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Nutrients Utilization and Growth by Yankasa Rams Fed Cowpea Husk, Ureaand Molasses Treated Maize Cobs

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Abstract: ***This study find out nutrients utilization and growth by yankasa rams fed cowpea husk, molasses treated maize cobs.Seventy days feeding trial was conducted to determined the nutrients utilization and growth by Yankasa rams fed cowpea husk, urea and molasses treated maize cobs.Twelve growing Yankasa rams aged between 8-12 months were subjected to four dietary treatments in a complete randomized block design (CRBD). The four dietary treatment were T_1 (4kg urea ensiled maize cobs and cowpea husk) only, T_2 (4kg urea and 2kg molasses ensiled maize cobs with cowpea husk, T_3 (4kg urea and 4kg molasses ensiled maize cobs with cowpea husk) T_4 (4kg urea and 6kg molasses ensiled maize cobs with cowpea husk).The result of the chemical composition shows the dry matter, crude protein, crude fibre, Ash, Ether extract, nitrogen free extract values were 96.0% -97.0 %(DM), 9.0-12.2% (CP), 4.0-5.5% (CF), 8.5-10.0% ash, 1.1-2.4% (EE), 68.70- 73.00% (NFE), ME,2979.35-3118.90Kcal/kg for T_1, T_2, T_3, and T_4. The proximate composition of maize cobs were 98.5% (DM), 3.8% (CP) 10.0% (CF) 1.1% (EE), 1.2% Ash; 80.0% NFE 76.1 %(NDF) 49.9% (ADF), 3.06Kcal/kg. The total feed intakes were 118.90 -128.70 g/h/day. The feed conversion ratios were from 10.62-0.860. The final weight gains were 28.00kg-30.04kg.Avearage Daily Live weight gain were 86.56 – 115.78g/h/day. The nutrients intake values were 118.84-127.74 (DMI) g/h/day, 116.42-119.41g/h/d (OMI), 119.69 -128.59g/h/d (CPI), 119.66-128.56g/h/d (CFI) and 119.70-128.68 Ash. While the nutrients digestibility were from 47.88- 59.43% (DMD), 46.29-56.72% (CPD), 36.06- 47.13EED, 32.72-65.71 CFD, 39.58-44.25% ASHD, 39.21-29.69(NFED). The study revealed that treatment four (4kg urea and 6kg molasses) gave significant higher dry matter intake and live weigh gain in Yankasa rams.***

Keywords: Cowpea Husk, Urea, Molasses, Maize Cobs and Yankasa Rams

1. Introduction

The bulk of the ruminants feeds comes from forages, grasses, shrubs and trees, the shrubs and grasses are only vegetative and available as animal feeds in the raining season while the trees which serves as browse plants are available throughout the year which decline rapidly in quality during the dry season Ademosum (1973). The need to search for cheaper alternative quality feed has become necessary, this can be carried out through various methods employed to upgrade crops residues by ensiling the material with various additives, which will lead to better utilization of the nutrients for rumen micro-bial growth and result in improve digestibility, increase surface area of lingo-cellulose due to higher nitrogen retention Khan *et.al* (2004) which might have resulted in increased in accessibility to microbial attack in maize cobs ensiled with molasses and cowpea husks. Molasses is an important by-product of sugar cane industry and a good source of fermentable carbohydrate (sucrose) can be used to capture NH_3-N in urea treated materials. Acidification of molasses may further help enhance the nitrogen capture in urea treated maize cobs and their feeding value for sheep. (Sarwar*et.al* 2005).

2. Materials and Methods

Experimental site

The study was conducted at the Research Farm of the ModibboAdama University of Technology, Yola, Adamawa State, Nigeria. The area is located between latitude 9^0 and 11^0 north and is on longitude 11^0 and 14^0 east of the meridian. This is a tropical area with climate marked by dry and rainy seasons, the rainy season commences in April and end in late October and the dry season start from late October and ends in March (Adebayo and Tukur, 1999).

Experimental animals

Twelve growing Yankasa Rams aged between 8-12 months were used for the study. They were de-wormed and treated for internal and external parasites. The animals were subjected to pre-experimental adaptation for two weeks, and were subjected to four dietary treatments in a complete randomized block design. (T_1) 4kg urea ensiled maize cobs with cowpea husk only. (T_2) 4kg urea and 2kg molasses ensiled maize cobs with cowpea husk. (T_3) 4kg urea and 4kg molasses ensiled maize cobs and cowpea husk. (T_4) 4kg urea and 6kg molasses ensiled maize cobs with cowpea husk. The feeds was mixed and fed as complete ration.

Procurement and processing of experimental diets

The cowpea husks and the maize cobs were procured from local farmers in Jimeta. Yola Adamawa State Nigeria and stored in bags. Before ensiling, maize cobs was dried and crushed 2cm particle size, before ensiling, the treated maize cobs were pressed for air exclusion, knotted to achieve anaerobic condition ensiled for 15 days as documented by Khan *et al* (2004). Although ensiling from 21 days was carried out in the present studies to achieve better urea hydrolysis. 4kg of urea was dissolved in one hundred litres of water and one hundred kg of maize cobs was submerged

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in the solution and tied in an air tight polythene bags for 21 days in treatment one. Treatment two, 4kg of Urea, 2kg of molasses was dissolved in one hundred litres of water and one hundred kg of maize cobs submerged and also tight in polythene bags for 21` days. Treatment three, 4kg kg of urea, 4kg of molasses was dissolved in one hundred litres of water and one hundred kg of maize cobs immersed and transferred to a polythene bags ensiled for 21 days. Treatment four, 4kg of Urea, 6 kg of molasses was dissolved in one hundred litres of water and one hundred kg of maize cobs submerged and transferred to a polythene bags ensiled for 21 days. The material ensiled was covered tightly to prevent seepage and air entrance.At the beginning of ensiling aerobic and facultative organisms survive on the oxygen trapped in the silo or container producing carbon dioxide, water and heat. Once the oxygen is exhausted only anaerobic organisms can survive, this allowed the growth of acid forming and photolytic bacteria which convert carbohydrates into lactic acid, protein into ammonia, amines and amino acid which caused decreased pH in the ensiled materials which kills both yeast and mould, acidity continued to increase to a level where the acid producing organisms themselves are killed, at this pH and time ensiling is completed.

Treatment and experimental design

Complete randomized block design (CRBD) was used for the experiments. Twelve (12) Yankasa rams were randomly allocated to four treatments with three (3) replications. The main feeds for the experiment were cowpea husk, and maize cobs ensiled with 4% urea and graded levels of molasses.

Treatment (1) = (control) 4kg urea ensiled maize cobs with cowpea husks mixed and fed as complete ration.
Treatment (2) = 4kg urea ensiled maize cobs + 2kg molasses with cowpea husks mixed and fed as complete ration.
Treatment (3) = 4kg Urea ensiled maize cobs + 4kg molasses with cowpea husks mixed and fed as complete ration.
Treatment (4) = 4kg urea ensiled maize cobs + 6kg molasses with cowpea husks mixed and fed as complete ration. 500g of cowpea husk + 500g ensiled maize cobs was mixed and fed as complete ration in all the treatment.

Housing and management

The research works consist of 12 growing Yankasa rams between the ages of 8-12 months. The experiment last for 3 months including the adaptation period, in which the rams were kept in pens with separate feeding and water troughs.The rams were dewormed and given multivitamins injection before the commencement of the experiment.The animals were fed twice daily 8:00am, in the morning and 4:00pm in the evening; the remnant was measured to find out the rejected. The difference between the amounts of feed offered and the amount rejected was the amount consumed. The rams were weighed weekly using a spring balance for changes in weight.

3. Experimental procedures

Feed intake

Feeds where measured and offered to the rams, at 8.00 am in the morning and 4:00pm. Remnant was weighed daily before fresh feeds were offered for the determination of feed intake.

Weight gain

Initial live weight of the animals was recorded before the commencement of the experiment; subserviently the live weight gain was measured weekly. The initial live weight was subtracted from the final live weight gain to get the live weight changes

Digestibility study

Digestibility study was conducted after the feeding trial, an improvised metabolic bag and plastic containers were used for the collection of faeces and urine, four (4) rams were adapted in the metabolic cage for seven days, faeces and urine were collected for fourteen days. An improvised bags were used to trap faeces from individual rams, total faecal output was measured daily using a weighing scale, the faeces were bulked and at the end of the collection period 10% sub samples were dried, milled and stored in sealed and labeled bottle before analysis. The urine was collected with the aid of a slanted groove attached to the cages which allowed the urine to flow into a plastic container; the volume was measured using a graduated laboratory cylinder, urine was collected into a bottle acidified with 10ml concentrated sulphuric acid and store in a refrigerator at 4^0C for ammonia concentration in urine and urine pH analysis.

Chemical analysis of the experimental diets

Proximate analysis of ensiled maize cobs and cowpea husk , nitrogen in the urine was carried out using the procedure outlined by AOAC, (1990) to determine the dry matter (DM), crude protein (CP), crude fiber (CF), ether extract (EE) and ash (ASH)

Statistical analysis

Data obtained was subjected to analysis of variance (ANOVA) and differences between mean separated Steel and Tories (1980) .The results was analyzed using SPSS version 17.

4. Result

Table 1: Proximate composition of the experimental ingredients

Constituent (%)	*Maize cob*	*Ensiled Maize Cobs*	*Cowpea Husks*
Dry Matter (DM)	98.5	97.0	98.0
Crude protein (CP)	3.8	12.2	12.0
Crude Fiber (CF)	10.0	4.0	10.0
Ether Extract (EE)	1.1	1.1	2.90
Ash	1.2	10	7.2
Nitrogen Free Extract (NFE)	80.0	68.70	65.7
Neutral Detergent fiber (NDF)	76.1	54.2	64.3
Acid detergent fiber (ADF)	49.9	53.8	43.5
ME (Kcal/Kg)	3.06	4.08	3.01

Proximate composition of the experimental ingredients, maize cobs, ensiled maize cobs & Cowpea husk:

The maize cobs contains 97.0 DM ensiled maize cobs 98.0-98.5% DM cowpea husk obtained in the present study which

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was contrary to the value of 92.40% DM obtained by Ibrahim (2007).

The crude fiber of 10.0% for maize cobs, 4.0% CF for ensiled maize cobs and 10.0% for cowpea husks was lower than the values of 35.1% CF obtained and reported by Toledo *et al* (1990).The Ash content in the present study was 1.2% for maize cobs, 10.0% for ensiled maize cobs and 7.2% for cowpea husk subserviently, comparable to the value of maize cobs of 1.2% obtained and reported by Agreheore (2001), but a little higher than the value of 5.63% reported by Ribanre (2007), and closely comparable to 11.1% obtained for ensiled maize cobs reported by *A.A.J (2006).*

Table 2: Chemical composition of maize cobs ensiled with urea and graded level of molasses

Constituent (%)	Treatment T_1 4U	T_2 4u+2m	T_3 4u +4m	T_4 4u+6m
DM	97.0	96.5	96.40	96.0
CP	12.2	11.0	9.5	9.0
CF	4.0	5.0	5.3	5.5
Ash	10	9.8	9.8	8.5
EE	1.1	1.2	2.1	2.4
NFE	68.70	69.70	71.01	73.00
ME (Kcal/kg)	2979.35	2978.55	3042.46	3118.90

Chemical composition of maize cobs, ensiled with urea and graded level of molasses

The result shows that the dry matter contents in T_1 was 97.0% DM (4kg urea only) while 96.5%DM T_2 (4kg urea and 2kg Molasses), 96.40%DM (4kg urea and 4kg Molasses)T_3 while 96.0%DM was obtained in T_4 (4kg urea and 6kg Molasses). The result showed a higher DM in T_1 followed by T_2, T_3 and T_4 being the lowest. The DM content was little higher to the value of 92.40% obtained and reported by Ibrahim (2007). The higher values might be attributed to variation in soil fertility, harvesting and curing which usually affect the chemical composition. The CP of 12.2% was obtained in T_1, 11.0% in T_2, 9.5% in T_3 and 9.0% T_4 the CP value were contrary to the values of 18.00% obtained and reported by Fadiyimu*et al* (2011). The fibre content was 4.0% in T_1 5.0% in T_2, 5.3% in T_3 and 5.5% in T_4 far below the 30.0% reported by Dimas, (2012) which is indication of characteristic nature of plants when harvested at the late stage of growth. The ether extract was 2.4% T_4 while 2.1% T_3, 1.2% T_2 and 1.1% T_1 been the lowest in the diet, the nitrogen free extract in T_1 was the lowest 68.70%, followed by 69.70% T_2, 71.0% T_3 and 73.00% T_4 been the highest which was contrary to the findings of (Sarwar *et al* 2005), ash content in treatment diets, was 10.0% T_1 9.8% in T2 and T3, 8.5% in T4.

Table 3: Growth performance of Yankasa rams fed cowpea husk, urea and molasses treated maize cobs.

Parameters	Treatment TI	T2	T3	T4	LSD
Total Fed intake g/h/day	118.90	121.40	124.10	128.70	11.34*
Feed conversion ratio	10.620	0.915	0.914	0.860	0.025**
Initial weight (kg)	20.21	20.42	20.53	20.62	0.517^{NS}
Final weight (kg)	28.00	29.70	30.03	30.04	0.961^{NS}
Total weight gain (kg)	7.79	9.28	9.50	10.42	0.513 *
Average Daily Live Weight gain (g/d)	86.56	103.11	105.56	115.78	21.824*

Daily feed intake

The daily feed intake of rams was 118.90 T_1, 121.40 T_2, 124.10 T_3 and 128.70T_4 g/d/h. The daily feed intake of the rams was significantly comparable in treatment one to three but significantly (P<0.05) different among the treatment. The rams fed T_4 diets had significantly (P<0.05) higher dry matter intake, followed by rams fed T_3 and T_2 diets than those on T_1. The feedintake showed a significant increase with increase level of molasses supplementation. The increase in DM intake could be as a result of molasses inclusion in the supplemental diet which had created a conducive environment in the rumen for the digestion and improvement in the rumen ecosystem Igene and Iboh (2004).

Live weight gain

The average daily live weight gain of rams fed urea and molasses treated maize cobs with cowpea husk were 86.56g/h/d, 103.11g/h/d, 105.56g/h/d and 115.78g/h/d for T_1, T_2, T_3 and T_4 respectively. The live weight gain in the molasses inclusion were significantly (P<0.05) higher than the un-supplemented diets with molasses in T_1. Thisstudy demonstrated that supplementation or inclusion of graded level of molasses has tremendous advantage in weight gain of Yankasa rams over non molasses inclusion. This study is also in agreement with Ibrahim (2007) in an investigation on the effects level of cowpea vines supplementation to Yankasa sheep fed basal diet of Gamba grass.

Table 4: Nutrients intake of yankasa rams fed cowpea husk, urea and molasses treated maize cobs

Treatment Parameter	T_1	T_2	T_3	T_4
DMI (g/h/d)	118.84	120.44	123.14	127.74
OMI (g/h/d)	116.42	118.21	112.11	119.41
CPI (g/h/d)	119.69	121.29	123.99	128.59
CFI (g/h/d)	119.66	121.26	123.96	128.56
ASHI (g/h/d)	119.70	121.33	124.00	128.68

Nutrient intake

The rams fed T_4 diets had significantly (P<0.05) higher dry mater intake, organic matter intake, crude protein intake, crude fibre intake and ash intake than those fed T_3, T_2 and T_1 diets. Supplementation recorded high-numerical feed intake values due to the high level of molasses inclusion in the supplemented diet which improved crude protein intake and energy intake than those fed other treatment diets. This finding is in agreement with Qualaet *al* (2011). That the activity of the rumen microbes is improved by nitrogen supplemented diets leading to improved nutrients intake

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which enhance digestion in the gut. Also Tolera and Standstol (2000) observed that as supplementation increases nutrients intake by sheep fed a basal diet of maize Stover increases.

Table 5: The Nutrients digestibility of yankasa rams fed cowpea husk, urea and molasses treated maize cobs.

	Treatment			
Parameters	T_1	T_2	T_3	T_4
DMD %	47.88	52.92	53.94	59.43
CPD %	46.29	36.18	38.66	56.72
EED %	36.06	45.41	40.74	47.13
CFD %	32.72	33.65	59.01	65.71
ASHD %	39.58	42.44	60.36	44.25
NFED %	39.21	47.33	63.54	29.69

Nutrient digestibility

The crude protein digestibility was 46.29 - 56.72. The results showed that rams fed 6kg molasses and 4kg urea (T_4) recorded the highest Crude Protein digestibility of 56.72% while the least 46.29% was recorded among rams in T_1, while T_2 36.18% and T_3 38.66%. This implies that ensiled urea treated fibrous material with fermentable carbohydrate could increase digestibility of the feed Nisa*et al* (2004), and there by improve voluntary intake Hogan (1996). One of the keys to profitable livestock production is to minimize the cost of producing marketable animal or animal products and these can be done through ensiling.

The crude fiber digestibility were from 32.72%, 33.65%, 59.01%; and 65.71% for T_1, T_2, T_3 and T_4 respectively, fiber in moderate quantities ensures proper functioning of the digestive system and gives a feeling of reflection, and that the essential of proper feeding is to feed a moderate quantities of crude fiber, because when excess occurs the digestion of all feeds constituents depressed total intake below nutritional needs.

The nitrogen free extract digestible of rams were 39.21 – 29.69, rams in diet T_1 39.21%, T_2 47.33%, T_3 63.54% and T_4 29.69%. T_4 had lowest value in the present study, though comparable to the value obtained and reported by Ibrahim (2007). The improved NFE might be due to incorporation of graded levels of molasses inclusion which supply soluble carbohydrates to the rumen microbes.

5. Conclusion

The inclusion of 6kg molasses and 4kg urea generally gave significantly (P< 0.01) higher dry matter intake and live weight gain than the other treatment diets. This showed that molasses and urea can be utilize in improving the nutritive value of maize cobs in dry season when there is constant seasonal fluctuations in the quality and quantity of forages which results in marked seasonality in animals growth and productivity otherwise known as stair case growth.

6. Recommendation

It implies that ensiled urea treated fibrous material with fermentable carbohydrate increased digestibility of the feeds, and that energy protein balance of a ration enhances growth rate

7. Conclusion

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