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Full Length Research Article

Haematological Response and Blood Chemistry of Yankasa Rams Fed Graded Levels of *Tamarindus indica* (Tamarind) Leaves

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ABSTRACT: A study was conducted to investigate the effect of graded levels of tamarind leaves (*Tamarindus indica*) based diets on the haematological and serum biochemical parameters of Yankasa rams. Twelve (12) rams with an average weight of 17.4 kg were allotted to three treatments. The treatments evaluated were 0%, 15% and 30% inclusion levels of the test ingredient in a Randomized Complete Block Design. The diets were iso-nitrogenous and the trial lasted for eight (8) weeks. Effect of the diets on haematology, serum chemistry and serum electrolytes were determined. The results reveal no significant difference (P> 0.05) in packed cell volume, red blood cell, haemoglobin, urea, total proteins, creatinine and the serum electrolytes between control and study animals. However, significant increases (P< 0.05) were obtained in the globulin (3.95, 4.05 and 4.45 g/dl for 0%, 15% and 30% inclusion levels respectively) and cholesterol levels (2.70, 3.20 and 3.60 mmol/l respectively) with increase in *T. indica leaves*. It is concluded that inclusion of tamarind leaves in the diet of Yankasa rams had no deleterious effect on the haematological parameters evaluated. It is recommended that further study on the feeding potential of *T. indica be* conducted on other species of livestock to ascertain the feeding value of same.
***Keywords**:* Haematology, serum chemistry, Yankasa and *Tamarindus indica*

INTRODUCTION

Sheep and goats constitute a very important part of the livestock sub sector in the Nigerian agricultural economy (Lakpini *et al.,* 2002). The use of sheep and goats for religious and social ceremonies adds unquantifiable value to their economic importance in the lives of Nigerians. They fulfill a most useful task in supplying human population with meat, milk, skin, hair and other products (Adeloye, 1998). The full exploitation of the numerous attributes of small ruminants is limited by the constraints in production and reproduction. Producers of sheep and goats face problems of seasonal malnutrition resulting in fluctuating productivity and economic loss (Lakpini *et al.,* 2002). Consequently, the use of unconventional feed resources has been advocated as a way out of this problem. The health implication of feeding these unconventional feeds however, has not been evaluated.

Blood is known to be vital to the life of an organism. This is a medium through which nutrients are conveyed to various parts of the body system of an organism. A readily available and fast means of assessing clinical and nutritional status of an animal on feeding trial may be the use of blood analysis (Olabanji *et al.,* 2007). Haematological parameter is an important and reliable medium used to monitor and evaluate health and nutritional status of animals (Babatunde *et al.,* 1992; Onifade, 1993; Gupta, *et al.,* 2007). It therefore becomes imperative to evaluate blood parameters of an organism particularly when unconventional feeds are fed to animals in order to determine the performance of the experimental animals as well as suitability of same on the specie of livestock. One of such feed material is *Tamarindus indica*. Tamarind is a tropical evergreen tree that belongs to the family leguminosae and sub- family caesalpinoideae, It grows wild in the semi-arid parts of Africa (Cobley, 1976).

Tamarind is used as an appetizer, laxative, antihelminthic, for the treatment of stomach disorders, general body pain, jaundice, febrifuge (for fighting fever), blood tonic and skin cleanser (Von Maydell, 1986). It is also used to treat bronchial disorders and gargling with tamarind water is recommended for a sore throat. The Ananga Ranga suggests consuming tamarind for enhancing a woman's sexual enjoyment and being highly acidic, it acts as a refrigerant (Dalla-Rosa, 1993). *T. indica* has been reported as a botanical milk enhancer *in* livestock feeding (Yahaya *et al.*, 2009)

It is against this background that the present study was carried out to evaluate the haematological and blood chemistry response of Yankasa rams fed graded levels of *T. indica* leaves.

MATERIALS AND METHODS

Experimental Location

The study was conducted at the Livestock Teaching and Research Farm, Bayero University, Kano which lies on latitude 11°58.675' North and longitude

8°25.746' East on an elevation of 468m above sea level. It has a mean daily temperature range of 30°C to 33°C and annual rainfall ranges between 787 and 960 mm (KNARDA, 2001).

Experimental Animals and their Management

Twelve (12) male growing Yankasa rams with an average weight of 17.4kg were used for the study. The animals were dewormed using Banmith II® at (12.5mg/kg body weight) and treated with oxytetracyline HCl (a broad spectrum antibiotic) at 1ml/50kg body weight.

Feed Formulation and Experimental Design

Three (3) experimental diets were formulated using 0%, 15% and 30% inclusion levels of the tamarind leaves (Table 1). A randomized complete block design (RCBD) was used in this trial with number of animals representing replication and experimental diets serving as treatments. Four (4) animals were allocated to each treatment individually housed in a feeding pen. Each group was assigned to one of the experimental diets. The animals were balanced for weight prior to commencement of the trial.

Table 1: Gross Composition of Experimental Diets

Ingredients	A (0%)	B (15%)	C (30%)
Tamarind leaves	0	15	30
Wheat offal	20	20	20
Cottonseed cake	20	20	10
Cowpea husk	20	15	10
Rice mill waste	20	15	15
Groundnut hay	20	15	15
Total	**100**	**100**	**100**
Calculated CP	15.02	15.29	13.20
Calculated CF	21.96	19.68	19.10

CP – Crude protein, CF – Crude fibre

Data Collection

Blood Sample Collection

Five (5) mls of blood were collected via jugular vein puncture using hypodermic needle for haematology, serum chemistry and electrolytes analyses. The blood was collected into ethylenediamine tetra acetic acid (EDTA) and plain container for hematology and blood chemistry respectively. This was done at the end of the feeding trial. Each treatment was however replicated three times. Serum was obtained by centrifugation and serum sample stored in a deep freezer at -10^0 C until analyzed.

Analytical Techniques

Packed cell volume was determined by microhaematocrit method (Igene and Iboh, 2004). Haemoglobin content was determined as described by Jain (1993), and Red blood cell was measured with the aid of Neubaur counter (haemocytometer) as reported by Oni *et al*. (2010). Total protein determination was carried out by the Biuret method of Savory and Sunderman (1968), serum electrolytes was determined by atomic absorption spectroscopy as reported by Adejumo and Onifade (2005), and serum metabolites assayed by standard calorimetric method using Sigma kits (Harris, 1995; Moss and Henderson, 1999; Igene and Iboh, 2004).

Data Analysis

The data generated were subjected to analysis of variance (ANOVA) using the SAS package (1999-2000). Fisher LSD was used to separate means ($P<0.05$) where differences manifest.

RESULTS AND DISCUSSION

Table 2 shows the haematological response of the experimental animals fed the treatment diets. There were no significant variation ($P>0.05$) in the values observed from the result in all the parameters investigated. The result show highest mean value in the control (0%) and least in 15% inclusion level. Table 3 summarizes the effects of the dietary treatments on blood chemistry. There was no significant differences ($P>0.05$) in blood urea nitrogen level and total protein across all treatments. There was a significant difference ($P<0.05$) in globulin level in the blood of animals fed 30% and 0% inclusion level. However, 15% and 30% inclusion leaves were statistically similar ($P>0.05$). The globulin level increased with increasing level of tamarind leaves. The result showed no significant difference ($P>0.05$) across the treatments in the level of plasma albumin and creatinine. Blood cholesterol level had the highest mean value in animals on 30% inclusion level and differed significantly ($P<0.05$) across treatments evaluated. Results on serum electrolytes are presented on Table 3. Sodium, Potassium and Phosphorus levels were not affected by the experimental diets. Chlorine level was also not affected by the dietary treatments but highest level of chlorine and sodium were observed in animals on the 0% inclusion level while potassium and phosphorus levels were highest in the 30% inclusion level. However, animals placed on 15% inclusion level recorded the least values in all the variables evaluated.

The PCV values obtained in the present study (6.65% - 8.30%) were below the normal range (27.0% - 45.0%) reported for sheep by Banerjee (2007). The RBC values were also lower than the values reported by Campbell *et al* (2003) who reported a range of (9 - 11) x 10^6µl. The low PCV and RBC values observed

in this study simulate the classical "protein deficiency anemia" in animals on protein deficient diets (Adejumo and Onifade, 2005). However, since diets were iso- nitrogenous and of crude protein level as recommended within the range of 9-14% for growing sheep (Aduku, 2005), the reason for the low levels on blood composition may be due to poor digestibility since protein quality is positively linked with blood composition (Onifade *et al.*, 1999). Another possible reason for the low values of these constituents or high value in some parameters of serum chemistry may be due to several factors such as age, breed and physiological state (Jain, 1993). Though, presence of anti-nutritional factors in the tamarind leaves could attribute to the poor utilization of nutrients by the experimental animals, the haemoglobin value however obtained was within reported range for sheep. This value is in agreement with the report of Orheruata *et al.*, (2004) in West African dwarf goats.

The total protein, globulin, urea and cholesterol had the highest mean values in the 30% inclusion level of tamarind leaves while the creatinine and albumin had the highest mean value in the 0% inclusion level. The plasma protein values (albumin and globulin) differed largely and in absolute value, globulin had higher value thus in contrast to what was reported by Orheruata *et al.*, (2004) but however in agreement with the result of Borjesson *et al.*, (2000) in desert big horn sheep. High creatinine is indicative of poor protein and amino acid metabolism that can lead to impaired renal function and cardiac infarction (Gray and Howorth, 1980). The urea value obtained was within reported range of 8-20 mg/dl (Banerjee, 2007) in matured domestic animals and 5-28 mg/dl for free ranging desert big-horn sheep. The values of serum electrolyte of sodium, potassium, phosphorus and chlorine obtained all fell within the normal range reported by (Borjesson, *et al.*, 2000; Banerjee, 2007).

Table 2: Mean Haematological Indices of Yankasa Sheep Fed Graded Levels of Tamarind Leaves.

Haematological indices	Treatments			LSD
	A (0%)	B (15%)	C (30%)	
Packed cell volume (%)	8.30	6.65	8.15	7.23
Red blood cell (×10^6µl)	2.24	1.80	2.20	1.84
Haemoglobin (g/dl)	10.75	8.65	10.30	4.91

Table 3: Blood Chemistry of Yankasa Sheep Fed Graded Level of Tamarind Leaves Diets

Blood Chemistry Indices	Treatments			LSD
	A (0%)	B (15%)	C (30%)	
Urea (mmo1/l)	7.45	6.00	7.80	NS
Total protein (g/dl)	6.65	6.75	6.85	NS
Globulin (g/dl)	3.95^{b}	4.05^{ab}	4.45^{a}	0.43
Albumin (g/dl)	2.70	2.70	2.40	NS
Creatinine (mmo1/l)	100.00	75.00	87.50	NS
Cholesterol (mmo1/l)	2.70^{b}	3.20^{ab}	3.60^{a}	32.48
Sodium (mEq/l)	140.50	138.50	139.00	9.19
Potassium (mEq/l)	5.20	5.70	6.55	4.55
Phosphorus (mEq/l)	2.00	1.86	2.03	0.52
Chlorine (mEq/l)	99.50	99.00	99.00	9.46

Means across the same row differently superscripted differ significantly (P<0.05). NS-not significant

CONCLUSION

It is concluded that tamarind leaves can be supplemented with other protein sources at 15% and 30% levels in the diet of Yankasa ram. However this may need further study on other breeds and species; for better understanding to emerge, especially when used as a dry season feed stuff.

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