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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 ± 4.02, 30.40 ± 3.36 for groups A, B and C respectively. The mean heart rates (beats/minutes ± S.D.) 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 transferese (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 ete reparti au Hazard en 3 groupes de traitement (A, B etc) de 4 animals chacum. Ils s'etaient nourri d'une meme fraction de 0% de milletia thoningii durant 4 semines pour permettre l'acclimatisation et les donnees de base etaient releves sur tous les canards. Its avaient ensuite recu un teste de regime. Le groupe de controle A contenant 0% de miltetia thoningii Le groupe B. 17% et le groupe C: 34% de M. thoningii dans leur nourriure pendant 8 seminaines. Leurs parametres cliniques etaient les suivants: La temperature rectale ((t°c ± S.D) retaient: 38.84 ± 0.38, 38.48 □ 0.15 et 37.88 ± 0.58 pour les groupes A, B etc respectivement. La frequence de respiration moyenne (bettement ± S.D) etaient 31.20 ± 3.42, 39.80 ± 4.02, 30.4 ± 3.36 des groupes A, B etc respectivement. La frequence des battements cardiaques (battement/min ± S.D) etaient de 82.00 ± 5.52, 62.20 ± 3.56 et 70.00 ± 3.67 des groupes A, B etc respectivement. IL Y avait une reduction significative (P<0.05) en battement cardiaques en groupes B etc compare au groupe de control A. Li Hematocrite des 3 groupes ni etaint pas significamment differents l'un de l'auntre. (P<0.05). Le taux de globules rouges ($X10^{12}/e$) etaiti plus elevee en groupe B avec 12.85 ± 6.24 et plus bas en groupe C avec 10.25 ± 1.29 lorsque le taux des globules balncs ($X10^{9}L$) etait plus eleve en groupe C (11.07 x 6.25) et plus bas in groupe A (7.59 ± 3.39). Le taux de proteine total (g/100ml) dans les groupes B (5.85 ± 0.42) etc (0.13 ± 0.52) n'etaient plus significanament 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) restaient contant dans les 3 groupes lorsque les valeurs des enzymes d alanine amino transferase (ALT) etaient plus eleve' 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, stupefaction 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% levamisol (Citarin ® Bayer, Leverkusen), vaccinated with tissue culture Rinderpect 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.

Table 1:
Cross Composition of Diet used for Acclimatization

Ingredients	%
Maize	32
Sundried cassava peels	26
Corn bran	5
Guinea corn offal	34
Bone meal	1.5
Salt	1
Mineral and vitamins	0.5
Total	100.00

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 plains test tubes and those containing ehtylene 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 indicies 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). Erythrocytes (RBC) were counted using the improved Neubauer haemocytometer (Dacie and Lewis, 1984). Haemoglobin concentrtion (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 claculated from their percuitile distribution using the total WBC counts.

Table 2
Gross Composition of Test Diets

Ingredients (%)	Group A (Control) Diet 1	Group B Diet 2	Group C Diet 3
Maize	32	32	32
Sundried cassava peels	26	26	26
Corn bran	5	5	5
Milletia thonningii (dry)	0	17	34
Guinea corn offa	34	17	0
Bone meal	1.5	1.5	1.5
Salt	1	1	1
Minerals and vitamins	0.5	0.5	0.5
Total %	100.003	100.00	100.00

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 prameters 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 hadthe 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 neurophil increased significantly from Group A to B and (P<0.05).

Table 3:
Summary of clinical parameters of WAD bucks fed varying levels of *M. thonningii*

Parameters	Group A	Group B	Group C
Rectal Temperature(oC)	38.84 ± 0.38	38.4 ± 0.15	37.88 ± 0.58
Respiratory Rate (beats/Minutes)	31.20 ± 3.42	39.80 ± 4.02	30.40 ± 3.36
Heat rate (beats/Minutes)	82.00+ 5.52[a]	66.20 ± 3.56[b]	70.00 ± 3.67[b]

a, b, means along the same row with different superscripts are significantly different from each other. (P<0.05).

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

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

d, e, f, x, y, z, means along the same row with different superscripts are significantly different from each other

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 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).

DICSCUSSION

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

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

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

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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