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Haematologial Indices of Sahelian and Kano Brown Cross Bred Bucks Fed Treated Sesame Straw Diets

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ABSTRACT
The study was carried out to evaluate Performance and of Sahelian and Kano Brown Cross Bred Bucks fed treated sesame straw diets. A 12-week feeding trial and nutrients digestibility study were conducted at the small ruminant unit of the Audu Bako College of Agriculture Dambatta, Kano. Nine crossbred (Sahelian x Kano brown) bucks with initial body weight of 10.67 ± 1.0 kg were used for the experiment. They were assigned to three dietary treatments of urea treated sesame straw diet (UTSS), poultry litter treated sesame straw (PLTSS) diet and a control (USS) with no treatment laid in a completely randomized design replicated three times. The result showed no significant (P>0.05) difference in all the haematological parameters with the exception of granulocytes.White blood cell counts for goats in control group was higher and better than the treatment groups.It was concluded that treated sesame straw up to 4% have no any detrimental effect on the Haematological parameters of cross bred bucks.

Keywords: Sesame, Poultry Litter, Urea, Sahelian, Cross Bred.

I. INTRODUCTION

Goat production have been hampered over the years primarily by the non-availability of good quality and quantity of feed (Onwuka, 1999). This is so for ruminant animals during the dry season when the little forages available are low in quantity causing occasional weight losses, low birth weight, lowered resistance to diseases and reduced animal performance (Onwuka, Adeluyi, Biobaku, & Adu 1992).

Feeding agro industrial by-products and crop residues to livestock is a practice as old as the domestication of animals. The main advantages have been less dependency of livestock on grains that can be consumed by humans and the reduction of costs related to waste management (Grasser, Fadel, Garnett and Depeters, 1995).

Sesame (Sesamum indicum L.), otherwise known as sesamum or benniseed, is a member of the family Pedaliaceae. Most sesame seeds are used for oil extraction and the rest are used for edible purposes like toppings in bread (El Khier, Ishag, & Yagoub, 2008).The major world producers of sesame include India, Sudan, China and Burma (who contribute about 60% of the total world production) (El Khier et al., 2008).

Sesame is an important crop to Nigerian agriculture being quite extensively cultivated especially in Northern part of the country. Sesame yields in relatively poor climatic conditions, and it is widely used within Nigeria. More so, it is an important component of Nigeria's agricultural exports (Chemonics International Inc, 2002)

Similar to other crop residues, sesame straw (SS) is generally low in nutritional value with low level of protein (4-5% DM), high fibre content (NDF > 50% DM) and low digestibility (37-42% DM) (Teferi et al., 2013). Produce laxative effect after absorbing more water from intestine This demands for designing appropriate strategies to enhance the feeding value of sesame straw to increase feed intake and digestibility. So far, limited research has been published concerning methods to improve sesame straw as livestock feed.

Various treatment methods have been used to improve nutritive value of straw including physical, biological and chemical treatments (Ibrahim, 1983). Method of processing straws such as chopping has been shown to affect feed intake and utilization (Lu, Kawas & Mahgoub, 2005). Different chemicals are also used to upgrade the nutritive value of straws. Lime (CaO) can be used

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to enhance the utilization of crop residues and the level of calcium (Ca) in straws (Chaudhry 1998). Urea is a commonly used chemical for straw treatment to improve nutritive value (Sundstol & Coxworth, 1984). Urea feed treatment is one of the technologies that has been tried in most of the tropical countries and found to be effective in improving nutrient content and feeding value of various types of crop residues. It has been reported that urea treatment increase digestibility, palatability and nutrient content of straws (Dahiya, Sengar, Sikka & Mudgal, 1992).

The significance of determining haematological and biochemical indices of domestic animals has been well documented (Tambuwal, Agala & Bangana 2002; Orheruata & Aikhuomobhogbe, 2006). There is a great variation in the haematological and biochemical parameters as observed between breeds of goats (Meyer & Harvey, 1998). Normal blood values are defined as those of clinically healthy animals which are kept under normal housing conditions and fed balance ration Meyer and Harvey (1998) noted that the ingestion of numerous dietary components have measurable effect on blood constituent.It has also been reported that haematological indices give insight into the production potential and help to monitor and evaluate incidence of diseases in animals (Orheruata & Aikhuomobhogbe, 2006).

II. MATERIALS AND METHODS

Study area

The research was conducted at thesmall ruminant unit of the Department of Animal Health and Husbandry Audu Bako College of Agriculture (ABCOA), which is situated about 35km Kano to Daura road. The college is located at the northern part of Kano and positioned on latitude 12^0 20.260^1 N and longitude $8^0 31.567^1$ E and possesses tropical climate with marked periods of rainfall ranging from 888.6mm - 1,009mm. The mean temperature fluctuates from 18.5^0C (65.3^0F) minimum in cold season to 39.5^0C (103.1^0F) maximum in hot season and relative humidity range from 22 to 52 % as recorded by (KNARDA, 2011). Goat production is practiced in the area as well as cultivation of crops such as sesame, maize, and sorghum among others (KNARDA, 2006)

Experimental diets

The sesame straw was purchased from different farms within Dambatta local government of Kano state in Nigeria. The sesame straw purchased were divided into three treatments of 100 kg each. The first was treated with 5% urea dissolved in 50 liters of water and the solution sprinkled over the straw while mixing thoroughly (Girma, Abebe & Goetsch, 2007). The treated straws were filled in a pit dug at the college farm (depth-1.5 m and diameter 1 m) and pressed manually by trampling. The pit was sealed with a polythene sheet, plastered with soil to make the pit air tight and ensiled for 14 days (Chenost & Kayouli, 1997).

The second diet was treated with poultry litter obtained from the battery cage system of ABCOA poultry farm.Five percent (5%) poultry litter was spread on top of the sesame straws and water sprinkled evenly until wet while mixing thoroughly. The poultry litter treated straw was ensiled for 14 days using a pit with adepth of 1.5 m and diameter 1 m.

The third diet which served as the control diet had no form of treatment imposed but little water sprinkled to soften the straw and to reduce dustiness.

A concentrate diet was formulated (Table 1) and offered as supplement to each of the experimental animals.

Ingredients	Inclusion Level (%)
Maize	19
Wheat Offal	30
Soybean Meal	20
Cowpea husk	30
Salt	1
Total	100
Calculated CP (%)	16.21
Calculated Energy Kcal/Kg	2391.8

Table 1: Gross composition (%) of concentrate diet fed to experimental animals

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Experimental animals and their management

Nine (9) crossbred (Sahelian and Kano brown) bucks with initial body weight (BW) of 10.67±1.0 kg were randomly selected from the college herd and used for the experiment. The animals were treated with Albendazole suspension at 7.5mg per kg of the body weight against endo parasites and Oxytetracycline (a broad spectrum antibiotic) at 10mg per kg of body weight. The animals were managed for a period of twelve weeks, with adaptation period of 14 days. The pens were disinfected and cleaned. The experimental animals were housed in individual pens measuring 2m x 1m. Weighed feed samples were offeredto all animals. They also had access to fresh drinking water ad libitum. Animals were fed the experimental diet at 4% of their body weight then supplemented with a concentrate diet at 2% of their body weight. Animals in treatment A were fed with urea treated sesame straw in the morning and supplemented with concentrates. Animals in treatment B were fed with poultry litter treated sesame straw in the morning and supplemented with concentrates. Treatment C served as the control, the animals were fed with only the sesame straw in the morning and supplemented with concentrates respectively. Feeding time is 7:00 to 8:00 am daily.

III. DATA COLLECTION

Feed Intake determination

The daily feed intake was monitored and measured as quantity of feed offered minus quantity of left over feed in (kg) every morning before feeding the experimental animals using a hanging scale.

Body Weight Changes Determination

The body weight changes of bucks in response to the experimental treatment was measured by taking the bodyweight of individual bucks at the commencement of the trial. This then followed by individual weighing on a bi-weekly basis until the last day of the experiment. The body weight changes was determined by the difference between previous body weight (kg) and current body weight (kg). A bathroom scale was used for weighing.The weight of the animal is measured as the difference between the weight of the researcher before carrying the animal on the scale and the weight after carrying the animal on the scale

Digestibility determination

Faeces were collected using harness bags with each animal serving as a replicate during the collection period which was at the end of the experiment. The collection lasted for 21 days, 14 days for adaptation and 7 days for collection of the feacal sample. Total feacal output were weighed. About 10% of the total well mixed faeces were retained, shed dried and stored in a glass jar. At the end of the collection period, the shade dried faeces was composited together and used for proximate components analysis at the department of Animal science laboratory of Faculty of Agriculture, Bayero University Kano. Digestibility was calculated as nutrient intake minus nutrient in faeces divide by nutrient intake multiplied by 100.

Chemical Analysis

Chemical analysis for crude protein (CP), crude fibre (CF), ether extract (EE), ash and nitrogen free extract (NFE) was carried out on respective samples of feed and faeces following the methods of AOAC (2019). Analysis of Neutral detergent fibre NDF and Acid detergent fibre ADF as described by Van Soest, Lewis and Robertson (1991).

EXPERIMENTAL DESIGNA completely randomized design (CRD) with nine (9) animals was used in conducting the experiment. The animals were randomly assigned to three treatments and each treatment had three bucks as replicates.

IV. DATA ANALYSIS

The data generated were subjected to analysis of variance (ANOVA) using general linear model procedure of IBM SPSS VERSION 23 (SPSS, 2015). The Significant differences between the means were compared at ($P<0.05$) using fisher's least significant differencesof the same statistical softw

V. RESULTS AND DISCUSSION

Proximate Composition of Sesame Fractions and Experimental Diets

Results of the proximate analysis of the fractions and the control diet (sesame straw), which is a combination of the sesame sticks and sesame pods all together did not show any consistent trend across the three fractions for crude protein, crude fibre and nitrogen free extract.The values obtained in this study where that the crude protein and ash content for sesame sticks is found to be lower as well as ADF. Aregawi et al., (2013) noted (5.44%) CP, (9.68%) ash, (61.1%) NDF and (56.4%) ADF respectively for sesame capsule comparable to the result of this study. Asma, Hamed and Mohamed (2009) reported (4.52%) and (7.84%) for CP and ash content of sesame straw, respectively comparable to the study of Aregawi et al., (2013) who reported (4.40%) CP and (6.23%) ash content.

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Kamali (2007) on the other hand reported slightly higher CP of (5.05%) and ash (9.87%), and lower NDF (57.6%) and ADF (42.9%) contents for sesame straw, as compared to the values obtained in this study the CP and ash content are both slightly higher than reported by the previous researchers and almost similar NDF and ADF values compared to the study of Kamali (2007) but higher than that reported by Aregawi et al., (2013). The nutritive value of the capsule in terms of chemical composition appeared to be relatively better than the stem fraction and that of the whole straw to be intermediate.

The crude protein content of all the diets were higher than 8% necessary to provide minimum nitrogen required by micro-organisms to support basic rumen activities (Tona et al., 2013). The result of this study showed entire decrease in NDF content which may be as a result of fibre bound Nitrogen. Roughage feeds with NDF content of more than 65% dry matter were categorized as low quality roughages (Singh and Oosting, 1992). Gao (2000) on the other hand reported decreased values of NDF, ADF and ADL for urea treated wheat straw which is in agreement with the values reported in this study. According to Madrid et al (1997) and Trach, Mo and Dan (2001), urea was effective in solubilizing NDF and hemicelluloses from straws, but did not significantly affect other cell wall components. Sarwar, Ajmal, khan and Mahr (2003) on the other hand reported further increase in Neutral detergent fibre of urea treated wheat straw.

As a result of urea and poultry litter treatment, crude protein content have increased obviously due to the incorporated nitrogen from urea and poultry litter into the Sesame straw.The improvement in nutrient content due to urea treatment is in agreement with the results reported by Rehrahie and Ledin (2001), (Getahun, 2014) and (Moss et al 1994).

Table 2. Proximate analysis for morphological fractions and experimental diets

Parameters (%)	UTSS	PLTSS	USS	SS	SP
Ash	7.89	6.33	5.61	6.87	9.87[a]
Dry matter	89.5	89.19	87.69	89.71	89.65
Crude protein	19.26	18.74	6.52	5.06	5.86
Crude fibre	34.15	31.90	29.63	35.79	34.13
Ether extract	6.85	7.28	5.80	6.10	5.82
Nitrogen free extract	31.85	35.78	52.44	46.89	44.31
Acid detergent fibre	49.51	45.90	50.68	43.41	50.69
Neutral detergent fibre	54.32	53.48	58.87	62.96	61.74

Key:UTSS= urea treated sesame straw, PLTSS= poultry litter treated sesame straw diet, USS= untreated sesame straw, SS= sesame sticks, SP= sesame pod, SEM= standard error of mean

Haematology of Cross Bred Bucks Fed Treated Sesame Pod Diet

The red blood cell values obtained in the present study were not far from the values obtained by Jain and Douglas (2010) who reported (2.5 – 3.9 µ m) for healthy goats. This indicates that there is vital functions of oxygen transport, carbon dioxide transport, and buffering of hydrogen ions in the experimental bucks.

In the current study, results for PCV is within the normal range for clinically healthy goats. Stacey and John (2010) recorded values of (22-38%) for clinically healthy goats although the values are on the higher side. The higher values might be attributed to increase in environmental temperature as (Palterson, Shrode, Kunkel, Leghton and Rupel, 1960;

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Isidahomen,Ikhimioya,Njidda and Okoruwa, 2010) reported. High PCV haematocrit values indicates either an increase in the number of circulating RBC or reduction in circulating plasma volume (Kopp and Hetesa 2000).Haematological traits especially PCV and Hb were correlated with nutritional status of the animal(Adejumo, 2004). The higher PCV values observe in this study might likely be a sign of healthier goats.

The haemoglobin values obtained in this study were in range with the standard value of 7-16g/dl reported for goats (Jain and Douglas, 2010). This shows that oxygen and carbon (IV) oxide carrying capacity were in good condition

Mean corpuscular haemoglobin and mean corpuscular haemoglobin concentrations are indicators of blood level conditions (Aster, 2004). The higher values obtained in this study indicates that the experimental bucks are not anaemic.

The higher values obtained in this study for WBC suggest well develop immune system of the cross bred bucks. The higher values of the WBC observed may also be attributed to the extensively managed goats which makes them face challenges from microbes when on free range. However, the values obtained in this study fell within the broad range recorded for Red Sokoto goats (Tambuwal, Agale and Bangana, 2002) and West African dwarf goats (Opara, Udevi, and Okoli, 2010). The result of this study shows higher values for lymphocytes than the values of (64.8 to 70%) for adult goats (Opara et al., 2010) while Plumb (2002) reported values ranging from 50 to 70% for adult goats respectively. Similarly, increase in lymphocyte percentage has been reported by (Samad and Rahman, 1986). Lymphocytes are the key elements in the production of immunity. Low levels can be seen in some bacterial infections, aplastic anaemia, and in some forms of leukemia while high values can be observed in viral infections, and in some forms of leukemia (Ganong, 2005).

Table 5: Haematological profile of cross bred bucks fed treated sesame straw diet

PARAMETERS (%)	TREATMENTS			
	UTSS	PLTSS	USS	SEM
WBC (g/dl)	16.10	13.20	21.50	2.13
RBC ($X10^6mm^{-1}$)	4.47	5.09	5.10	0.83
HB (g/dl)	7.16	8.40	7.90	0.54
PCV (%)	31.4	33.07	33.33	2.14
MCV (μm^{-3})	25.80	25.60	26.10	0.29
MCH (pg)	16.80	17.63	15.53	1.99
MCHC (%)	34.80	38.90	30.43	2.37
WBC DIFFERENTIALS				
Lymphocytes (%)	70.03	71.6	77.07	1.33
Monocytes (%)	4.27	3.83	6.77	1.02
Granulocytes (%)	1.70^b	1.57^c	2.17^a	0.35

[abc]Means within the same row with different superscripts are significantly different ($P<0.05$)
Key: PCV=Packed Cell Volume; HB=Haemoglobin; RBC=Red Blood Cell; WBC= White Blood cells; MCV=Mean corpuscular volume; MCH=Mean corpuscular haemoglobin; MCHC=Mean corpuscular haemoglobin Concentration; SEM= standard error of mean;

UTSS= urea treated sesame straw diet; PLTSS= poultry litter treated sesame straw diet; USS= untreated sesame straw diet.

VI. CONCLUSION

Urea treatment of sesame straw led to better utilization of the sesame straw thus improving feed intake, nutrients digestibility and body weight gain of the experimental animals. Poultry litter treatment had no positive effect on the intake, digestibility and weight gain of sahelian cross bred bucks

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