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Full Length Research Paper

Haematological Indices and Biochemical Changes of Rams Fed Graded Levels of Fore-Stomach Digesta and Rice Milling Waste Ensiled with Urea

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Fore-Stomach Digesta (FSD) from camel, cattle, sheep and goats was collected at Sokoto abattoir. At least 5-10 animals that were brought to the abattoir for slaughter from each species were selected for the collection. After slaughter and evisceration, fresh FSD was collected from each animal. Samples were thoroughly mixed and representative samples were collected. The representative samples collected were immediately transferred to an air-tight container and transported to the experimental site where it was dried. Urea and Rice Milling Waste (RMW) were purchased from Sokoto central market and Kalambaina rice processing centre in Sokoto respectively. The procedure of Roy and Rangnekar was followed in which 1kg urea was dissolved in 15 litres of water and sprinkled on 25kg FSD. The samples were ensiled for 21days.The dried FSD mixture was ensiled with urea and RMW in larger quantity, in a tank container of about 300 litres capacity. The experimental diets were formulated using 50% FSD plus 50% RMW ensiled with urea. Randomised Complete Block Design (RCBD) was used in this experiment as outlined by Steel and Torrie (1980). Five animals were allocated as replications to three experimental diets as treatments in this trial. Prior to allocation to treatment diets the animals were balanced for weight so that each group/treatment will have the same weight. Blood samples were collected from each animal at the last week of the feeding trial. The blood sample was collected from the Jugular vein with a sterilized 19-gauge needle and syringe. Bleeding was done early morning before feeding. There were no significant differences in terms of final packed Cell volume, Haemoglobin concentration, Red blood cell, white blood cell, Neutrophils, Eosinophils, Lymphocytes, monocytes counts, final blood glucose, urea concentration, total protein, Albumin, Globulin and total bilirubin. RBC and WBC concentration were within RBC 8-15 x 10^{12}/L and WBC 4-12 x 10^{9}/L for sheep. Conclusively the results show that FSD ensiled with urea and RMW could be used in the diets fattening rams without any health hazard.

Keywords: Haemoglobin concentration; Stomach; Digesta; camel; cattle; sheep.

INTRODUCTION

In the tropics, dry season feeding of livestock, especially domesticated ruminants have always been a lingering problem faced by farmers over the years (Kwaido *et al.,* 2008). In the dry season, very little pastures exist and/or pastures that are available are dry and highly lignified, which alone cannot satisfy maintenance requirements of livestock with the resultant loss of some of the weight gained in the previous rainy season (Onwuka and Akinsoyinu, 1989). Therefore these animals are exposed to nutritional deficiencies and diseases.

In Nigeria, inadequate feeding is one of the major constraints militating against successful livestock

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Table 1: Composition of the experimental diets

Ingredients	A (0%)	B (10%)	C (20%)
50% FSD + 50% RMW + Urea Ensiled	0	10	20
Groundnut Hay	30	20	10
Maize	19	19	19
Wheat Offal	25	25	25
Cowpea husk	25	25	25
Salt	1.00	1.00	1.00
Total	100	100	100
Calculated CP	13.19	13.19	13.19
Cost/kg Diet (N/Kg Diet)	56.11	53.11	50.11

production especially in the semi-arid zone of Northern Nigeria, which habours three- quarter of the country's national herd (Mamman, 2005). This perhaps contributes to the low level of productivity of the Nigerian livestock sector (Maigandi *et al*., 2002). The scarcity of feeds is more severe in the dry season period which necessatiate the expoloration of alternative option such as the utilization of unconventional feed resources such as domestic refuse, rumen contents, tannery waste and other products (Maigandi, 2001).

Rumen content is also referred to as Fore-stomach digesta and it is an abattoir waste from the fore-stomach compartments of camel and other ruminants after cleaning their guts. It is found decaying in most Nigerian abattoirs due to inadequate waste disposal facilities (Maigandi, 2001). It causes repulsive odour and discomfort to the communities neighboring abattoirs. (Kwaido and Nasiru, 2016).

Haematology is the study of blood, its cells and fluids surrounding the cells (Swenson, 1990). Haematological components of animals can provide useful information on their health status (Oyedipe, 1981). These haematological parameters vary greatly between and even within species of animals (Jain, 1993).

MATERIALS AND METHODS

Experimental Animals and their Management

Fifteen (15) entire male Uda Rams were purchased from known sources in Sokoto State for the experiment. The Rams were transported to the Usmanu Danfodiyo University, Sokoto Livestock Teaching and Research Farm. The rams were dewormed with Sambizole 11^{R} dewormer at the rate of 3mls/10kg liveweight of the animal and sprayed against ectoparasites by use of Triatic^{R} and treated with Oxytetracycline HCL at the rate of 1ml/10kg liveweight (a broad spectrum antibiotic) administered intramuscularly.

The weight of the animals were balanced for each treatment and thereafter allocated to three treatment diets with five replicates each. The Rams were housed individually in a pen measuring 1m × 2m size.

Experimental Feed Preparation and formulation

Fore-Stomach Digesta (FSD) from camel, cattle, sheep and goats was collected at Sokoto abattoir. At least 5-10 animals that were brought to the abattoir for slaughter from each species were selected for the collection. After slaughter and evisceration, fresh FSD was collected from each animal. Samples were thoroughly mixed and representative samples were collected. The representative samples collected were immediately transferred to an air-tight container and transported to the experimental site where it was dried. Urea and Rice Milling Waste (RMW) were purchased from Sokoto central market and Kalambaina rice processing centre in Sokoto respectively.

The procedure of Roy and Rangnekar (2006) was followed in which 1kg urea was dissolved in 15 litres of water and sprinkled on 25kg FSD. The samples were ensiled for 21days in triplicate.The dried FSD mixture was ensiled with urea and RMW in larger quantity, in a tank container of about 300 litres capacity. The same ensiling procedure in experiment 1 was followed to produce large quantities of ensiled materials. The experimental diets were formulated using 50% FSD plus 50% RMW ensiled with urea and fed to the animals. The experimental diets are complete diets containing 13.61% CP content (Table 1).

Experimental Design and Feeding Procedure

Randomised Complete Block Design (RCBD) was used in this experiment as outlined by Steel and Torrie (1980). Five animals were allocated as replications to three experimental diets as treatments in this trial. Each animal was individually housed in a pen, which was disinfected. Each group of five animals was assigned to one of the experimental diets and fed *ad libitum* for 90 days. Also water was offered *ad libitum*. Prior to allocation to treatment diets the animals were balanced for weight so

Table 2: Haematological changes of rams fed Fore-Stomach-Digesta (FSD) ensiled with urea and Rice Milling Waste (RMW).

Variables	Treatments (FSD Inclusion levels %)		
	A (0%)	B (10%)	C (20 %)
Packed cell volume (%)	29.40	30.00	28.60
Haemoglobin concentration (g/dl)	9.62	10.08	9.82
Red blood cell ($X10^{12}$/L)	10.64	9.51	10.95
White blood cell ($X10^{12}$/L)	5.88	6.96	8.43
Neutrophils	51.60	51.20	49.40
Eosinophils	1.20	1.20	2.20
Lymphocytes	44.40	44.20	44.20
Monocytes	2.60	2.20	3.00

abc means in the same row with different superscripts are significantly different (P<0.05)

Table 3: Biochemical changes of rams fed Fore-Stomach-Digesta (FSD) ensiled with Urea and Rice Milling Waste (RMW)

Variables	Treatments (FSD Inclusion levels %)			
	A (0%)	B (10 %)	C (20 %)	SE
Blood Glucose	89.00	87.20	88.00	6.77
Urea concentration (mmol/L)	31.64	32.00	37.09	3.20
Total protein (g/d/L)	75.63	73.69	81.94	4.17
Albumin (g/dL)	53.95	56.55	55.44	3.36
Globulin (g/dl	21.68	17.14	26.49	3.98
Total bilirubin (mmol/L)	86.40	71.28	88.56	12.75
Conjugated bilirubin (mmol/L)	37.44	20.16	31.68	9.09
Unconjugated bilirubin (mmol/L)	48.96	51.12	56.88	6.37

abc means in the same row with different superscripts are significantly different (P<0.05)

that each group/treatment will have the same weight.

Blood Samples Collection

Blood samples were collected from each animal at the last week of the feeding trial. The blood sample was collected from the Jugular vein with a sterilized 19-gauge needle and syringe (Coles, 1986). Bleeding was done early morning before feeding. About 7ml of the blood was collected from each animal and 3ml of each sample was placed in an Ethylene Diamine Tetraactate EDTA (Anti-coagulant) bottle for heamatological studies. The remaining 4ml was placed in a universal bottle and allowed to stand for about 2 hours at room temperature. The universal bottles were thereafter centrifuged at 700 xs for 15 minutes to separate and decant the serum, which was stored in a freezer at 2^0 to -20^0 centigrates, this allowed the coagulation to take place and subsequent collection of serum which was used for the analysis.

Blood Chemistry

Whole blood samples in ethylene diamine tetraacetate (EDTA) bottles were analysed for Haemoglobin (Hb) content using Cyanomethemoglobin method (Coles, 1986). Packed Cell Volume (PCV), erythrocyte and leucocyte counts were determined according to microhaematocrit method and microscopic method respectively (Coles, 1986).

The Blood Urea Nitrogen was estimated by method of Tanis and Naylor (1968). Total protein and Albumin were determined by Biuret and Bromocressol green (BCG) methods respectively (Henry and Stobel, 1957). Globulin was determined by difference between total protein and Albumin. Blood glucose and bilirubin were determined by glucose oxidase and sulphanylic acid methods respectively.

Statistical Analysis

The data generated from the experiment was subjected to analysis of variance (ANOVA) using CRD design according to Steel and Torrie (1980). Where significant differences between the means were indicated, Duncan's Multiple Range Test (DMRT) was used to separate the means (Duncan, 1955).

RESULTS

Table 2 presents the Haematological changes of Uda

Rams fed Fore-Stomach-Digesta ensiled with urea and Rice Milling Waste (RMW). There were no significant differences in terms of final packed Cell volume, Haemoglobin concentration, Red blood cell, white blood cell, Neutrophils, Eosinophils, Lymphocytes and monocytes counts. Biochemical changes in the blood of Uda rams fed Fore-Stomach-Digesta (FSD) ensiled with urea and Rice Milling Waste.Biochemical changes of rams fed fore-stomach-digesta ensiled with urea and rice milling waste are presented in table 3. The results indicated no significant differences (P>0.05) between treatments in terms of final blood glucose, urea concentration, total protein, Albumin, Globulin, total bilirubin, conjugated bilirubin and unconjugated bilirubin.

DISCUSSION

Haematological Changes of Fattening Rams

Packed cell volume PCV and Haemoglobin Hb in this present study were within the normal ranges of PCV (24-45%) and Hb (8-16g/dl) reported by Coles (1986), although PCV decrease from initial to final and also Hb decrease from initial to final in treatment C (20%); PCV and Hb values in the present study were higher than those obtained by Kwaido *et al*. 2008 when the authors fed conventional feed like cowpea husk to sheep. However, Hb is within the normal range reported by (Coles, 1986) and increase in Hb is connected to ability to combat diseases and infection.

Red blood cells (RBC) and white blood cells were within the normal ranges reported by Jain (1993) and were also higher than the values reported by Maigandi *et al.* (2008) when the authors fed FSD and poultry litter waste alone or in mixtures to sheep. The main function of RBC is to carry oxygen from lungs to the body tissue and transfer carbondioxide from tissue to lungs (Njidda *et al,* 2014).

The Red blood cell RBC increased from initial to final in all the treatments, but White Blood Cell WBC decreased after the feeding trial. RBC concentration was lower than the levels of RBC 11 x 10^{12}/L (Frandson, 1981) and 12 x 10^{12}/L by Heath and Olusanya (1988). RBC and WBC concentration were within RBC 8-15 x 10^{12}/L and WBC 4-12 x 10^{9}/L for sheep (Coles, 1986; Jain, 1993).

It could be observed that Neutrophils was higher at the beginning of the trial while lymphocytes took over at the end of the trial, lymphocytes was lower in all the treatments, this reject the reports that with age in an animal neutrophils decreased while lymphocytes counts increases (Coles, 1986; Kwaido *et al*., 2008). Monocytes counts increases at the end of the trial, this may be due to the report that maturity in animals lead to variation in monocytes counts (Mathias, 1985; Coles, 1986). Eosinophils were low in both initial and final values in all the treatments while there were no Basophils in all the treatments. This is an indication that the animals are healthy both at the beginning and end of the trial and also the test ingredient (FSD ensiled with Urea and RMW) does not pose any danger to the animals (Coles, 1986; Frandson and Spurgeon, 1992; Maigandi, 2001).

Biochemical Study of Blood

Blood glucose concentration in the present study decreased as the FSD ensiled with urea and RMW was added into the diets (initial and final) although the values were higher than those reported by Elkholy *et al*., 2009 when the authors fed ensiled corn crop residues to sheep Urea concentration both initial and final were higher than he values reported by Ogunsan *et al*, 2011; Kwaido *et al,* 2008. The higher urea concentration may be due to the treatment of test ingredient with urea lead to high release of ammonia in rumen resulting to high absorption of ammonia from rumen to the blood (El-Badawi *et al*., 1998).

Generally, haematological parameters analysed were within the normal ranges reported for sheep (Coles, 1986; Kwaido *et al*. 2008). This is an indication that ensiling Fore-Stomach Digesta with Urea and Rice Milling Waste is not detrimental to sheep.

CONCLUSION

Conclusively, haematological parameters analysed were within the normal ranges reported for sheep (Coles, 1986; Kwaido *et al*. 2008). This is an indication that ensiling Fore-Stomach Digesta with Urea and Rice Milling Waste is not detrimental to sheep health. Also, the trend of the results indicated that FSD and RMW could be used in the diets of ruminant animals especially in the dry season.

RECOMMENDATIONS

Ensiled FSD, RMW and Urea combinations could be used in the diets of ruminants.
FSD and RMW could be used as main ingredients in the formulation of commercial fattening diets.

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