

**NSAP****47th Annual
Conference
(JOS 2022)****CONFERENCE
PROCEEDINGS**THEME
**SECURING ANIMAL
AGRICULTURE AMIDST
GLOBAL CHALLENGES****Nutrient Intake and Digestibility by Uda Ram Lambs Fed Maize Cobs Ensiled with Soybean and Poultry Litter**

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Abstract

The study was conducted at the Usmanu Danfodiyo University Livestock Teaching and Research Farm to determine nutrient intake and nutrient digestibility by growing Uda rams fed maize cobs ensiled with poultry litter and soybean meal based diets. Twelve growing Uda rams weighing 20-25 kg were randomly divided into four groups (3 in each) and assigned to four experimental diets designated A-D. The silage was prepared using maize cobs fortified with soybean meal and poultry litter. Animals were fed *ad libitum* for 63 days at the rate of 60:40 ratio basal to concentrate diet. Data were collected on nutrient intake and nutrient digestibility coefficient. Results showed that rams fed the control diet significantly ($P < 0.05$) had lower nutrient intake as well as apparent nutrient digestibility coefficient when compared with the rams fed maize cobs ensiled with poultry litter and soybean meal based diets. It was therefore concluded that poultry litter and soybean meal inclusion of up to 30% in the diet of the rams enhances nutrient intake and nutrient digestibility.

Key words: Digestibility, Maize cobs, Nutrient intake, Uda rams

Introduction

The use of conventional feedstuff such as maize, soybean cake, fish meal and others as supplement to low quality feed may not be cost effective (in present day Nigeria) to intensify production, owing to their high cost, irregular supply (Akinmutimi, 2004) and the competition with humans and monogastric animals. It is in this respect that non-conventional energy and protein materials of farm and agro-industrial wastes origin are presently being utilized for livestock production in Nigeria (Ndubueze *et al.*, 2006). Such feed resources should be cheap, have high nutritive value, non-toxic, readily available, should have low or no demand by both human and other livestock species and without industrial usage (Ndubueze *et al.*, 2006).

The increase of corn production will be followed by the increase in corn by-products, such as corn cob. Corn cob is potential to be used as a source of roughage for replacement of grass. Ground corn cob can be used as a basal diet for sheep up to 40% (Ref.).

Material and Methods**Description of experimental site**

The experiment was conducted at the Livestock Teaching and Research Farm, Usmanu Danfodiyo University, Sokoto. The farm is situated within the main campus of the university at about 10km north of Sokoto metropolis in Wamakko Local Government Area. Sokoto state has a semi-arid climate, which is characterized by low rainfall, in which the mean annual rainfall is about 700mm although, rainfall vary in amount from year to year.

Sourcing of experimental feed ingredients

Maize cobs was purchased from Zamfara State, and crushed using grinding machine. Soybean meal and cotton seed cake was purchased from Kano and Funtua, respectively and ingredients for concentrate diet were purchased from Sokoto Kara Market. Poultry litter was obtained from Chick Tech Farm Kasarawa Area, Sokoto State.

Ensiling of experimental feeds (basal diets)

The silage was prepared using maize cobs fortified with soybean meal and poultry litter as shown in Table 1. Forty percent water by the weight of the feed was sprinkled on the diet before ensiling. The mixture was thoroughly mixed and poured into 120 liter containers, then compressed using stones until filled to the brim without air space. The top of the containers was covered tightly with nylons to provide anaerobic environment suitable for fermentation, then covered with the lid and stones placed on the top. The treatment and proportions of the ingredients are shown in Table 1. The experimental treatments were designated as treatment A, B, C, and D (which represent the control diet).

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(JOS 2022)**CONFERENCE PROCEEDINGS**THEME
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GLOBAL CHALLENGES**Table 1: Gross composition of ensiled experimental diets treatments**

TREATMENTS			
Ingredients (%)	A	B	C
Maize Cobs	70	70	70
Soybean Meal	30	-	15
Poultry litter	-	30	15
Total	100	100	100

Table 2: Gross composition of control diets

Ingredients	Control diet	Concentrate diet
Maize	-	19
Groundnut haulms	20	-
Cowpea husk	20	20
Wheat offal	24	30
Cotton Seed Cake	25	30
Rice milling waste	10	-
Salt	1	1
Total	100	100
Calculated crude protein (%)	16	16.21
Calculated crude fiber	24	23
Calculated energy (kcal)	2023	2081.8

Experimental design and feeding procedure

Completely randomized design (CRD) was used in this experiment with each animal representing a replicate. Twelve (12) Uda ram lambs weighing between 20- 25 kg were purchased. Three (3) animals were allotted to each treatment. The pens were disinfected and each animal was assigned to one of the experimental diet and fed *ad libitum* for 63 days at the rate of 60:40 ratio basal to concentrate diet. Water was also made available always.

Data collection**Feed intake**

The animals are weighed prior to the commencement of the experiment and subsequently on the same day of every week between 9-10am after withdrawing feed for 14-16 hours, to avoid error due to gut fill. Daily record of both feed intake was taken throughout the feeding trial.

Digestibility trial

At the end of the feeding trial, a digestibility trial was conducted. The animals were kept in their feeding pens and fed four different experimental diets per treatment during the feeding trial. The digestibility trial lasted for 14 days, with the last 7 days for collection of faeces with harness bags. Record of daily feed intake was kept. Total faecal output from each animal was recorded daily and 5 percent was oven dried at 80 degree Celsius for dry matter determination and then stored for subsequent analysis.

Analytical technique**Chemical composition of experimental diets and faeces**

Thoroughly mixed representative samples of maize cobs, soybean meal, poultry litter waste, ensiled materials, concentrate diet and faeces were analyzed for proximate composition according to (AOAC, 2019) procedures.

Statistical Analysis

The data generated from the experiment were subjected to analysis of variance (ANOVA) using SPSS. Significant differences between the treatment means were determined using (LSD) Least Significant Difference, the probability level was set at ($P < 0.05$) level of significant.

Results and Discussion**Nutrient intake**

The result of nutrient intake was presented in Table 3. The result showed that there was significant ($P < 0.05$) difference on dry matter intake by Uda rams fed maize cobs ensiled with poultry litter and soybean meal which



is higher than the others. Dry matter, crude protein and ether extract intake were significantly ($p < 0.05$) higher in treatment (A) than the rest of the other treatments, while the intakes of crude fibre, ash, nutrient detergent fibre, lignin and hemicellulose were significantly ($p < 0.05$) higher in treatment (B) than others. Acid detergent fibre and cellulose intakes were significantly ($p < 0.05$) higher in treatment (C) compared to the other treatments. Treatment (D) which is the control diet has the least ($p < 0.05$) value of all the nutrients intake. High dry matter intake could be due to high soluble carbohydrates content of the diets. The dry matter intake values reported in this study were higher than 200-302 g/day reported by Fajemisin *et al.* (2012) when ensiled corn cobs treated with or without water and urea were fed to West African Dwarf sheep. Beyond nutritional composition, animal tend to consume more palatable diets. High dry matter intake obtained in this study for all the treatments could be attributed to non-significant difference in crude protein intake. High crude protein intake is known to stimulate dry matter intake. The crude protein intake obtained in this present study were comparable to values reported by Aruwayo *et al.* (2013) and Maigandi and Abubakar (2004). However, crude fibre and ether extract intake were higher than the values reported by Aruwayo *et al.* (2013). The nutrient detergent fibre and acid detergent fibre intakes were also lower than those reported by Fajemisin *et al.* (2002).

Table 3 Nutrient intake by Uda ram lambs fed maize cobs ensiled with poultry littler and soybean meal.

Parameters(g/day)	Treatments				
	A	B	C	D	SEM
Dry matter	1001.00 ^a	960.01 ^a	910.00 ^a	620.00 ^b	0.051*
Crude protein	175.40 ^a	165.00 ^a	160.00 ^a	83.30 ^b	0.86*
Ether extract	7.76 ^a	5.22 ^a	5.04 ^b	4.00 ^c	0.32*
Crude fiber	25.08 ^a	30.15 ^a	28.68 ^a	14.32 ^b	1.43*
Ash	9.33 ^a	9.77 ^a	9.00 ^a	5.43 ^b	0.60*
Acid detergent fiber	35.79 ^b	42.80 ^{ab}	44.30 ^a	17.44 ^c	2.11*
Nutrient detergent fiber	35.35 ^b	69.37 ^a	67.99 ^a	21.09 ^c	2.99*
Cellulose	14.19 ^b	30.15 ^a	30.40 ^a	7.64 ^c	2.51*
Hemi cellulose	11.88 ^b	24.28 ^a	23.70 ^a	8.81 ^b	1.10*
Lignin	12.57 ^a	12.68 ^a	10.44 ^b	10.12 ^a	1.59*

abc: means with difference superscript along row differed significantly at ($P < 0.05$) MC=maize cobs, SBM=soybean meal and PLW=poultry litter waste.

Nutrient digestibility

The result of nutrient digestibility of maize cobs ensiled with poultry litter and soybean meal fed to Uda rams is presented in the Table 4. Ether extract and acid detergent fibre were significantly ($p < 0.05$) higher for rams in treatment (A) compared to others. Crude fibre and cellulose digestibility were significantly ($p < 0.05$) higher for rams in treatment (B) compare to those in other treatments while lignin digestibility were significantly ($p < 0.05$) higher in treatment (C) than the others. Dry matter, crude protein, ash, nutrient detergent fibre and hemicellulose digestibilities were not significantly ($p < 0.05$) different across the treatments.

The FAO (1991) classified digestibility of feed as high (> 60), medium (40-60) and low (< 40). According to the report, the digestibility of all the nutrients obtained in this present study was high. Fajemisin *et al.* (2008) observed similar trend when sheep were fed rumen content, poultry droppings mixed with diets. The similarity could be due to the fact that soybean meal and poultry litter contain high amount of nitrogen that could be translated into high CP intake. High crude protein digestibility could have induced high crude fibre digestibility. It has been reported that maximum dietary crude fibre digestion in the rumen occurs when dietary protein is between 12 and 16% (Mc Allan, 1991). The CP digestibility showed that dietary protein is highly utilized by animals. The generally high digestibility value obtained in this present study was further supported by the reports of Garba and Maigandi, (2008) that adequate nitrogen in diets enhanced the activities of rumen microbes which eventually improve the overall nutrient digestibility.

Table 4: Nutrient digestibility of Uda ram lambs fed maize cobs ensiled with poultry littler and soybean meal.

Parameters (%)	Treatments
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	A	B	C	D	SEM
Dry Matter	81.60	85.33	83.33	82.13	1.67*
Crude protein	72.52	73.00	70.67	70.55	1.65 ^{NS}
Ether Extract	90.51 ^a	73.00 ^b	84.67 ^a	87.87 ^a	1.69*
Crude Fiber	65.73 ^a	74.67 ^a	72.00 ^a	59.42 ^{a b}	2.74*
Ash	77.38	73.67	73.67	70.72	2.74 ^{NS}
Acid Detergent Fiber	85.71 ^a	66.00 ^b	68.00 ^b	66.22 ^b	1.67*
Nutrient detergent Fiber	70.59	72.00	72.67	76.55	2.43 ^{NS}
Cellulose	74.99 ^b	82.33 ^a	80.67 ^a	71.44 ^b	1.61*
Hemicellulose	73.44	69.33	66.00	66.58	2.46 ^{NS}
Lignin	59.77 ^b	58.67 ^b	68.00 ^a	57.43 ^b	1.88*

abc: means with difference superscript along row differed significantly at ($p < 0.05$), NS = Not significant and MC= maize cobs, SBM= soybean meal and PLW= poultry litter waste.

Conclusion

Based on the findings from this study, it could be concluded that ensiled maize cobs with poultry litter and soybean meal improved the nutrient intake and digestibility better than the control diet.

References

- AOAC. (2019). Association of Official Analytical Chemists. Official Methods of Analysis 21st Edition AOAC Inc, Arlington, Virginia USA. 1094pp.
- Akinmutimi, A.H., (2004) Evaluation of sword bean *Canavalia gladiata* as an alternative feed resource for broiler chickens. Ph.D. Thesis, Michael Okpara University of Agriculture Umudike, Nigeria.
- Aruwayo, A., Maigandi, S. A., Malami, B. S., Daneji, A. I., Saulawa, L. A., and Garba, M. G. (2013). Nutritional evaluation of alkali treated neem kernel cake fed to fattening Uda Rams. *Pakistan Journal of Nutrition*, 12(3): 224-228.
- FAO, (2020). Food and Agricultural organization Nigerian statistics for live animals from 2008-2020. Food and Agricultural Organization, Rome, Italy.
- Fajemisin, A. N., C. M., Fadiyamu, A. A., Fajemisin, A. J. and Alokun, J. A., (2012). Dietary effects of ensiled corn cobs treated with or without water, Iye and urea on performance of West African Dwarf Sheep. In: Akpa, G. N., Dairo, F. A. S., Bawa, G. S., Solomon, I. F., Amaefule, K. U., Odunsi, A. A., and Iadokon, A. O. (eds.) *Agricultural Transportation: Strategies and policies for livestock Development in Nigeria*. Proceedings of the 17th annual conference of the Animal Science Association of Nigeria (ASAN), 9th-13th September held at international conference center opposite Radio House Area 8 Abuja, Nigeria. Pp 575-578.
- Garba, Y., and Maigandi, S. A. (2008). Nutrient digestibility and utilization by growing lambs fed ensiled fore stomach digesta (FSD) with poultry litter waste (PLW). In G. S. Bawa, G. N. Akpa, G. E. Jokthan, M. Kabir, & S. B. Abdul (Eds), *Repositioning Agriculture for the Realization of Nigerian Vision 2020. Proceedings of the 13th Annual conference of the Animal Science Association of Nigeria (ASAN), 15th-19th September held at Department of Animal Science, Ahmadu Bello University, Zaria* (pp, 222-225).
- Maigandi, S. A and Abubakar, S. (2004). Nutrient intake and digestibility by Red Sokoto goats fed varying level of *faidherbia albida* pods paper presented at 29th Annual conference of the *Nigerian society for Animal production*. 29:325-328.
- McAllan, A. B. (1991). Sources of nitrogen supplements to maximum cereal crop residues digestion in rumen. In H. G. C. Galle (Ed.), *Production and utilization of lignocellulosics*. (pp. 378-385). Elsevier Science Publishers Ltd England.
- Ndubueze, A.I., S.N. Ukachukwu, F.O. Ahamefule and J.A. Ibeawuchi, (2006). Milk yield and composition of grazing white Fulani cows fed poultry waste-cassava peel based diets. *Pak. J. Nutr.*, 5: 436-440.