Nigerian J. Anim. Sci. 2016 (2):525 - 530

Haematology and faecal parasitic load of West African Dwarf goats fed *Panicum maximum* supplemented with wheat offal

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Target Audience: Animal scientists, Small ruminant farmers

Abstract

The haematology and faecal parasitic load of West African Dwarf (WAD) goats fed Panicum maximum supplemented with wheat offal (WO) at varying levels of supplement were investigated. Sixteen (16) WAD goats aged between 6-9 months were randomly allotted to four dietary treatments viz: T_1 – Panicum maximum ad libitum only (PM); T_2 – PM + 200g/d WO; T_3 – PM+ 225g/d WO; T_4 – PM + 250g/d WO in a completely randomized design. Results show there were no significant differences (P>0.05) in the hematological parameters (pre- vs post-trial) for Packed cell volume (PCV), Lymphocytes (L), Neutrophils (N) and Monocytes (M) vs. Total White Blood Cell (TWBC), L and N. There was an increased post-trial hematological over pre-trial hematological parameters for PCV, N and M while a decrease was observed for L in animals across the treatments. Animals on T_3 recorded the highest values for PCV (21.83 %), TWBC (19.10 x 10^3/mm^3), L (64.50 %), M (2.50 %) and Eosinophils (E) (1.50 %). For faecal parasitic Egg Count (FPEC), animals on T_1 recorded the highest values for Coccidia oocysts (7.33, 11.66 and 11.33 egg/g), tapeworm (28.66 and 6.00 egg/g) and E. coli (50.33 cfu/g) assessed during the three months except for tapeworm segment at month two (5.00 egg/g). At the third month, tapeworm segment decreased when compared with the first month while Coccidia oocysts increased except for animals on T_3 which decreased. With wheat offal supplementation, WAD buck goats appeared to be capable of increasing PCV and N counts as worm and E. coli decreased when compared with those fed solely on Panicum maximum forage.

Key words: Goats; Haematology; *Panicum maximum*; Wheat offal; Worm counts

Description of Problem

The West African Dwarf (WAD) goats are one of the three main and most numerous species in the humid rainforest of southern Nigeria, due to their greater ability to survive in this tsetse fly infested area, compared to cattle (1).

It is often difficult and erroneous to assess the correct health status of an animal without proper examination of its blood (2), as it is a fast and readily available trait employed in assessing clinical, nutritional and health status of animals, as well as giving some weight as to their production performance potential (3). Efforts to improve the rather low productivity of the WAD goat

through modern intensive rearing and management have been hampered by difficulties in preventing and controlling major infectious diseases (4). Parasitic diseases such as helminthic infestation are a continuous serious health problem to WAD goats affecting their productivity. Gastro-intestinal nematode infection is associated with effects on feed intake, gastro-intestinal function and protein turn over. Factors affecting the development and survival of these parasites are mainly environmental, especially seasonal climatic change and certain management practices (5).

This study was aimed at providing information on some hematological parameters and fecal parasitic load of West African Dwarf goats fed a basal diet of *Panicum maximum* supplemented with wheat offal at varying levels of supplement.

Materials and Methods

Study location

The study was conducted at the Goatry Unit of the University of Uyo, Uyo. Akwa Ibom State, Nigeria, lies between latitude $4^0 59^1$ and $5^0 04^1$ N and longitudes $7^0 53^1$ and $8^0 00^1$E, with an elevation of about 60.96 m above sea level (6). The experiment was carried out between September and December of 2012 before the dry season became very pronounced.

Experimental animals and diets

Sixteen (16) bucks and aged 6 – 9 months with pretrial weights of 6.0 – 6.75 kg were used for the experiment that lasted for 90 days. They were quarantined and acclimatized for two weeks. The bucks were randomly allocated to four experimental diets in a completely randomized design with Treatment 1 (T_1) serving as the control. The compositions of the experimental diets are as follows:

T_1 = *Panicum maximum ad libitum* (PM)
T_2 = PM + 200g Wheat offal
T_3 = PM + 225g Wheat offal
T_4 = PM + 250g Wheat offal

The *Panicum maximum* was harvested in the evening and fed to the animals the following morning. Feeding was done at 9.00 am while clean drinking water was also provided *ad libitum*.

Haematological indices

Blood samples were collected from the jugular veins of the animals into labeled sample bottles containing Ethylene-diamine tetracetic acid (EDTA) as the anticoagulant for the determination of hematological parameters. Packed cell volume (PCV) was determined by Micro-haematocrit methods. White blood cell (WBC) count was performed using the improved Neubeouer heamocytometer chamber while the differential leukocytes counts were performed according to the methods described by (7).

Faecal parasitic count/load

Faecal samples were collected from the rectum of the animals and analyzed for the presence and/or absence of coccidian oocyst, tapeworm segment and *E. coli*. About 3 g of faecal sample were ground and mixed with 50 ml of flotation fluid (a saturated solution in water). After filtering through a "tea strainer", a subsample was transferred to both compartment of a McMaster counting chamber and allowed to stand for 5

minutes. All helminthic eggs were counted under a microscope at 10x magnification and multiplied by 50 to yield the egg per grams (EPG) of faeces (5).

Proximate composition and statistical design

The proximate composition of the *Panicum maximum* and wheat offal was determined using the guidelines of (8). All data obtained were subjected to analysis using (9) in a completely randomized design . Treatment means were separated using Duncan's Multiple Range Test (9).

Results and Discussion

Presented in Table 1 is the proximate composition of *Panicum maximum* and wheat offal fed to the WAD bucks. The dry matter content of 84.00 % recorded for wheat offal was higher than that obtained for *Panicum maximum* (31.47 %). The DM value recorded for *Panicum maximum* was higher than that obtained by (10) of 25.01 % and falls within the range 17.89 – 32.90 % reported by (11). The proximate values

Table 1: Proximate composition (% DM) of the test ingredients fed to the WAD bucks

Fractions	*Panicum maximum*	Wheat offal
Dry Matter (DM)	31.47	84.00
Crude Protein (CP)	7.00	18.03
Crude Fibre (CF)	27.40	20.00
Ash	4.20	3.80

Table 2 depicts the pre-trial haematology of WAD goats fed *Panicum maximum* and wheat offal. The mean PCV values of 19.84, 21.33, 21.83 and 18.55 were obtained for goats on T_1, T_2, T_3 and T_4 respectively. Lymphocytes, monocytes and neutrophils counts showed no significant ($P>0.05$) differences between the treatment means. Total WBCs was significantly different between T_3 and T_4. Eosinophils differed significantly ($P<0.05$) between T_3 and T_2. These values however, were within normal physiological range reported for healthy WAD goats: PCV (18.0 – 39.0 ml %), WBCs (12 – 19.0 ($x10^3$ / mm^3), Neutrophils (22.0 – 80.0 X $10mm^3$%), Lymphocytes (20.0 – 78.0 x $10mm^3$%), (13; 14; and 2), hence, indicating that the animals were all healthy.

Post-trial haematology of WAD goats fed *Panicum maximum* and varying levels of wheat offal is presented in Table 3. When compared with Table 2, PCV values increased in goats on T_1 and T_3 post-trial hematological but reduced in those on T_2 and T_4. The reduced PCV values may be attributed to season, nutritional stress, and intensive management. For lymphocytes, the values reduced for all animals post-trial hematological while for Neutrophils it increased across the treatments. The values obtained post-trial hematological was within normal physiological range reported for normal WAD goats (2).

Table 4 shows the parasites identified as a result of faecal floatation procedure method for endo-parasite determination. In the first two months, goats on T_1 recorded the highest faecal egg count of coccidia oocysts and tapeworm segment. By the ninety days, goats on T_1 also had the highest number of coccidia oocysts egg count and tapeworm segment. For *E. coli*, goats on T_1 also had the highest significant ($p<0.05$) count with those on T_4 recording the least. The

high level of *Eimeria* (coccidia) oocyst and tapeworm segments present in the faecal samples of these WAD goats may be an indication that the forage the goats were fed on were parasite infested due to the pre-dry season (Mid-September to Mid-December) that the experiment was conducted. It has been indicated that the number of infective larvae that successfully develop and migrate up to the stems of the herbage (to be consumed by animal) can be influenced by pasture-plant species and that some plant species might have thicker water films than other plants. This migratory behavior of the infective larvae could also partially explain why animals on T_1 which consumed only *Panicum maximum* had higher level of parasite egg per gram (EPG). However, faecal contamination of forage is an important factor which could lead to the prevalence of *E. coli* among West African Dwarf goats (15).

Table 2: Pre -trial haematology of WAD goats fed *Panicum maximum* and varying levels of wheat offal

	TREATMENTS				
PARAMETERS	**T_1**	**T_2**	**T_3**	**T_4**	**SEM**
PCV, (ml %)	19.83	21.33	21.83	18.50	0.97
Total WBCs, (X 10^3/mm^3)	18.50^{ab}	18.40^{ab}	19.10^{a}	16.36^{b}	0.69
Lymphocytes, %	56.66	57.66	64.50	62.50	4.71
Neutrophils, %	40.83	40.66	31.83	35.16	4.46
Eosinophils, %	2.00^{ab}	1.00^{b}	2.50^{a}	1.33^{ab}	0.36
Monocytes, %	0.83	0.66	1.50	1.00	0.51

Table 3: Post -trial hematological parameters of WAD goats fed *Panicum maximum* and varying levels of wheat offal

	DIETARY TREATMENTS				
PARAMETERS	**T_1**	**T_2**	**T_3**	**T_4**	**SEM**
PCV, (ml %)	24.00^{a}	21.00^{a}	22.00^{a}	14.50^{b}	1.36
Total WBCs, (X 10^3/mm^3)	18.50	17.80	22.00	18.70	1.28
Lymphocytes, %	41.50	38.00	41.00	45.00	2.77
Neutrophils, %	55.00	59.00	56.00	53.00	3.04
Eosinophils, %	2.00^{a}	1.50^{b}	1.00^{c}	1.00^{c}	0.14
Monocytes, %	1.33^{ab}	1.33^{ab}	2.00^{a}	1.00^{b}	0.24

$^{a, b, c}$: mean in the same row with different superscripts differ significantly (P<0.05).

Table 4: Identification of Endo -parasites of WAD Goats fed *Panicum maximum* and varying levels of wheat offal for ninety (90) days

0 – 30 DAYS	**T1**	**T2**	**T3**	**T4**	**SEM**
PARASITE					
Coccida oocyst (egg/g)	7.33	5.00	4.33	4.33	2.90
Tapeworm Segment (egg/g)	28.67^{a}	11.33^{ab}	6.00^{b}	7.33^{b}	5.64
31 – 60 DAYS					
Coccida oocyst (egg/g)	11.67	7.33	7.00	6.00	2.13
Tapeworm Segment (egg/g)	5.00	5.00	7.00^{a}	3.33	1.09
61 – 90 DAYS					
Coccida oocyst (egg/g)	11.33^{a}	5.67^{ab}	4.00^{b}	4.67^{b}	1.83
Tapeworm Segment (egg/g)	6.00^{a}	4.00^{a}	5.00^{a}	4.67^{b}	1.13
E coli	50.33^{a}	2.67^{c}	30.00^{b}	0.00^{c}	16.86

$^{a, b, c}$: means in the same row with different superscripts differ significantly (P<0.05).

Conclusions and applications

1. The coccidia was reduced to the least as a result of WO supplementation at 225g.
2. For optimum physiological health of the West African Dwarf goats in terms of haematology, 225 g level of wheat offal supplement with *Panicum maximum* (T3) is recommended for growing West African Dwarf goats as values up to 250 g lowered the PCV of the animals.

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