HAEMATOLOGICAL AND BIOCHEMICAL PARAMETERS IN WEST AFRICAN DWARF (WAD) BUCKS FED DIETS CONTAINING MILLETIA THONNINGII

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SUMMARY

Twelve adult West African Dwarf (WAD) bucks were randomized into three treatment groups (A, B and C) of four animals each. They were fed with the same ration of 0% Milletia thonningii for four weeks to allow for acclimatization and basal data were collected for all the bucks. They were later introduced to the test diet group A bucks were given 0% Milletia thonningii as control, group B, 17% M. thonningii while group C received 34% M. thonningii in their feed for 8 weeks. Their clinical parameters were recorded as follows: Rectal temperature (degrees centigrate ± S.D) were 38.84 ± 0.38, 38.48 ± 0.15 and 37.88 ± 0.58 for groups A, B and C respectively. The mean respiratory rates (beats/minute, ± S.D) were 31.20 ± 3.42, 39.80 ± 0.42, 30.40 ± 3.36 for groups A, B and C respectively. The mean heart rates (beats/minutes ± S.D) were 82.00 ± 5.52, 66.20 ± 3.56 and 70.00 ± 3.67 for groups A, B and C respectively. There was a significant reduction (P<0.05) in the heart rate in groups B and C when compared with the control Group A. The P.C.V. across the three groups were not significantly different from each other (P>0.05) the Red Blood Cell count (X10^12/L) was highest in Group B with 12.85 ± 6.24 and lowest in Group C with 10.25 ± 4.29, while the white blood cells (X10^9/L) was highest in group C (11.07 X 6.25) and lowest with the control group A, (7.59 ± 3.39). The total protein (g/100ml) of groups B (5.84 ± 0.42) and C (6.13 ± 0.52) were not significantly different (P>0.05) from each other but were significantly different from group A (5.06 ± 0.91) (P<0.05). The Aspartate amino transferase (AST) enzyme were within normal values in all the three groups while the values for Alanine amino transferase (ALT) enzyme were higher than normal. Based on these results the inclusion of between 17-34% of Milletia thonningii in feeds of WAD buck as protein supplement is recommended.

RESUME

Douze (12) canards nain d‘afrique de Liouest ont été reparti au Hasard en 3 groupes de traitement (A, B etc) de 4 animaux chacun. Ils s’etait nourri d’une meme fraction de 0% de Milletia thonningii durant 4 semaines pour permettre l’acclimatization et les donnees de base etaient relevues sur tous les canards. Ils avaient ensuite recu un teste de regime. Le groupe de controle A contenant 0% de milletia thonningii Le groupe B, 17% de M. thonningii dans leur nourriture pendant 8 semaines. Leurs parametres cliniques etaient les suivants: La temperature rectale (°C ± S.D) etaient: 38.84 ± 0.38, 38.48 ± 0.15 et 37.88 ± 0.58 pour les groupes A, B et C respectivement. La fréquence respiratoire moyenne (bats/minute ± S.D) etaient 31.20 ± 3.42, 39.80 ± 0.42, 30.40 ± 3.36 des groupes A, B et C respectivement. La fréquence des battements cardiaques (battement/minute ± S.D) etaient de 82.00 ± 5.52, 66.20 ± 3.56 et 70.00 ± 3.67 des groupes A, B et C respectivement. Il Y avait une reduction significative (P<0.05) en battement cardiaques en groupes B et C compare au groupe de control A. Le Hematocrite des 3 groupes ni etaient pas significament different l’un de l’autre. (P>0.05). Le taux de globules rouges (X10^12/L) etait plus elevee en groupe B avec 12.85 ± 6.24 et plus bas en groupe C avec 10.25 ± 4.29 lorsque le taux des globules blancs (X10^9/L) etait plus eleve en groupe C (11.07 X 6.25) et plus bas en groupe A (7.59 ± 3.39). Le taux de proteine total (g/100ml) dans les groupes B (5.85 ± 0.42) et C (6.13 ± 0.52) n’etaient plus significament different l’un de l’autre (P>0.05) mais notamment different du groupe A (5.06 ± 0.91) (P<0.05). Les enzymes d aspartique d amino transferase (AST) etaient contant dans les 3 groupes lorsque les valeurs des enzymes d alanine amino transferase (ALT) etaient plus elevee’ que la normale.

One of the problems of goat production in Nigeria is feeding, especially during the dry season. The result of this problem is the delayed age at sexual maturity (Bhattacharyya. 1998). Because of this the cultivation of browse plants that can thrive during the dry season are advocated. Among the available browse plants for goats in the Tropics that is available in dry season is Milletia thonningii. Milletia thonningii is a multipurpose browse leguminous plant. It’s leaves has high protein content and are commonly used for feeding ruminants (Rose Inners and Mabey 1964). Previous studies however, indicate that this legume contains an active constituents saponin (Balbar et al., 1970) which has been reported to cause haemolysis of the red blood cells, exudative diathesis (Oliver Bep, 1960) subcutaneous inflammation and necrosis, stufepaction and paralysis of the central nervous and paralysis of the central nervous system (Bierier and Rhodes 1965).

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This study was therefore designed to determine the effects of feeding three levels of *M. thonningii* on the clinical, hematological and biochemical parameters of WAD bucks.

**MATERIALS AND METHODS**

Twelve clinically healthy WAD bucks aged between 12 to 24 months and weighing between 10 - 12kg were used for the study. The bucks were dewormed routinely using 2.5% levamisole (Citarin ®, Bayer, Leverkusen), vaccinated with tissue culture Rinderpest vaccine (TCRV, NVRI, Vom Nigeria) against pestes des petit ruminant (PPR) and groomed using Asuntol ® (Bayer, Leverkusen, Germany). They were allowed to acclimatise with their new surroundings for 4 weeks and were fed on diet 1 (Table 1) at the rate of 0.45kg per animal per day. Data for basal records were collected in the last 2 weeks of the acclimatisation period.

The bucks were then randomly allotted to three groups of 4 each (A, B and C). They were fed the experimental; diets of zero percent for Group A as control. 17% Group B and 34% for group C of *Milletia thoningii* (Table 2) at 0.45kg per animal per day for a period of 8 weeks. Fresh water and salt lick were provided *ad libitum*. The animals were fed once daily by 8.00am throughout the experiment. The residue was weighed every morning to estimate feed intake. Animals were weighed weekly. Rectal temperature was measured using clinical thermometer, respiratory rates and heart rates were counted with the aid of stethoscope, blood samples were taken via the jugular vein from each animal into plain test tubes and those containing ethylene diamine tetra acetic acid (EDTA) to obtain serum and uncoagulated blood respectively for haematological and biochemical analysis. This was carried out weekly for ten weeks. The following indices were determined using routine laboratory methods. Packed cell volume (PCV) was determined by the micro haematocrit method described by Dacie and Lewis (1984) and Schalm et al (1975). Erythrocyte (RBC) were counted using the improved Neubauer haemocytometer (Dacie and Lewis, 1984). Haemoglobin concentration (Hb) and Leucocytes counts (WBC) were determined by method described by Jain, (1986). Five hundred WBC were differentiated on Gemsa stained this blood smears and absolute values calculated from their percentile distribution using the total WBC counts.

The mean corpuscular volume (MCV) mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) were obtained by calculation from the PCV Hb concentration and RBC counts (Dacie and Lewis 1984, Jain, 1986). The biochemical indices such as total protein and plasma. Fibrinogen were determined by the biuret method (Gomall et al., 1949). Albumin and Globulin as Aspartate aminotransferase (AST) and Alanine aminotransferase (ALT) were also determined as described by Toro and Ackermann (1975).

The data obtained were analysed using two-way analysis of variance (ANOVA) where there was any significance, the means were compared using Fischer’s LSD test (Steel and Torrie, 1986).

**RESULT**

**Clinical parameters:**

As depicted on Table 3 the respiratory rate and rectal temperature were comparable across the three groups. The heart rate (beats/minutes) was highest in animal of group A with 82.00 ± 5.52 which reduced to 66.20 ± 3.56 and 70.00 ± 3.67 for groups B and C respectively.
**Haematological parameters:**
The haematological parameters of the WAD bucks fed diets with varying amount of *M. thonningii* leaves are presented on Table 4. The diets did not significantly affect (P<0.05) the PCV, RBC, MCH, MCV, MCHC and Hb values of the animals of Groups B and C when compared with the Group A. There was a significant difference (P<0.05) in the WBC values across the three groups. Group C had the highest values when compared with Group A. While Group B had the lowest. For the differential counts, the Reticulocytes, Monocytes, Eosinophils were within normal range for male goat. The Neutrophil increased significantly from Group A to B and (P<0.05).

**Biochemical parameters:** As indicated on Table 5, the percentage values of the Albumin, Globulin and fibrinogen had marginal increase across the groups but the values of the total protein were significantly different from each other (P<0.05). Values for the two liver enzymes analysed AST and ALT were not significantly different from each other (P<0.05).

**Discussion**
The PCV values obtained for all dietary levels were similar to those reported for healthy goats by Edward et al., (1955) but lower when compared with the values reported by Oduye, (1976). The values of PCV, HB, MCHC, MCV were similar for the three (P<0.05) values for A group were lower than for groups B and C.

**Enzymes:**
The values for the two liver enzymes analysed AST and ALT were not significantly different from each other (P<0.05).

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**Table 4:**
Haematological parameters of WAD bucks fed vary levels of *M. thonningii*

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCV (%)</td>
<td>25.71 ± 4.43</td>
<td>25.04 ± 2.28</td>
<td>25.30 ± 3.09</td>
</tr>
<tr>
<td>RBC (X10^12/L)</td>
<td>11.42 ± 4.53</td>
<td>12.85 ± 6.24</td>
<td>10.25 ± 4.29</td>
</tr>
<tr>
<td>Hg g/dl</td>
<td>6.28 ± 1.65</td>
<td>6.14 ± 1.80</td>
<td>6.80 ± 1.68</td>
</tr>
<tr>
<td>MCH pg</td>
<td>6.22 ± 2.59</td>
<td>5.35 ± 2.34</td>
<td>8.09 ± 4.38</td>
</tr>
<tr>
<td>MCV (FL)</td>
<td>25.43 ± 10.27</td>
<td>22.23 ± 8.00</td>
<td>30.88 ± 11.57</td>
</tr>
<tr>
<td>MCHC g/dl</td>
<td>22.73 ± 4.69</td>
<td>24.25 ± 5.41</td>
<td>25.02 ± 3.68</td>
</tr>
<tr>
<td>WBC (X10^9/L)</td>
<td>7.59 ± 3.37f</td>
<td>9.50 ± 4.12l</td>
<td>11.07 ± 6.25f</td>
</tr>
<tr>
<td>Reticulocytes</td>
<td>1.20 ± 1.04</td>
<td>0.70 ± 0.45</td>
<td>0.20 ± 0.45</td>
</tr>
<tr>
<td>Monocytes (%)</td>
<td>0.30 ± 0.45</td>
<td>0.40 ± 0.42</td>
<td>0.20 ± 0.45</td>
</tr>
<tr>
<td>Lymphocyte (%)</td>
<td>56.40 ± 14.4</td>
<td>19.50 ± 9.31</td>
<td>48.00 ± 12.91</td>
</tr>
<tr>
<td>Eosinophil (%)</td>
<td>0.40 ± 0.9</td>
<td>0.30 ± 0.27</td>
<td>0.50 ± 0.11</td>
</tr>
<tr>
<td>Neutrophil (%)</td>
<td>42.70 ± 14.39x</td>
<td>49.80 ± 9.54e</td>
<td>51.30 ± 13.23f</td>
</tr>
</tbody>
</table>

**Table 5:**
Some Biochemical parameters liver and enzymes of WAD bucks fed on various levels of *M. thonningii*

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albumin (g/100ml)</td>
<td>2.17 ± 0.51</td>
<td>2.19 ± 0.16</td>
<td>2.30 ± 0.19</td>
</tr>
<tr>
<td>Globulin (g/100ml)</td>
<td>3.39 ± 0.57</td>
<td>3.65 ± 0.26</td>
<td>3.73 ± 0.36</td>
</tr>
<tr>
<td>Total protein (g/100ml)</td>
<td>5.06 ± 0.91a</td>
<td>5.8 ± 0.42b</td>
<td>6.13 ± 0.52b</td>
</tr>
<tr>
<td>Fibrinogen (g/100ml)</td>
<td>0.10 ± 0.00</td>
<td>0.12 ± 0.03</td>
<td>0.13 ± 0.03</td>
</tr>
<tr>
<td>AST (SF units)</td>
<td>23.10 ± 7.45</td>
<td>21.50 ± 6.26</td>
<td>20.50 ± 6.22</td>
</tr>
<tr>
<td>ALT (SF units)</td>
<td>35.00 ± 18.71</td>
<td>42.00 ± 20.80</td>
<td>39.00 ± 16.22</td>
</tr>
</tbody>
</table>

a, b means along the same row with different superscripts are significantly different from each other (P<0.05).
levels of diet since the test diets did not produce any notable effect but marginal increase, it may be suggested that *M. thonningii* at those levels have not caused any haemolysis or its effect might have been antagonised by cholesterol present in the animal (Bierier and Rhodes, 1965). The values of Leukocytes in this work are similar to values reported by Holman and Dew (1965), Oduye (1976) and Nemi, (1986) for normal healthy goats. Since the results from group B and C compared well with those of Group A, it can be inferred that the method of preparation of the *M. thonningii* leaves must have removed some of its toxic effects in the animals. This is according to the Anan, (1986) report that sun-curing (heat treatment) is a means of treating materials with toxic substance to eliminate toxicity and this is also supported by Merkel et al., (1994).

The values of serum proteins obtained in this study fall within the range values reported by Oduye (1976) but higher than those reported by Kamalu et al., (1988). Since dietary protein has influence on the serum protein and this is manifested on the serum albumin portion (Coles 1986) the increase in the total protein seems to be due to the protein richness of the test diets of the animals in groups B and C, which is due to *M. thonningii*.

The AST values this study are within the range reported for normal goats by Oduye (1976) while the ALT values were slightly higher.

In conclusion considering the results of this study it is recommended that *M. thonningii* can be included in the diet of WAD as a cheap protein supplement during the dry season to the level of about 17-34% without any side effects.

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