitamins composition of WMR (Table 5) revealed that Vitamin A contains 56.81mg, 1.22 vitamin B1, 2.33mg B2, 5.01 mg B3 and 58.12 mg C respectively. Vitamin C had the highest number followed by vitamin A, B3, B2 and B1.

Table 6: Performance traits of growing rabbits fed varying inclusion levels of WMR.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>T5</th>
<th>S/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial live wgt (g)</td>
<td>606±31.4</td>
<td>610±22.1</td>
<td>613±27.2</td>
<td>616±40.4</td>
<td>609±41.4</td>
<td>Ns</td>
</tr>
<tr>
<td>Final live wgt (g)</td>
<td>1344±24.6</td>
<td>1326±34.3</td>
<td>1304±30.6</td>
<td>1309±41.1</td>
<td>1337±39.8</td>
<td>Ns</td>
</tr>
<tr>
<td>FWG (g)</td>
<td>738±3.02</td>
<td>716±5.31</td>
<td>691±7.80</td>
<td>693±4.41</td>
<td>728±6.12</td>
<td>Ns</td>
</tr>
<tr>
<td>Feed intake (g)</td>
<td>78.1±1.31</td>
<td>79.6±0.32</td>
<td>77.4±2.53</td>
<td>76.4±2.61</td>
<td>76.9±1.77</td>
<td>Ns</td>
</tr>
<tr>
<td>FCR</td>
<td>6.34±0.43</td>
<td>6.47±0.01</td>
<td>6.59±0.01</td>
<td>6.48±0.10</td>
<td>6.22±0.78</td>
<td>Ns</td>
</tr>
<tr>
<td>DWI (ml)</td>
<td>904.1±1.23</td>
<td>903.7±1.02</td>
<td>906.9±0.07</td>
<td>900.5±0.19</td>
<td>901.3±0.21</td>
<td>Ns</td>
</tr>
<tr>
<td>Mortality</td>
<td>0/6</td>
<td>0/6</td>
<td>0/6</td>
<td>0/6</td>
<td>0/6</td>
<td>Ns</td>
</tr>
</tbody>
</table>

Ns: No significant (p>0.05) difference.

Generally, Vitamins are very vital components in food because of their role in proper functioning and body metabolic activity [28]. Vitamin C protects the body from oxidative stress and maintains the immune system, their synergistic combination with other vitamins allows proper growth, high reproductive performance and enzymatic activities. The results obtained for WMR is in agreement with the reports of Collins et al. [29]; Leterme et al. [30]; Moon and Shibamoto [31] as presented in Table 6. Supplementation of (WMR) at different levels in growing rabbits showed no significant effect on their feed intake, body weight change and feed conversion ratio (FCR) in the current study. This was similar with the finding of Alagbe J O [32]; Haruna & Muhammad [33].

Table 7: Hematological parameters of growing rabbits fed varying inclusion of WMR.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Treatments</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>T5</th>
<th>S/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pack cell volume (%)</td>
<td>39.06±0.21</td>
<td>41.91±0.3</td>
<td>57.11±0.11</td>
<td>57.22±0.41</td>
<td>57.32±0.12</td>
<td>Ns</td>
<td></td>
</tr>
<tr>
<td>Hemoglobin (g/dl)</td>
<td>8.13±0.09</td>
<td>11.3±0.05</td>
<td>13.13±0.07</td>
<td>13.15±0.10</td>
<td>13.44±0.17</td>
<td>Ns</td>
<td></td>
</tr>
<tr>
<td>RBC (×106/L)</td>
<td>6.11±0.19</td>
<td>7.01±0.17</td>
<td>7.11±0.15</td>
<td>7.18±0.45</td>
<td>7.33±0.56</td>
<td>Ns</td>
<td></td>
</tr>
<tr>
<td>MCV (fl)</td>
<td>60.11±0.87</td>
<td>63.12±0.66</td>
<td>68.10±0.1</td>
<td>69.14±0.09</td>
<td>70.19±1.22</td>
<td>Ns</td>
<td></td>
</tr>
<tr>
<td>MCH (pg)</td>
<td>19.18±1.22</td>
<td>19.45±1.34</td>
<td>20.14±1.34</td>
<td>20.44±1.09</td>
<td>20.66±1.54</td>
<td>Ns</td>
<td></td>
</tr>
<tr>
<td>MCHC (%)</td>
<td>30.10±0.56</td>
<td>31.23±0.97</td>
<td>31.77±0.87</td>
<td>32.10±0.37</td>
<td>32.51±0.66</td>
<td>Ns</td>
<td></td>
</tr>
<tr>
<td>WBC (×106/L)</td>
<td>10.02±0.89</td>
<td>10.66±0.78</td>
<td>11.03±0.80</td>
<td>11.35±0.91</td>
<td>12.10±0.82</td>
<td>Ns</td>
<td></td>
</tr>
<tr>
<td>Lymphocytes (%)</td>
<td>50.12±0.34</td>
<td>51.71±0.54</td>
<td>52.13±0.65</td>
<td>52.33±0.80</td>
<td>52.36±0.36</td>
<td>Ns</td>
<td></td>
</tr>
<tr>
<td>Monocytes (%)</td>
<td>1.31±0.05</td>
<td>1.28±0.01</td>
<td>1.23±0.03</td>
<td>1.27±0.00</td>
<td>1.20±0.03</td>
<td>Ns</td>
<td></td>
</tr>
<tr>
<td>Neutrophils (%)</td>
<td>33.12±1.10</td>
<td>33.03±1.26</td>
<td>33.18±1.14</td>
<td>33.27±1.53</td>
<td>33.10±1.10</td>
<td>Ns</td>
<td></td>
</tr>
<tr>
<td>Basophils (%)</td>
<td>0.72±0.05</td>
<td>0.67±0.01</td>
<td>0.58±0.00</td>
<td>0.71±0.02</td>
<td>0.69±0.01</td>
<td>Ns</td>
<td></td>
</tr>
<tr>
<td>Eosinophils (%)</td>
<td>5.11±0.04</td>
<td>4.54±0.18</td>
<td>4.32±0.01</td>
<td>4.59±0.02</td>
<td>5.01±0.06</td>
<td>Ns</td>
<td></td>
</tr>
</tbody>
</table>

Ns: No significant (p>0.05) difference.

According to Ojabo et al. [34] the use of Sweet orange peel in the diet of growing rabbits produced no significant increase in feed intake, final body weight and FCR when compared to a control diet but contrary with the reports of Ishaya B. Kaga [35] on the performance of rabbits fed Delonix regia meal. The water intake values obtained are practically the same and mortality was recorded throughout the experimental period, this could be due to proper hygiene, biosecurity measures and the safety margin of including WMR in the diet of the animal as presented in Table 7.

Table 8: Serum biochemical profile of growing rabbits fed varying inclusion levels of WMR.

<table>
<thead>
<tr>
<th>Parameters</th>
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<th>T1</th>
<th>T1</th>
<th>T3</th>
<th>T4</th>
<th>T5</th>
<th>S/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total protein (g/ml)</td>
<td>4.45±0.67</td>
<td>4.74±0.74</td>
<td>4.57±0.55</td>
<td>4.82±0.63</td>
<td>4.87±0.44</td>
<td>Ns</td>
<td></td>
</tr>
</tbody>
</table>

Ns: No significant (p>0.05) difference.
Results on the blood hematological parameters of weaner rabbits fed diets supplemented with water melon peels is presented in Table 8. The values of PCV obtained is between 39.06% - 57.32% hemoglobin values of 8.13 – 13.44 (g/dl) while RBC values are 6.11 – 7.33 ((x10^6/L). The PCV values fall within the normal ranges of 35-60% previously reported by Aduku and Olukosi [20]; Flecknell [36]. All the hematological parameters obtained in this study showed that were not significantly (p>0.05) different. The percent red blood cell counts (PCV) obtained in this study showed that were not significantly (p>0.05) different.

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<table>
<thead>
<tr>
<th>Albumin (g/dl)</th>
<th>2.34±0.45</th>
<th>2.61±0.31</th>
<th>2.47±0.65</th>
<th>2.66±0.12</th>
<th>2.56±0.18</th>
<th>Ns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Globulin (g/dl)</td>
<td>2.11±0.03</td>
<td>2.13±0.08</td>
<td>2.09±0.61</td>
<td>2.16±0.80</td>
<td>2.31±0.01</td>
<td>Ns</td>
</tr>
<tr>
<td>Uric acid (mg/l)</td>
<td>10.4±0.01</td>
<td>10.1±0.04</td>
<td>10.75±0.91</td>
<td>11.21±0.06</td>
<td>11.5±0.03</td>
<td>Ns</td>
</tr>
<tr>
<td>Creatinine (mg/l)</td>
<td>7.12±0.12</td>
<td>8.87±0.18</td>
<td>8.90±0.44</td>
<td>9.10±0.39</td>
<td>9.22±0.83</td>
<td>Ns</td>
</tr>
<tr>
<td>SGOT (U/L)</td>
<td>14.60±0.01</td>
<td>12.23±0.03</td>
<td>12.54±0.21</td>
<td>12.32±0.14</td>
<td>12.03±0.03</td>
<td>Ns</td>
</tr>
<tr>
<td>SGPT (U/L)</td>
<td>8.44±0.33</td>
<td>8.41±0.26</td>
<td>8.23±0.00</td>
<td>8.03±0.35</td>
<td>8.01±0.66</td>
<td>Ns</td>
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</tbody>
</table>

Ns: No significant (p>0.05) difference.

Conclusion

WMR could be included in the diet of weaner rabbits up to 6% without any deleterious effect on the health and general performance of rabbits without causing any pathological abnormalities in their blood profile.

References


