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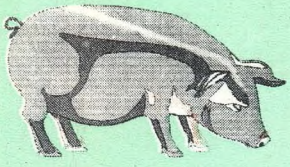

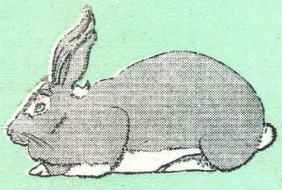

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HAEMATOLOGICAL EVALUATION OF PREGNANT EWES FED BROILER - LITTER BASED DIETS

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ABSTRACT

Blood is a transport medium for the body which plays an active role in sustainability and survival of the organism. Haematological indices reflect the effect of dietary treatments on the animal especially the type and amount of feed ingested and available for the animal to meet its body requirements. A study was carried out for 10 weeks to assess changes in some haematological indices with advancing pregnancy in ewes fed Broiler Litter (BL) based rations. Blood samples were collected at each trimester of pregnancy and analyzed for Packed Cell Volume (PCV), Red Blood Cell (RBC), White Blood Cell (WBC) counts and Haemoglobin (Hb) concentration. Other parameters estimated were: Mean Corpuscular Value (MCV) and Mean Corpuscular Haemoglobin Concentration (MCHC). Results showed that in the first trimester, PCV and Hb. values were significantly higher ($P<0.05$) in animals fed at 0%, 25%, 50% and 75% BL inclusion levels. In the second trimester, RBC values decreased with increasing levels of BL in the diet while other parameters studied were not significantly different. The findings of this study showed that livestock farmers in the tropics can include broiler litter as feed supplement up to 25% without any adverse effect on the blood chemistry.

Keywords: Pregnant ewes, Broiler litter, Blood, Haemoglobin and Pregnancy.

INTRODUCTION

Blood is a transport medium for the body and plays an active role in the sustainability and survival of the organism. It is an important index of physiological and pathological changes in any organism (Mitruka and Rawnsley, 1977).

The purpose of investigating blood composition is to distinguish normal state from states of stress. Stress factors can be nutritional, environmental or physical (Tewe *et al.*, 1981). Ilemobade (1982) stated that it is often difficult to assess the correct health status of an animal without recourse to an examination of its blood. The heamatological indices are reflections of the effects of dietary treatments on the animal in terms of the type and amount of feed ingested and were available for the animal to meet its physiological, biochemical and metabolic necessities. The blood contains a myriad of metabolites and other constituents which provide a valuable medium for clinical investigation and nutritional status of human beings and animals, therefore, blood constituents are widely used in nutritional evaluation and survey of animals (Olorode *et al.,* 1995). Essentially, blood consists of plasma, a fluid medium in which is suspended the red blood cells (erythrocytes), white blood cells (leukocytes) and the platelets (thrombocytes). The blood cell forming organs include the bone marrow, liver, spleen, lymph nodes and reticuloendothelial tissues (Esugbohungbe, 1991).

The usefulness of normal haematological values in assessing the health status of ruminants has been established (Oduye and Okunaiya, 1971). Aletor and Egberongbe (1992) reported that blood variables consistently affected by dietary influences include packed cell volume, haemoglobin concentration, erythrocyte counts and plasma protein glucose.

Also, in hematological assessment, the parameters of interest are Red Blood Cedll (RBC) count, White Blood Cell (WBC) count, Packed Cell Volume (PCV), Hemoglobin (Hb) values, Mean Corpuscular Value (MCV), Mean Corpuscular Hemoglobin Concentration (MCHC).

This study was carried out to observe the changes in some haematological indices with advancing pregnancy in ewes when fed broiler litter based rations.

MATERIALS AND METHODS

Management of Animals: In a 10 week study, sixteen primiparous WAD ewes (aged 2-3 years and weighing 23-28kg) were distributed into four treatments in a randomized complete block design. The flock was routinely dewormed using Ivomectin and dipped against ticks and fleas using Gamatox. Also, at the beginning of rainy season, the animals were treated with antibiotics and vaccinated against *Pestes des petit* ruminants' disease. They had access to mineral licks and fresh water on the free choice basis. They were randomly distributed into four groups of four animals assigned to each of the four experimental rations comprising 0, 25, 50 and 75% levels of broiler litter inclusion as replacements for Palm Kernel Cake in their diets (Table 1).

Blood Collection:

Blood was collected once in a trimester from each animal by jugular vein puncture into bijou bottles containing ethylene-diamine-tetra-acetic acid (EDTA) at 1.5mg/ml of blood as anticoagulant. The first sample was collected three days prior to mating while subsequent collections were done at the same time corresponding to the three trimesters of pregnancy till parturition. Total Red Blood Cell (RBC) and White Blood Cell (WBC) counts were determined. The Packed Cell Volume (PCV) was determined by microhaematocrit method. Haemoglobin (Hb) values were estimated by the alkali haematin method according to Schalm (1965). Values of RBC were determined by the microscopic method in a counting chamber after dilution with Hayens solution. Estimation of WBC was done in the improved Neubauer haemocytometer chamber using 2% acetic acid as diluent. MCV and MCHC were calculated from values of PCV, Hb. and RBC as described by Mitruka and Rawnsley (1977).

Chemical Composition and Statistical Analysis:

Dry matter, crude protein, fat, ash, acid detergent fibre and neutral detergent fibre of the broiler litter based diets were determined as described by AOAC (1990).

All data were subjected to analysis of variance using the procedure of SAS (1999). Statistical significance between means was determined according to Duncan option of the same package.

RESULTS AND DISCUSSION

Changes in haematological indices due to treatment effect:

Haematological values for WAD ewes fed broiler litter based rations during pregnancy are presented in Tables 3 – 8. Variations observed in haematological indices due to treatments were significant ($P < 0.05$) for PCV, RBC, Hb and MCV in the first trimester of pregnancy while in the second trimester of pregnancy, indices like RBC, WBC and Hb. were significantly affected ($P < 0.05$). However, in the third trimester of pregnancy, no significant difference was observed among all parameters studied except RBC which was significantly different ($P < 0.05$).

Variations observed due to treatment did not follow any definite observable trend. This could be due to the fact that under a wide range of feeding regimes, an animal maintains its blood picture within ranges normal for that breed in that environment. Once the feed is adequate, variations observed could indirectly be due to reactions to external changes rather than direct response to feeding regime.

Changes in haematological indices due to advancing pregnancy:

PCV values in the first trimester were: 31.4%, 31.6%, 28.8% and 27.9% for animals on 0, 25, 50 and 75% BL inclusion respectively. The values obtained fell within the normal range of 29.0 – 38.5% for mixed sex, breed and age (Mitruka and Rawnsley, 1977). However, animals on 50% BL inclusion recorded lower values in the first and second trimesters. Despite the low PCV in the second trimester, the animals survived and reported a high PCV in the third trimester.

Similarly, WBC for all the animals on all experiments remained within the normal range of 4.0 – 12.0 103/mm3 described by Mitruka and Rawnsley (1977) from the beginning to the end of the period of experimentation. A slight peak was observed for animals on 25% BL inclusion for second trimester coinciding with the peak in DM intake.

Ironically, very high WBC values were observed in all the animals during the second trimester of pregnancy.

RBC values were below the normal values (8.0 – 14.0 **106/mm3**) documented for sheep by Mitruka and Rawnsley (1977) but agreed with values obtained by Esugbohungbe (1991) who also worked on WAD sheep at Ibadan, Nigeria. Low erythrocyte values reported may be due to the presence of a low but constant parasitic burden (Nfi, 1991).

Table 1: Gross composition of the broiler litter based diets fed pregnant ewes

	Diets			
Ingredients	A	B	C	D
Broiler litter	0	25	50	75
Palm kernel cake	52	27	02	-
Wheat bran	`30	30	30	15
Corn bran	15	15	15	07
Salt	2	2	2	2
Palm oil	1	1	1	1
Calculated CP	16.1	17.5	15.8	20.9

Table 2: Chemical Composition (g/100g DM) of Broiler Litter

	Treatment (Age in Days)		
Nutrient	35^{th}	42^{nd}	49^{th}
Dry matter (%)	81.1±2.2	86.0±2.0	84.1±1.9
Crude Protein(%)	22.5±1.3	25.4±0.9	23.5±0.2
Fat (%)	$2.5±0.0^a$	$2.5±0.1^b$	$2.5±0.1^a$
Ash (%)	$21.5±0.4^a$	$18.6±0.2^a$	$21.5±0.8^a$
ADF (%)	21.4±0.4	20.3±0.2	20.8±0.4
NDF (%)	40.5±0.5	38.2±0.1	39.3±0.5

a,b: Means within the same row with different superscripts are significantly different.

Table 3: Packed Cell Volume (PCV) of WAD ewes fed broiler litter based ration

	Treatments			
Trimester	A	B	C	D
1st	31.4±1.1[a]	31.6±0.5[a]	28.8±0.5[ab]	27.9±1.3[b]
2nd	31.0±1.2	30.3±0.8	28.8±1.4	30.3±1.4
3rd	32.8±1.1	30.0±0.7	32.3±1.2	30.6±1.4

a,b,c: Means in the same row with different superscripts are significantly different ($p < 0.05$).

Table 4: White Blood Cell (WBC) count of WAD fed broiler litter based ration

	Treatments			
Trimester	A	B	C	D
1st	8.9±1.2[a]	7.5±0.5[a]	8.2±0.5[a]	6.8±0.6[a]
2nd	8.8±0.5[a]	10.3±0.9[c]	8.3±0.9[b]	7.3±0.4[a]
3rd	7.4±1.1	6.9±1.3	8.6±1.1	7.1±0.5

a,b,c: Means in the same row with different superscripts are significantly different ($p < 0.05$).

Table 5: Red Blood Cell (RBC) count of WAD ewes fed broiler litter based ration.

	Treatments			
Trimester	A	B	C	D
1st	5.5±0.2[a]	6.8±0.9[a]	9.7±0.4[a]	4.9±0.2[b]
2nd	6.1±0.6[c]	6.6±0.5[c]	5.5±0.5[b]	4.9±0.2[a]
3rd	6.7±0.3[a]	6.2±0.4[a]	5.9±0.5[a]	6.9±0.3[b]

a,b,c: Means in the same row with different superscripts are significantly different ($p < 0.05$).

MCV values observed for all treatments fell outside the normal range (28.4 – 31.6) for all the ewes. This probably shows that the erythrocytes of the WAD ewes used in this study were observed to be macrocytic or larger than normal.

MCHC values were initially below the normal range (30.0 – 38.0%) for ewes in the first trimester; however, with advancing pregnancy, the MCHC values became very high in the second trimester and dropped a little in the third trimester. This is to be expected since most macrocytic anemia's are transitory being commonly observed in the recovery stages in recuperating animals (Coles, 1974). By the end of the third trimester, MCHC values had returned to normal.

For Hb.values, Mitruka and Rawnsley (1977) reported 8.5 – 13.2g/dl therefore in this study, Hb. values stabilized within the normal range in this study. This observation on haematological indices shows that parasitic diseases play an important role in livestock productivity in the humid tropic (Wilson, 1964) into which zone Southern Nigeria falls. Ecological conditions here also support several vectors and parasites of economic significance. This explains why a considerable proportion subsists under sub-clinical infections (Ristic and Mcintyre, 1981).

Table 6: Haemoglobin (Hb) values of WAD ewes fed broiler litter based ration

	Treatments			
Trimester	A	B	C	D
1st	10.5±0.3[a]	10.6±0.2[a]	9.6±0.4[b]	9.3±0.5[b]
2nd	10.3±0.1[a]	10.1±0.4[a]	8.9±0.5[b]	10.1±0.6[a]
3rd	10.9±0.4	10.0±0.8	10.8±0.7	10.2 ± 0.8

a,b,c: Means in the same row with different superscripts are significantly different ($p < 0.05$).

Table 7: Mean Corpuscular Volume (MCV) of WAD ewes fed broiler litter based ration

	Treatments			
Trimester	A	B	C	D
1st	57.3±1.2[a]	47.0±3.8[a]	51.4±2.1[ab]	57.3±0.8[a]
2nd	52.9±3.3	46.9±3.0	50.0±2.4	61.4±3.4
3rd	49.6±2.2	49.6±2.2	48.8±1.0	44.8±2.5

a,b,c: Means in the same row with different superscripts are significantly different ($p < 0.05$).

Table 8: Mean Corpuscular Haemoglobin Concentration (MCHC) of WAD ewes fed broiler litter based ration

	Treatments			
Trimester	A	B	C	D
1st	22.8±0.3	25.5±0.9	27.4±1.2	27.4±0.9
2nd	35.5±2.1	33.8±1.4	39.1±1.6	38.0±1.9
3rd	34.1±2.0	31.4±1.5	30.1±1.8	33.9±1.2

a,b,c: Means in the same row with different superscripts are significantly different ($p < 0.05$).

The animals used in this study were trypanotolerant WAD sheep. This category of animal has a certain degree of innate genetic resistance to trypanosomiasis (ILCA, 1976). This phenomenon confers on the animal the ability to contain to a great extent the effect of trypanosomiasis infection and continue growing and reproducing without therapy but this challenge will show in the blood picture.

CONCLUSIONS AND APPLICATIONS:

The positive response of the pregnant ewes to varying levels of broiler litter in the rations, shown by the normal blood parameters suggests its positive acceptance and utilization. It then implies that livestock farmers in the tropics may include broiler litter as feed supplement up to 25% without any adverse effect on their haematology.

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