EFFECTS OF FEEDING UREA TREATED ENSILED COWPEA HUSK BASED DIETS ON FEED INTAKE AND MORPHOLOGICAL CHARACTERISTICS OF RED SOKOTO GOATS

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ABSTRACT
Eighteen healthy growing male goats (13.40 ± 0.59 kg BW) were used in a completely randomized design to evaluate the inclusion of urea treated ensiled cowpea husk (UTECH) at 0, 35 and 70% to replace 0, 50 and 100% of dried brewers' grains (DBG). Daily intakes of dry matter, crude protein, organic matter, total carbohydrate and neutral detergent fibre were not significantly ($P > 0.05$) affected by diets. Intakes of ether extract and non-fibre carbohydrate were higher ($P < 0.05$) for the 0% (control) relative to 35 and 70% UTECH. Mineral intake progressively decreased ($P < 0.05$) with increasing level of UTECH in the diet. Diet effects on the linear body measurements and testicular morphology of the goats were not ($P > 0.05$) significant. It is concluded that 70% inclusion level of UTECH in goat ration was well tolerated, as voluntary intake and morphological parameters were not affected.

Keywords: Cowpea husk, urea treatment, ensiling, voluntary intake,body measurement,goats.

INTRODUCTION
Intensive crop production to feed the teeming human population worldwide has resulted in concomitant increase in availability of crop residues. Crop residues are mostly farm wastes which, if well harnessed, have great potential as non-conventional inexpensive feedstuffs for livestock feeding. Olafadehan (2011) earlier posited that it is customary to feed non-conventional feedstuffs such as browse plants, tree and shrub fodders, crop residues, etc. to ruminant stock. The abundance of crop residues makes them cheap sources of feed for ruminants. Nevertheless, they are generally low in nutrients (Nicholson, 1984). Various strategies have been adopted in improving their nutritive value and utilization. One of such is treatment with fertilizer graded urea to improve the nutritional composition, particularly the CP. Fibrous crop residues are further improved when treated and fermented through ensiling.Cowpea husk (CH) has been reported (Ososanya *et al.*, 2013) as cowpea by-product used by livestock farmers to supplement fodder during the dry season. Cowpea husk is abundantly available but its nutrient availability may be limited by high fibre content which affectsfeed digestibility in ruminants. Large quantities of cowpea husks are produced in the country. Adebowale (1981) reported that about 82,000 metric tonnes of cowpea husks and straws are produced in Nigeria annually.Feed intake is a good index of nutritive value of a feed and is more reliable than digestibility in evaluation of the feeding value of a diet, because animals will digest only what they can consume. Body dimension measurements have been used in estimating body weight (BW) and appropriate pricing of meat animals. Body measurements, on most farms in the tropics, help farmers who lack formal education and cannot afford or use weighing scales to estimate their animals' BW and market value in terms of cost of the animals. Prasad and Neeraj (2008) reported that BW can be estimated by body measurements. The biometric parameters commonly used in predicting BW in small ruminants include: body length, chest girth and height at withers. The study aimed to investigate the effects of feeding urea treated ensiled CH (UTECH) as a replacement of dried brewers' grains (DBG) on feed intake and body measurements of Red Sokoto goats.

MATERIALS AND METHODS
Eighteen growing Red Sokoto male goats about 10 months old with an average initial BW of 13.4 ± 0.59 kg were used for the study. Prior to the inception of the study, the animals were

given prophylactic treatments. They were weighed and divided into three groups of six goats each. Each group was randomly allotted to one of the experimental diets in a complete randomized design (CRD). Goats were housed individually in cages. Two weeks of adaptation to both the cages and the experimental diets were allowed before data collection. Three complete diets were formulated such that DBG was replaced by 0, 50 and 100% of UTECH. Thus, treatment diets contained (%): (70DBG + 30 cassava peel meal (CPM)), 2 (35 DBG + 35 UTECH + 30 CPM) and 3 (70 UTECH + 30 CPM) and were tagged 0, 35 and 70% UTECH respectively. Voluntary feed intake was measured by subtracting the quantity of orts from the quantity served. Body measurements were taken weekly just before feeding using measuring tape. Samples of treatment diets were ground separately to pass through a 1 mm sieve in a Wiley mill and analysed for proximate constituents using the standard methods of AOAC (1995). Fibre analysis was by the methods of Van Soest *et al.* (1991). Data were subjected to ANOVA in CRD using the SPSS BASE 17 (SPSS software products, USA). Significant differences between means were separated using DMRT.

RESULTS AND DISCUSSION

The crude protein (CP) content of the diets was similar which implies that urea treatment and ensiling of the test ingredient upgraded its CP content to similar level as that of the DBG it replaced. However, the NDF content decreased with increasing level of UTECH in the diets which suggests lower level of NDF in UTECH probably due to degradation of its fibre component during ensiling or fermentation. Non-fibre carbohydrates (NFC), readily fermentable carbohydrates, content increased with increasing level of UTECH. The DM intake was not ($P > 0.05$) affected by the diets (Table 1). The similar feed consumption by the goats implies palatability and thus acceptability of the diets, even at 70% UTECH inclusion level. Dry matter intake is an important factor in the utilization of feed by ruminants and is a critical determinant of energy and performance in small ruminants (Devant *et al.*, 2000). Intakes of CP, organic matter (OM),neutral detergent fibre (NDF) and total carbohydrate were marginal ($P > 0.05$), reflecting the pattern of DM intake. According to Olafadehan *et al.* (2014), nutrient intake is a function of feed intake *ceterisparibus*. Intakes of ether extract, mineral and NFCwere lower ($P < 0.05$) for the UTECH based diets compared to the control diet. All body measurements were not ($P > 0.05$) different across treatments for both initial and final body measurements, except for the initial scrotal length which varied ($P < 0.05$). Lack of diet effect suggests that inclusion of UTECH up to 70% in the diet did not affect the morphology and testicular characteristics of the goats. These results are different from what Babale *et al.* (2015) reported for the same breed of goats where significant ($P < 0.05$) differences were recorded for all measured linear body parameters. Variation in results may be due to differences in nutritional regime and management of the animals. Linear body measurement is an index for estimating the changes in growth and live weight/BW of animals. Olafadehan *et al.* (2015) previously attributed increase in BW of Red Sokoto goats to increase in linear body measurements of the animals.The mean heart girth (HG) across treatments was not significantly ($P > 0.05$) affected. HG has been reported to be more reliable in estimating BW (Bello and Adamu, 2012; Olafadehan *et al.*, 2015).The values for height at wither were higher than 58.19 cm reported for Red Sokoto goats(Jibir *et al.*, 2013) but were within range of 62 - 72 cm reported by Devendra and McLeroy (1982). The values of chest depth were higher than the overall meanchest depth value of 25.73 cm reported by Jibir *et al.* (2013). Variation in values could be attributed to differences in husbandry practices and strains of Red Sokoto goats breeds used in different experiments. The body length values are, however, similarto the reported overall mean body length of 48.84 cm (Jibir *et al.*, 2013). The size of the scrotum has been identified to positively correlate with the fertility and reproductive efficiency of the male offspring genetically. Therefore, the similar ($P > 0.05$) values for scrotal circumference and scrotal length among the diets indicate that feeding UTECH up to 70% did not compromise the reproductive potential of the experimental goats.

CONCLUSION

The results show that UTECH can be used up to 70% in a total mixed ration without any negative effect on feed consumption, morphology and testicular characteristics of buckling goats.

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Table 1. Chemical composition of experimental diets

Nutrient (%)	Level of urea treated ensiled cowpea husk in the ration (%)		
	0	35	70
Dry matter	92.38	95.18	95.88
Crude protein	17.51	17.33	17.15
Organic matter	95.40	94.36	93.44
Ether extract	3.49	1.26	1.00
Ash	4.96	5.64	6.56
Neutral detergent fibre	57.02	54.78	52.55
Non-fibre carbohydrates	17.02	20.99	22.74
Total carbohydrates	74.04	75.77	75.29

Table 2 Dry matter and nutrient intakes (g/day) of goats fed graded levels of urea treated ensiled cowpea husk

Intake	Level of urea treated ensiled cowpea husk (%)			SEM
	0	35	70	
Dry matter	574.63	569.44	561.64	23.3
Crude protein	100.62	98.68	96.32	4.06
Organic matter	548.20	537.32	524.80	33.2
Ether extract	20.05[a]	7.17[b]	5.62[b]	0.74
Ash	36.84[a]	32.12[b]	28.50[b]	1.21
NDF	323.74	311.94	295.14	16.0
NFC	97.80[a]	117.28[b]	127.72[b]	4.58
Total carbohydrates	425.46	431.46	422.86	17.3

Mean with different superscripts in the row are significantly (P< 0.05) different.

Table 3 Effect of urea treated ensiled cowpea husk on the morphology and testicular characteristics of Red Sokoto goats

Variable	Level of urea treated ensiled cowpea husk (%)			SEM
	0	35	70	
Heart girth (cm)				
Initial	56.67	59.33	57.3	2.91
Final	67.83	66.00	64.67	1.91
Body length (cm)				
Initial	38.67	39.67	39.67	2.06
Final	47.33	50.00	53.00	4.72
Height at wither (cm)				
Initial	55.33	53.67	51.00	4.98
Final	63.33	65.33	61.67	3.37
Scrotal circumference (cm)				
Initial	19.83	19.67	18.17	1.37
Final	28.00	28.83	27.33	1.05
Scrotal length (cm)				
Initial	13.17[a]	12.17[ab]	10.67[b]	0.94
Final	22.00	22.17	22.00	1.06
Rump height (cm)				
Initial	54.00	52.33	54.00	1.36
Final	63.67	63.33	63.33	1.76
Neck gait (cm)				
Initial	26.33	26.33	24.67	2.16
Final	37.00	38.00	35.33	1.44
Chest depth (cm)				
Initial	26.67	27.33	27.33	0.94
Final	37.67	37.67	36.67	0.94
Pin bone width (cm)				
Initial	11.00	10.33	10.33	0.61
Final	21.17	21.00	20.33	0.80

Mean with different superscripts in the row are significantly (P < 0.05) different.