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HAEMATOLOGICAL PARAMETERS OF WEST AFRICAN DWARF SHEEP AND GOAT FED A BASAL DIET OF CASSAVA PEEL SUPPLEMENTED WITH FRESH G*LIRICIDIA SEPIUM* LEAVES

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Abstract: This study was conducted to investigate the effects of feeding fresh *Gliricidia sepium* leaves as supplement to basal diet of dried cassava peel on the haematological parameters of West African Dwarf sheep and goats in a completely randomized design experiment. Twelve each of WAD sheep and goat were randomly divided into three groups of four animals per group for both sheep and goats. The three groups were given different diets of (T_1: 100% cassava peel, T_2; 70% cassava peel + 30% Gliricidia and T_3; 50% cassava peel + 50% Gliricidia) for a period of 7 weeks with an initial 2 weeks of acclimatization. Haematological indices of these animals were investigated; before and after experiment. Parameters monitored included; PCV, WBC, RBC, Hb, Neutrophil and lymphocytes. The results showed that cassava peel was higher in DM than Gliriadia but *Gliricidia sepium* had higher values of CP, EE and total Ash than cassava peel. Animals fed 100% cassava peel (T_1) had better PCV, WBC and Hb values followed by T_3 and T_2 in goat. Similarly, PCV and Hb values in sheep were higher under T_1while WBC, RBC and lymphocytes had better values in T_3.

Both species of animals (sheep and goat) can be fed dried cassava peel supplemented with fresh leaves of *Gliricidia sepium* at 50% inclusion level and perform well during the dry season. Supplementation with *Gliricidia sepium* will cause no harm on the performance of sheep and goat in term of haematological parameters, most especially those investigated in this study.

Keywords: Cassava peel, WAD, Haematological parameters, Basal diet, Gliricidia.

Introduction

Livestock productivity in the tropics has suffered major setback due to inadequate quantity and quality feeds for the animals especially during dry season (Peters, 1998). In wet season, forage is relatively available and animals (small ruminants) may easily gain weight and remain thrifty (Babayemi, *et al*., 2003). Akinlade, *et al*., (2005) reported that a major problem facing small ruminant animal producer is how to feed the animals adequately in all year round. Small ruminant production in dry season could be improved upon; by cultivating forage plants with high leaf yield (Fasae; *et al*., 2009). These crops when harvested, could be

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dried or stored as food for ruminants during the scarce period when these animals lose a considerably percentage of their body weight as a result of shortage of good quality forage.

In meeting the energy, protein, crude fibre and mineral requirements of small ruminant animals during dry season period, Adegbola and Asaolu (1985) identified cassava peel as an important by product. Browse plant with high nutritive value have been successfully fed to ruminant animals in alley farming system (Fasae and Alokan, 2006). Studies have shown that multipurpose trees can be used as cheap protein supplement which can improve voluntary intake, digestibility and general performance of animals fed low quality feeds. *Gliricidia sepium* has been described as suitable feed for ruminants which can be consumed in large quantities without deleterious effects on animal performance (Bawala, *et al*., 2006). It contains nutrient levels which are superior to minimum critical levels required for ruminants, and is comparable to other shrubs considered as having a right fodder quality (Smith and Van Houtert, 1981). The nutritive value of *Gliricidia sepium* as animal feed had been studied by Carew (1982), Mba *et al*., (1981), Onwuka (1980) among others. These studies indicated that *Gliricidia sepium* contains between 3.2 to 4.2% N and can also be used as a source of supplemental energy in animal feeding.

Blood is a specialized bodily fluid in animals that delivers necessary substances such as nutrients and oxygen to the cells and transport metabolic waste products away from those same cells. In vertebrates, it is composed of blood cells suspended in a liquid called blood plasma. Plasma, which constitute 55% of blood fluid, is mostly water (92% by volume) (Franklin institute, 2009) and contains dissipated proteins, glucose, mineral ions, hormones, carbon-dioxide (plasma being the main medium for excretory products transportation) and blood cells themselves. Blood performs many important functions within the body including: supply of oxygen to tissues (bound to haemoglobin, which is carried in red cells, supply of nutrients such as glucose, amino acids and fatty acids (dissolved in the blood or bound to plasma proteins e.g. blood lipids), removal of waste such as carbondioxide, urea and lactic acid, hydraulic functions and Regulation of core body temperature (Franklin institute, 2009).

Materials and Methods

Experimental Site

The experiment was carried out at the small ruminant unit of the Ladoke Akintola University of Technology Teaching and Research Farm, Ogbomoso. The area is located at 80 10'North latitude and 400 10′ East longitudes with annual rainfall of 1270 to 2030mm, which occurs in 7–10 months with a peak between July and September of the year. The temperature

of the area ranges between 33^0C to 38^oC, with humidly of about 79% all year round except in January when the dry wind blows from North (Olaniyi, 2006).

Experimental Animals and their Management

Twelve West African Dwarf sheep and goats of about one year old weighing 10 – 12kg for sheep, 6 – 8kg for goat were purchased from local markets. They were randomly divided into three treatments of four animals per treatment (for sheep and goat). The animals on arrival were confined in the quarantine pen which had been preciously washed and disinfected using Iodophor solution. The animals were treated against internal and external parasites using Ivomec at 1ml to 10kg body weight. They were also given long acting antibiotic at 1ml to 10kg body weight. They were then transferred into individual pens having the floor covered with wood shaving as bedding materials.

Experimental Diet

Cassava peels were collected from a local "garri" processing plant and sundried on a clean concrete floor for 5 days. *Gliricidia sepium* was harvested from existing plantation at the Teaching and Research farm. The leaves were pooled together and air dried to a constant moisture level and thereafter bagged for later use. The animals were allotted experiment as follows; T_1 was given 100% cassava peel, T_2 70% cassava peel + 30% *Gliricidia sepium* and T_3 50% cassava peel + 50% G*liricidia sepium*. Each animal within a group received 5% of its body weight daily of an assigned diet for 7 weeks and water was given ad libitum.

Chemical Analysis

The feed samples were analysed for their proximate composition to determine their Dry matter (DM), Crude protein (CP) Crude fat, Crudefibre (CF) and Total Ash according to AOAC (1995).

Data Collection

Blood sample was collected from each animal twice; on the 1st day of experiment and the last day of experiment through the jugular vein puncture using sterilized needle and syringe and emptied into collecting tube containing Ethylene-diamine-tretracetic acid (EDTA anti-coagulant). These blood samples were taken to laboratory where the following haematological parameters were determined; Red Blood Cell Count (RBC), White Blood Cell count (WBC), Packed Cell Volume (PCV), Hemoglobin Concentration (Hb), Neutrophil and Lymphocytes.

Statistical Analysis

Data obtained were subjected to analysis of variance (ANOVA) using the general linear model procedure of SAS 2000. The means were separated using Duncan multiple range test of the same statistical packages.

Results and Discussions

The chemical composition of cassava peel and *Gliricidia sepium* as shown in table 1 indicates higher Dry matter in cassava peel than what was obtained in *Gliricidia sepium* leaves. These values were higher than (66.25%) reported by Adegbola and Asaolu (1985) for cassava peel and (34.5%) reported by Onwuka (1985) for *Gliricidia sepium*. The crude protein content of cassava peel and *Gliricidia sepium* leaves were lower in value than (5.94%) and (20.69%) respectively, obtained by Onwuka (1985) when he studied *Gliricidia sepium* as dry season feed for goat production in Nigeria but cassava peel value was similar to what was reported by Adegbola and Asaolu (1985). Crude fat in cassava peel and *Gliricidia sepium* leaves were higher than values reported by Onwuka (1985) but the total Ash values were lower to results of Onwuka (1985) and Adegbola and Asaolu (1985). These variation or different values could be attributed to different environment where these feed stuffs were gotten, seasonal variation or time of the year (dry or raining season), age of the plant and varieties.

The experimental diet had significant effect on the haematological parameters of WAD sheep as shown in table 3. Though the WBC, RBC, Hb and Neutrophil values were higher in T_2 and T_3 before experimentation (Table 2) but higher values were obtained in T_1, T_2 and T_3 for lymphocytes at the end of experiment (Table 3) compared to what was obtained in table 2. Despite these significant effects of treatments, T_1 still retained its value unchanged which showed that if available in abundant during dry season, dried cassava peel (T_1) can be fed to sheep. The PCV value obtained from T_1, T_2 and T_3 (Table 3) despites the effects of experimental diet still fell within the normal range for sheep as reported by (Reece and Swenson, 2004). The lower values recorded for WBC and RBC for T_1 (Table 3) could be attributed to low level of protein (CP) in the feed (Table 1). The Hb value ranged from (9.83 – 13.00g/dl) and fell within the normal value reported by Adaramola, *et al*., (2005). The neutrophil values that were statistically similar ($p > 0.05$) in all treatments were higher than the values (28.25 and 35) reported by Anaeto *et al*., (2010) who studied the effect of cassava leaf silage and cassava peel diet on WAD sheep during dry season. Meanwhile the

lymphocytes values recorded in this study (Table 3) were lower to the value obtained by Anaeto *et al.*, (2010).

Goat showed positive response to experimental diet in lymphocytes with higher value recorded in T_2 than T_1 and T_3 (Table 5) which were also higher than what were obtained before experimental diet was given (Table 4). The treatment also had positive effect on T_1forHb and $T_3$for WBC than what were obtained in table 4. The PCV range of this study were lower to 32 – 45% reported by Banerjee (2005) but in agreement with what was reported by Adaramola *et al*., (2005) and higher than 28.30 – 28.80% reported by Ukanwoko and Ironkwe (2012) when they studied the growth performance and haematological values of West African Dwarf (WAD) goats fed *Leucaena, Gliricidia* and cassava leaf meal – cassava peel based diets. The PCV value in T_1 (Table 5) which was significantly ($p < 0.05$) different from others counts that cassava peel had ability to sustain goat without much effect on the total blood volume. The WBC (10^3/ml) values in T_1 and T_3 which were significantly higher ($p < 0.05$) than T_2 (Table 5) were lower to what was reported by Ukanwoko and Ironkwe (2012). The values recorded in this study for Hb in T_1, T_2 and T_3 (Table 5) were higher than what was reported by Ukanwoko and Ironkwe (2012) and compared favourably with the range of 7 – 15(g/dl) reported for WAD goats by Adaramola *et al*., (2005). The Neutrophil, though not significantly different ($p > 0.05$) in all treatments as well as lymphocytes, their values fell within the normal physiological values for WAD goats (neutrophil = 17- 52% and Lymphocytes 47 – 82%) (Daramola *et al*., 2005) as reported by Ifut *et al*., (2010).

Table 1: Proximate Composition of cassava peel and *Gliricidiasepium*leaves

PARAMETERS	**CASSAVA PEEL**	***GLIRICIDIA SEPIUM***
Dry matter (DM) %	88.68	70.84
Crude protein (CP)%	5.35	19.68
Crude fat %	5.11	10.93
Crude fibre %	3.35	2.77
Total Ash	4.77	7.51

Table 2: Haematological parameters of WAD sheep before experimentation

Parameter	T_1	T_2	T_3	SEM
PCV (%)	41.33	37.33	43.00	2.4
WBC(10^3/ml)	10533.33	9300.00	10900.00	937.0
RBC(10^6/ml)	13600000.00	13866666.67	13600000.00	1288122.3
Hb(g/dl)	13.17	11.93	13.40	0.8
Neutrophil (%)	42.33^b	42.67^b	58.33^a	2.6
Lymphocytes (%)	59.00^a	57.33^a	41.67^b	2.8

^{ab}, means within the same row with different superscripts are significantly ($P < 0.05$) different.

Where:

PCV = Packed cell volume, WBC = White blood cell, RBC = Red blood cell, Hb = Haemoglobin T_1 = Treatment 1, T_2 = Treatment 2, T_3 = Treatment 3, SEM = Standard error of mean, WAD = West African Dwarf.

Table 3: Haematological parameters of WAD sheep after experimentation

Parameter	T_1	T_2	T_3	SEM
PCV (%)	41.33^a	28.00^c	33.33^b	1.8
WBC(10^3/ml)	6000.00^b	6533.33^b	8933.33^a	449.2
RBC(10^6/ml)	5413333.33^b	7200000.00^{ab}	8533333.33^a	853715.3
Hb(g/dl)	13.00^a	9.83^b	12.07^a	0.4
Neutrophil (%)	39.33	42.00	38.00	2.9
Lymphocytes (%)	60.67	58.00	62.00	2.9

^{ab}, means within the same row with different superscripts are significantly ($P < 0.05$) different.

Where:

PCV = Packed cell volume, WBC = White blood cell, RBC = Red blood cell, Hb = Haemoglobin T_1 = Treatment 1, T_2 = Treatment 2, T_3 = Treatment 3, SEM = Standard error of mean, WAD = West African Dwarf.

Table 4: Haematological parameters of WAD goat before experimentation

Parameter	T_1	T_2	T_3	SEM
PCV (%)	40.00^b	58.00^a	53.00^a	2.0
WBC(10^3/ml)	17800.00^a	17500.00^a	13133.3^b	1283.9
RBC(10^6/ml)	12533333.33^b	17333333.33^a	11226666.67^b	1619712
Hb(g/dl)	12.67^b	17.33^a	16.33^a	0.6
Neutrophil (%)	34.00	39.33	40.33	6.1
Lymphocytes (%)	66.00	60.67	59.00	6.0

[ab], means within the same row with different superscripts are significantly ($P < 0.05$) different.

Where:

PCV = Packed cell volume, WBC = White blood cell, RBC = Red blood cell, Hb = Haemoglobin T_1 = Treatment 1, T_2 = Treatment 2, T_3 = Treatment 3, SEM = Standard error of mean, WAD = West African Dwarf.

Table 5: Haematological parameters of WAD goat after experimentation

Parameter	T_1	T_2	T_3	SEM
PCV (%)	38.67[a]	30.33[b]	32.33[b]	1.7
WBC(10^3/ml)	15066.67[a]	10733.33[b]	14333.33[b]	1230.1
RBC(10^6/ml)	10666666.67[a]	7200000[b]	7200000[b]	55511
Hb(g/dl)	13.27[a]	10.67[b]	11.07[ab]	0.7
Neutrophil (%)	33.33	26.67	34.00	2.7
Lymphocytes (%)	66.67	73.33	66.00	2.7

[ab], means within the same row with different superscripts are significantly ($P < 0.05$) different.

Where:

PCV = Packed cell volume, WBC = White blood cell, RBC = Red blood cell,Hb = Haemoglobin T_1 = Treatment 1, T_2 = Treatment 2, T_3 = Treatment 3, SEM = Standard error of mean, WAD = West African Dwarf.

References

[1] Adegbola, A.A. and Asaolu, O. (1985), Preparation of Cassava peels for use in Small Ruminant Production in western Nigeria. FAO Corporate Document Repository. Available at htt://www.fao.org/wairdocs/iLri/x5487e/x5487eog.htm.

[2] Akinlade J.A., Farinu, G.O., Olujide, A.M., Ojebiyi O.O., Aderinola, O.A. and Togun, V.A. (2005), Evaluation of shrubby legumes (*stylosanthesguinensis* and *stylosanthesscabra*) and cotton seed cake on the performance of West African Dwarf sheep, proceedings of 10th Annual Conference of Animal Science Association of Nigeria (ASAN), University of Ado-Ekiti, Nigeria. Sept 12 – 15, 2005, pp. 184 – 186.

[3] Anaeto M, Sawyerr, A.F. Alli T.R., Tayo G.O. and Olarinmoye A.O (2011). Effect of cassava leaf silage and cassava peel diet on West African Dwarf sheep during the dry season. Proceedings of 15th Conference of Animal Science Association of Nigeria (ASAN), (13 – 15 September 2010) University of Uyo, Nigeria.

[4] AOAC (1995) Association of Analytical Chemists, Official Methods of Analysis (18th edition) Washington D.C. USA pp. 69 – 88.

[5] Babayemi, O.J., Bamikole, M.A., Daniel, I.O, Ogungbesan, A., and Oduguwa, B.O. (2003) Degradability of three Tephrosia species, *Nigerian Journal of Animal Production* 30:62-70.

[6] Banerjee G.C (2005). Animal Husbandry (8th Edition), Bidhan Chendra Krishi Viswavidylaya Pg. 99-111.

[7] Bawala, T.O., Isah, O.A. and Akinsoyinu, A.O. (2006).Studies on Milk Mineral Composition of Lactating West Africa Dwarf goats. *Journal of Animal and veterinary Advances*, 5(10): 805 – 809.

[8] Carew, B.A.R. (1982). Free choice response of extensively managed goats in a tropical environment. Humid zone programme Document. No. 8, ILCA, Ibadan, Nigeria.

[9] Daramola J.O. Adeoloye A.A., Fatiba I.A and Soladoye A.O. (2005). Haematological and Biochemical Parameters of West African Goats. *Livestock Research for Rural Development.* 17(8).

[10] Fasae, O.A and Alokan J.A., (2006). Growth performance of weanerYankasa sheep fed varying levels of *Leucaenaleucocephala* leaf residues. ASSESS SERIES A6(2):323-328.

[11] Fasae, O.A, Adu, I.F. Aina, A.B. J and Ekemo, K.A. (2009). Effects of defoliation time of maize on leave yield, quality and shortage of maize leaves as dry season forage for ruminant production. *Brazillian Journal of Agricultural Sciences* 4(3):358 – 362.

[12] Ifut O.J., Inyang U.A. Ikpatt, E.A and Eyoh G.D (2010).Effect of Management Systems on Haematology, Parasite status and body mass index of West Africa Dwarf Goats in University of Uyo farm. Proceedings of 15th Conference of Animal Science Association of Nigeria (ASAN)(13 – 15 September 2010) University of Uyo, Nigeria.

[13] Mba, A.U., Manigu, S.A. &Awah, A.A. (1981). Influence of concentrate supplement with browse plant (*Gliricidia sepium)* on nutrient utilization and growth of West African Dwarf (Fouta Djallon) kids. *Nigerian Journal of Animal Production* 9(2):63 – 73.

[14] Olaniyi, J.O. (2006). Influence of phosphorus and Nitrogen fertilizers on seed yield and quality of egusi melon (*Citulluslanatus*) thumb in Ogbomoso, South Western Nigeria. PhD Thesis, University of Ibadan, Nigeria.

[15] Onwuka, C.F.I (1985). *Gliricida sepium* as dry season feed for goat production in Nigeria.FAO corporate Document Repository. In:
http:/www.fao,org/wairecsi/iLri/x54882e11.htm.

[16] Onwuka, C.F.I. (1980). The chemical composition and "In vitro" organic matter digestibility of some browse plants in Nigeria. Msc. Thesis, University of Ibadan, Nigeria pp70

[17] Peters, K.J., (1998). The important of small ruminants in rural development. *Animal resources and development* vol. 28:115 – 125.

[18] Reece, W.O. and Swenson, M.J. (2004). Composition and function of blood. Duke's physiology of Domestic Animals. Cornell University press U.S.A pp 26 – 32.

[19] Smith O.B and Yan Houtert, M.J., (1981). The Feeding Values of *Gliricidiasepium.* World Animal Review. (Rome). 62-68

[20] The Franklin institute inc. "Blood-The Human Heart".Retrieved 19 March, 2009.

[21] Ukanwoko A.I. and Ironkwe M.O. (2012). Growth Performance and Haematological Values of West African Dwarf (WAD) Goats fed *Leucaena, Gliricidia* and cassava leaf meal-cassava peel based diets. *International Research Journal of Agricultural Science and soil Science* (ISSN: 2251 – 0044) Vol. 2(3) pp. 098 – 101: 2012).