Serum Biochemical Profiles of Fattening Yankasa Rams Fed Diets Containing Different Proportions of Urea Treated Rice Straw and Gamba Hay

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Abstract
An experiment was conducted for a period of 90 days to evaluate the effect of feeding different proportions of urea treated rice straw and gamba hay on the serum profiles of fattening Yankasa rams. Twenty (20) fattening Yankasa rams of mean initial body weight of 21.87±2 kg and aged 12–18 months were allotted to four dietary treatments with five (5) animals per treatment in a Completely Randomized Design. Urea treated rice straw and gamba hay proportions of 0:60, 20:40, 40:20 and 60:0 were used as roughage diets. A concentrate diet consisting of maize grain, cotton seed cake, rice milling waste, wheat bran, bone meal and salt was formulated to contain 13 % crude protein. The animals were fed roughage diets ad libitum while concentrate was fed at 2.0% of individual body weight. Blood samples were collected and analysed for serum parameters. Data generated were subjected to analysis of variance and differences in means were compared using Duncan's Multiple Range Test. Significant (P<0.05) differences were observed on all blood profile parameters measured except the serum creatinine. The serum glucose, urea nitrogen and total protein values ranged from 50.29 to 61.32 mg/dl, 5.73 to 8.64 mg/dl and 58.77 to 67.03 g/l, respectively. It is concluded that, diet containing UTRS:gamba hay had no detrimental effect on the serum profiles of fattening Yankasa rams as they were in the recommended normal ranges.

***Key words**: Fattening Yankasa rams, urea treated rice straw, gamba hay, and Serum Biochemical profiles*
***Target Audience**: Animal Nutritionists, Extension Experts, Sheep Farmers and Feed Millers*

INTRODUCTION

According to Abbey *et al*. (2001) under-production of livestock and their low productivity is attributed mainly to inadequate year-round availability of feed and water, coupled with poor management. In the Savannah zone in Nigeria the basal diets of most ruminants in the dry season is based on crop residues and dry standing grasses, most of these feed resources are

imbalanced in nutritional value and vary from year to year (Zemmelink, 1999). The feed resources available for small ruminants are natural pastures, browses and crop residues and by-products. Ademosun *et al*. (1988) reported that agricultural by-products and crop residues are used for fattening and dry season feeding of small ruminants. Gamba (*Andropogon gayanus*) is a tropical grass which is widely distributed throughout the savanna ecology of Nigeria and forms the bulk of feed available to ruminants grazing ranges (Fitzhugh, 1978). Urea treatment of crop residues such as rice straw is acknowledged to improve their nutritional value and reduce feed cost and wastages (Ehoche, 2002). The significance of determining serum biochemical indices of domesticated animals has been well documented. Ingestion of numerous dietary components has been noted to have measurable effect on the blood constituents. Blood is an important and reliable medium for assessing the health status of individual animal. According to Gupta *et al*. (2007) examining blood for their constituents is used to monitor and evaluate health and nutritional status of animals. There is paucity of information on the effect of feeding diets containing different proportions of urea treated rice straw and gamba hay on serum biochemical profiles of fattening Yankasa rams. The objective of this study was to determine the effect of feeding different proportions of urea treated rice straw and Gamba hay diets on serum biochemical profiles of fattening Yankasa rams.

Materials and Methods

Experimental site

The study was conducted at the Livestock Farm of the Department of Agricultural Education, Sa'adatu Rimi College of Education, Kumbotso, Kano state, Nigeria. Kano lies on longitude 9°30' and 12°30' North and latitude 9°30 and 8°42' East on an elevation of 468m. It has a mean daily temperature range of 30°C to 33°C and annual rainfall ranges between 787 and 960 mm (KNARDA, 2001). The area is characterized by tropical wet and dry climate, a wet season (May-September) and dry season (October-April) (Olofin, 1987).

Feed collection and processing

Rice straw (*Oryza sativa* L.) was collected from harvested rice farms in *Danhassan,* District of Kura Local Government Area of Kano State. The rice straw was chopped manually to a particle length of 3-5 cm. Chopped rice straw was treated by dissolving 4.0 kg urea in 50 litre of water and sprinkled on 100 kg rice straw (Schiere *et al.,* 1988) and mixed manually. It was stacked for 14 days under air tight condition in PICS (Perdue improves cowpea storage) sacks. The treated rice straw was left opened for three days which allowed ammonia gas to escape before being fed to the animals. Gamba hay (*Andropogon gayanus* Kunth) was collected from villages in Gabasawa Local Government Area of Kano state. The gamba hay was also chopped to a particle size similar to that of the rice straw. The treated rice straw and gamba hay were then bagged and stored in a store room, before being used for animal feeding trial.

Experimental animals and management

Twenty intact Yankasa rams aged 12 - 18 months with mean initial body weight of 21.87±2 kg were used for the study. The rams were procured from Dambatta and Gezawa markets in Kano State. Prior to the commencement of the experiment, the rams were given prophylactic treatments, consisting of intramuscular application of oxytetracycline and vitamin B complex at the dosage of 1ml/10 kg body weight of the animal. They were drenched with 1ml/10 kg body weight of albendazole® and treated against ectoparasites with 0.5 ml/10 kg body weight of Ivomec®. The rams were ear-tagged (for identification) and quarantined for a period of 6 weeks. Adequate feed and clean fresh water were provided to the rams *ad libitum*.

Experimental treatments, design and feeding of animals

The dietary treatments consisted of urea treated rice straw (*Oryza sativa* L) and gamba (*Andropogon gayanus* Kunth) hay proportions of 0:60, 20:40, 40:20 and 60:0. A concentrate diet consisting of maize grain, cotton seed cake, rice milling waste, wheat bran, bone meal and salt was formulated to contain13% crude protein (Table 1). The rams were weighed and randomly assigned to four dietary treatments with 5 rams per treatment in a completely randomized design. Experimental animals were housed in individual pens of 2m x 1m dimension with corrugated iron roof and a concrete floor. The house was cleaned and disinfected and the animals were individually fed experimental diets and weighed fortnightly. They were fed concentrate diet at the rate of 2.0% body weight individually throughout the feeding trial. Basal diet was offered *ad libitum*. The feed offered was adjusted at regular intervals of two weeks along with changes in weight. Clean fresh water was provided to the rams *ad libitum* throughout the period of the experiment, which lasted for 90 days.

Blood analysis

Blood samples were collected from the rams at the end of the feeding trial, at zero time (before morning feeding) and at 2, 4 and 8 hours after feeding. Five (5) ml of blood samples were drawn from the jugular veins of the individual animals using sterilized 19-gauge needle and syringe as described by Frandson (1986). The samples were placed into labeled sample bottles without EDTA for biochemical studies according to Ajagbonna *et al*. (1999). The blood samples were thereafter centrifuged for 5-10 minutes at 3000 rpm to separate serum from blood cells (Coles, 1986).

Chemical analysis

The blood samples collected were analyzed for blood urea nitrogen by the method of Tannins and Maylor (1968), total protein was estimated by the method of Henry and Stobel (1957). Creatinine was determined according to the method described by Lamb (1991). Total glucose was determined by the method of Werner *et al*. (1976).

Statistical analysis

Data collected from the study were subjected to analysis of variance (ANOVA) using SAS (2001) procedure. Significant differences in the treatment means were separated using the Duncan's Multiple Range Test (Duncan, 1955).

Table 1: Composition of concentrate mixture for fattening Yankasa rams

Ingredients	**(%)**
Maize	25
Rice mill waste	27
Wheat offal	30
Cotton seed cake	17
Bone meal	0.5
Salt	0.5
Total	100
Calculated % CP	13

Table 2. Effect of different proportions of urea treated rice straw and gamba hay on serum profiles of fattening Yankasa rams

	Proportions of UTRS:gamba hay (%)				
Parameter	0:60	20:40	40:20	60:0	SEM
Glucose (mg/dl)	50.29[c]	51.62[b]	60.65[a]	61.37[a]	0.81
Urea nitrogen (mg/dl)	5.73[c]	5.98[c]	7.40[b]	8.64[a]	0.62
Creatinine (mg/dl)	1.12	1.18	1.14	1.12	0.07
Total protein (g/l)	58.77[c]	62.52[b]	66.51[a]	67.03[a]	0.92

[abc]*Means are significantly different (P< 0.05) along the same row, UTRS=urea treated rice straw SEM= standard error of means*

Results and Discussion

The results of serum profiles of the fattening Yankasa rams are presented in Table 3. There was no significant difference (P>0.05) in serum glucose between rams fed 60:0 and 40:20 UTRS:gamba hay diets. The values were however, higher (P<0.05) than in rams fed 20:40 UTRS:gamba hay which in turn had higher (P<0.05) serum glucose concentration than those fed 0:60 UTRS:gamba hay. Serum urea nitrogen was significantly higher (P<0.05) in rams fed 60:0 UTRS:gamba hay compared to those fed 40:20 UTRS:gamba hay which value was higher (P<0.05) than in the other treatments. There was no significant difference (P>0.05) between the values recorded for rams fed diet containing 0:60 UTRS:gamba hay and rams fed 20:40 UTRS:gamba hay. Serum creatinine concentration was similar (P>0.05) among the treatment groups. The total protein values for rams fed 60:0 and 40:20 UTRS:gamba hay were similar (P>0.05), but significantly higher (P<0.05) than for rams fed 20:40 UTRS:gamba hay. Fattening rams on 0:60 UTRS:gamba hay diet had the lowest (P<0.05) total protein concentration.

The significant differences in serum glucose, urea nitrogen and total protein and the non-significant effect in serum creatinine obtained in this study did not conform to the values reported by Finangwai *et al*. (2010) when they fed urea treated maize stover based complete diets to crossbred (Friesian Bunaji) bulls. The increase in serum glucose in rams fed diets containing urea treated rice straw could be as a result of increased intake of soluble carbohydrate leading to increase in the level of blood glucose. This is in support of Abd El Latif (2003) who indicated that values of blood glucose concentration in growing Friesian calves were correlated with energy in the diets. The higher values of blood urea nitrogen concentration for rams fed diets containing urea treated rice straw proportion might be as a result of high release of ammonia in rumen resulting to high absorption of ammonia from the rumen to the blood (Sano *et al*., 2009; Abubakar *et al*. 2010). Gunun *et al*. (2013) also reported increased blood urea nitrogen concentrations with increasing rumen ammonia nitrogen level when cows were fed with urea treated rice straw. Similarly, Yadav and Yadav (1988) found that, cattle given ration containing urea treated straw showed higher serum urea concentration values than those fed untreated paddy straw. The higher values of total serum protein obtained for rams fed diets containing urea treated rice straw could be probably due to increased crude protein content of the diet as well as higher crude protein intake. Values obtained for the serum profiles in this study fell within normal range for sheep (Kaneko, 1989; Banerjee, 2007).

Conclusion and Application

Based on the results obtained in this study it could be concluded that inclusion of urea treated rice straw and gamba hay proportions in the diet of fattening Yankasa rams will not have

deleterious effect on their blood profiles hence recommended as suitable roughage feed material in fattening Yankasa rams.

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