HAEMATOLOGICAL AND SERUM PROFILE OF YANKASA RAMS FED ENSILED CORNCOB LAYER-LITTER BASED DIET WITH GRADED LEVELS OF *F. POLITA* LEAF MEAL IN A TOTAL MIXED RATION

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ABSTRACT
Provision of feed for ruminants in a profitable livestock enterprise is a challenge. Use of conventional diets often results to high cost of input. Animal based fed may be available and cheaper but may detrimental to the animal consuming it. Thus, this study was conducted to determine the haematological and serum profile of Yankasa rams fed ensiled corncob layer-litter based diet with different levels of Ficus polita leaf meal in a Total Mixed Ration. Sixteen rams weighing averagely 21kg were assigned to four diets containing 0, 15, 30, and 45% inclusion levels of FPLM in a completely randomized design. The rams were fed 4% of their body weight daily at 8:00am and 4:00pm for 90 days. Blood samples were collected at the end of 90days for haematological and serum analysis. The results showed that significant (P<0.05) differences were recorded in the PVC, HB and RBC levels with higher values of 30.50%, 11.23g/dL, and 5.28 x10^{12}/L, respectively recorded in the rams fed the experimental diet with FPLM at 45% inclusion level. The white blood cell, neutrophil, lymphocyte and monocytes counts of Yankasa rams fed experimental diets were not significantly (P>0.05) influenced. The serum biochemistry results showed that the total protein of rams fed the control diet was significantly (P<0.05) lower than those on 15% inclusion level of FPLM. The blood urea, and albumin level were significantly (P<0.05) affected and decreased as inclusion level of FPLM increased, while the levels of globulin and creatinine significantly (P<0.05) increased with increase in inclusion levels of FPLM. The result obtained in this study falls within the normal range reported for a healthy ram and showed that ensiled corncob layer-litter with FPLM did not have adverse effects on health status of Yankasa rams.
Keywords: Haematology, Serum, *F. polita*, Corncob, Layer-litter

INTRODUCTION

Ruminant farmers face problems of seasonal malnutrition resulting in fluctuating productivity and economic loss (Aruwayo and Razaq, 2019). However, the use of browse plants and unconventional feed resources such as crop residues has been advocated as a way out of this problem, while researches are being carried out to evaluate the health implication of feeding these unconventional feeds (Oloche *et al.,* 2018).

Corn-cob, being one of the most plentiful crop residues is often overlooked or deemed a waste product. Its potential value in enhancing ruminant nutrition and widespread availability have sparked interest in its inclusion in livestock feed (Zagi and Mahmud, 2022). However, due to its fibrous nature and high lignocellulose content, appropriate treatment or supplementation with browse plants and/or additional nutrients is necessary before feeding it to ruminants (Haula *et al.,* 2021). Browse plants such as Ficus spp make up a significant portion of the available forage and provide livestock with supplemental nutrition during dry season because they are perennial and as such, they are resistant to abrupt weather changes, thus continue to produce higher quality and quantity of fodder even during the dry season (Aruwayo and Razaq, 2019).

Blood is a medium through which nutrients are conveyed to various parts of the body system of an animal and a readily available and fast means of assessing the health and nutritional status of an animal on feeding trial (Oloche *et al.,* 2018). It therefore becomes imperative to evaluate blood parameters of an animal particularly when feeding unconventional feeds. It is against this background that the present study was carried out to evaluate the haematological and serum profile of Yankasa rams fed ensiled corncob layer-litter based diet with graded levels of *F. polita* leaf meal.

MATERIALS AND METHODS

Experimental Site

The study was carried out at the Teaching and Research Farm of the Department of Animal Science, Ahmadu Bello University Zaria, between latitudes 11^0 12‟ N and longitudes 7^0 33‟ E, with a mean relative humidity of 21% and 72% during the harmattan and rainy seasons respectively, annual rainfall range of 1100-1200mm per annum, and mean temperature range of 9.20-40.20^{0}C (IAR, 2021).

Feed Collection, Processing and Ensiling Procedure

Twigs of *Ficus polita* representing the Genus Ficus of the family Moraceae were collected and authenticated at the Herbarium section of the Department of Botany, Faculty of Life Sciences, Ahmadu Bello University Zaria. They were shade dried for 5 days and milled. The corncobs were collected from the Institute of Agricultural Research (IAR), Ahmadu Bello University and were ground using hammer mill, fitted with a 3mm particle size sieve. The layers litter was sourced from the deep litter system of the NAPRI poultry farm, shade dried for five days, feathers and caked litters were sieved out. The ground corncob and layers litter were thoroughly mixed in a ratio of 70:30 (Haula *et al.,* 2021) with 2% molasses added to enhance fermentation. The mixture was put in plastic bags (PICS®), compressed to remove air, closed, and stored for 21 days away from sunlight to ferment. At the end of the 21 days samples of ensiled materials were opened and shade dried for 5 days before feeding to the animals.

Experimental Animals, Management, Design and Treatment

Sixteen growing Yankasa rams at about 8-11 months weighing averagely 21kg were obtained from Lamba-Zango livestock Market in Kaduna South Local Government Area of Kaduna State. They were quarantined for two weeks and dewormed using Ivermectin Injection (Ivermec®), vaccinated against PPR and long-acting antibiotic (Oxytetracycline LA®) was administered at the recommendation of a veterinarian. At the end of the 2weeks, they were weighed and randomly allotted to four dietary treatment groups, with four animals per treatment in Completely Randomized Design (CRD). Four iso-nitrogenous supplementary diets were formulated, containing *Ficus polita* leaf meal at 0, 15, 30, and 45% inclusion levels, with each inclusion level serving as a treatment. Animals were fed the ensiled corncob-layer litter (ECCLL) and the supplementary diet at a ratio of 60:40 in a total mixed ration (TMR) at 4% of their body weight at 8:00 am, and 4:00pm daily and freshwater was provided *ad libitum.*

Haematology and Serum Biochemistry and Analytical Methods

About 5mL of blood was collected at the end of the feeding trial from the jugular vein of three rams from each of the treatment groups using a hypodermic syringe into EDTA and plain containers and taken to the NAPRI lab for determination of haematology and serum profile respectively. Packed cell volume was determined using the standard technique described by (Coles, 1986), haemoglobin concentration was assayed colourimetrically using the cyanomethaemoglobin method (Drabkin, 1945). Red blood cell and white blood cell was measured with the aid of Neubaur counter (haemocytometer) (Schalm,1976). Total protein determination was carried out by the biuret method of (Lubran, 1978), serum albumin concentration was determined using bromocresol green method (Doumas and Peters, 1997), determination of serum cholesterol concentration was done using the method as described by (Abel *et al.,* 1952) and serum creatinine concentration was determined by the modified Jaffe method (Blass *et al.,* 1974).

Chemical and Statistical Analysis

Samples of experimental diets were taken to the National Animal Production Research Institute (NAPRI) Biochemical Laboratory and analysed for proximate composition according to the procedure of (AOAC, 2005), and NFE by difference. Acid Detergent Fibre, Neutral Detergent Fibre were analysed using the method of (Van soest *et al.,* 1991). Data collected were analyzed using the procedure of the statistical analysis system (SAS, 2002). Significant differences among treatment means were compared at a 5% probability level using Fishers Least Significant Difference (LSD) test in the SAS Package.

RESULTS AND DISCUSSION

Ingredient and Chemical Composition of Experimental Diet

The result of chemical composition of the experimental diet is presented in Table I. The DM content ranged from 89-92.52% and are comparable to the values (91.71-92.73%) of (Oyewo *et al.,* 2022)

when they fed varying mixture of *F. polita* to Bunaji bulls. The CP content of the diets varied between 11.17-16.69% and some of the values are lower and some are higher to the range of 4.98-13.86% reported by (Zagi and Mahmud, 2022) when they analysed the chemical composition of mixture of corncob and broiler litter. The levels of CP in the current study are higher than the critical level of 8% necessary to provide minimum ammonia required by rumen microorganism to support optimum activity (Oloche *et al.,* 2018). Neutral detergent fibre (NDF) ranged between 35.74 - 40.97% and are higher than the 18.90-31.77% reported by (Oyewo *et al.,* 2022). The ADF was varied from 22.96 - 26.88% and are similar to the values documented by (Zagi and Mahmud, 2022) in a similar study.

Table I: Ingredient Composition of Concentrate Diet fed to Yankassa ram

	Inclusion Levels of Ficus Leaf Meal (%)					
Ingredients	0	15	30	45		
Maize Offal	68.65	57.65	46.65	35.65		
Ficus Leaf Meal	00.00	15.00	30.00	45.00		
Brewers Dried Grain	19.00	15.00	11.00	07.00		
Cowpea Husk	10.00	10.00	10.00	10.00		
Bone Meal	01.50	01.50	01.50	01.50		
Common Salt	00.60	00.60	00.60	00.60		
Premix	00.25	00.25	00.25	00.25		
Total	**100**	**100**	**100**	**100**		
Chemical Composition of Experimental Diet (%)					FPLM	ECCLL
Dry Matter	92.52	91.69	89.00	91.55	86.57	92.32
Crude Protein	14.75	16.31	16.69	16.12	11.17	12.19
Crude Fibre	16.74	13.51	17.41	13.31	19.28	12.92
Nitrogen Free Extract	56.47	53.62	51.76	57.55	45.75	54.72
Neutral Detergent Fibre	35.74	35.87	39.94	40.97	42.36	49.15
Acid Detergent Fibre	22.96	24.40	25.53	26.88	17.62	27.39

Haematological Indices of Yankasa Rams Fed Varying Levels of *F. polita* Leaf Meal with Ensiled Corncob Layer-Litter Based Diet

Table II shows the haematological response of the experimental animals fed the treatment diets. Except for the RBC values, the result obtained in this study all falls within the reference value documented by (Jackson *et al.,* 2002) for a healthy ram. Significant ($P<0.05$) differences were recorded in the PVC, HB and RBC levels with inclusion of *F. polita* leaf meal. The values of PCV, RBC and Hb obtained in this study are higher than those reported by (Njidda *et al.,* 2021), and lower than those obtained by (Oloche *et al.,* 2018). No significant difference was recorded among the white blood cell differentials (Neutrophils, lymphocytes and monocytes).

Table II: Haematological Indices of Yankasa Rams Fed Varying Levels of *F. polita* Leaf Meal with Ensiled Corncob Layer-Litter Based Diet.

	Inclusion Levels (%)					
Parameters	0	15	30	45	LSD	Ref. Value
PCV (%)	23.75^{b}	29.50^{ab}	27.00^{ab}	30.50^{a}	5.82*	27.0-45.0
HB (g/dL)	8.18^{b}	10.43^{ab}	9.30^{ab}	11.23^{a}	2.52*	9.0-15.0
RBC (10^{12}/L)	4.10^{b}	4.98^{ab}	4.65^{ab}	5.28^{a}	0.96*	8.0-18.0
TWBC (10^{9}/L)	8.30	8.80	10.75	10.25	4.20^{NS}	4.0-12.0
Neutrophils (10^{9}/L)	4.19	3.72	3.76	3.98	2.18^{NS}	0.7-6.0
Lymphocytes (10^{9}/L)	3.63	4.25	6.13	5.45	2.70^{NS}	2.0-9.0
Monocytes (10^{9}/L)	0.12	0.21	0.20	0.16	0.20^{NS}	0-0.8

PCV= Packed Cell Volume, HB= Haemoglobin, RBC= Red Blood Cell, TWBC= Total White Blood Cell, abc Mean values with different superscripts within a row differed significantly; LSD= Least Significant Difference; * Significant at 0.05; NS= Not Significant.

Serum Metabolites of Yankasa Rams Fed Varying Levels of *F. polita* Leaf Meal with Ensiled Corncob Layer-Litter Based Diet.

Table III summarizes the effects of the dietary treatments on blood chemistry. The values obtained falls within the normal range reported by (Fielder, 2022) for a healthy ram, Significant (P<0.05) differences were observed in all parameters except cholesterol across treatments groups. The Total protein level in this study ranged between 7.25-7.85 g/dl and within the range of 7.33-7.93 g/dl reported by (Oloche *et al.,* 2018) for red Sokoto buck fed *F. polita* basal diet. This study recorded a decrease in the level of blood urea, albumin and cholesterol as the inclusion level of *F. polita* increased. The levels of urea recorded in this study are lower than the levels of 4.4 to 8.9mmol/l reported by (Njidda *et al.,* 2021). The creatinine values in the present study ranged between 0.08-0.13 mmol/l and higher than those of (Oloche *et al.,* 2018) for bucks fed *F. polita* basal diet.

Table III: Serum Metabolites of Yankasa Rams Fed Varying Levels of *F. polita* Leaf Meal with Ensiled Corncob-Layer Litter Based Diet.

	Inclusion Levels (%)					
Parameters	0	15	30	45	LSD	Ref. Value
Total Protein (g/dL)	7.25^{b}	7.85^{b}	7.43^{ab}	7.50^{ab}	0.54*	6.0-7.9
Blood Urea (mmoL/L)	1.23^{a}	1.23^{a}	1.19^{a}	1.01^{b}	0.32*	2.8-7.1
Albumin (g/dL)	5.28^{a}	5.55^{a}	4.23^{ab}	3.27^{b}	1.96*	2.4-3.0
Globulin (g/dL)	1.97^{b}	2.30^{b}	3.19^{ab}	4.23^{a}	1.90*	3.5-5.7
Creatinine (mmoL/L)	0.08^{b}	0.08^{b}	0.10^{ab}	0.13^{a}	0.08*	0.06-0.11
Cholesterol (mmoL/L)	3.36	3.18	2.91	2.85	2.41^{NS}	2.8-4.2

abc Mean values with different superscripts within a row differed significantly; LSD= Least Significant Difference; * Significant at 0.05; NS= Not Significant

CONCLUSION

The study of haematological and serum biochemical constituents of Yankasa rams fed ensiled corncob layer-litter based diet with varying levels of *Ficus polita* leaf meal showed no adverse effect on the health status of the animals, and should be fed to animals during the dry season without adverse effect on the animal's health status.

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