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EFFECTS OF FEEDING SOLE GRASSES AND MIXED GRASS-LEGUME SILAGES ON GROWTH PERFORMANCE OF YANKASA RAMS IN NORTHERN GUINEA SAVANNA OF NIGERIA

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ABSTRACT
The study was conducted to evaluate growth performance of Yankasa rams fed sole grasses and mixed grass-legume silages. A total of 30 growing Yankasa rams weighing 21.50kg on average were used for the experiment. The Yankasa rams were assigned to 6 dietary ensiled feeds of sole maize silage (SM), sole Elephant grass silage (SE), maize-lablab (ML), maize-mucuna (MM), Elephant grass-lablab (EL) and Elephant grass-mucuna (EM). Experimental animals were fed 3% of their body weight and administered water ad libitum for the growth trial period which lasted for 90 days in a Completely Randomized Design (CRD). Feed intake, weight gain and feed conversion ratio were determined. Results obtained shows that, rams fed MM and ML silage diet recorded significantly (P<0.05) higher daily silage intake, total feed intake, average daily feed intake, body weight gain and good feed conversion ratio. It was therefore concluded that, feeding mixed grass legume silage improved weight gain and feed conversion ratio than feeding sole grass silage.

Keywords: Grass-legume, Growth performance, Sole grass, Silage, Yankasa rams.

INTRODUCTION

Small ruminants are produced with the aims of getting meat, milk, wool and skin. The four products assume varying degrees of importance in different countries depending on the existing agro ecological condition (Paez *et. al.*, 2013). Among these four products, meat is the most important product especially in Nigeria where there is no taboo against its consumption (Alikwe *et al.* 2011). Feed quality and availability are major constraints in increasing small ruminant animal productivity under tropical conditions. Basal feed often provides inadequate protein, minerals and vitamins to support optimum animal productivity during dry season. Supplementary feeds are used as sources of protein and energy. The oilseed cakes, cereal bran and brewer's grains often used to alleviate the effect of the long dry season are scarce, costly and sometimes adulterated (Adediran, 2002). Silage production is among the forage conservation methods practiced in intensive livestock production system. While it is not a common practice among the livestock producers in Nigeria, silage is a viable option for preservation of surplus quality forage during the growing season when yield and nutritional values are optimal (Kallah *et al.* 1997). Ruminants prefer grass-legume silages as they produce more milk and lambs grow faster on grass-legume silages as compared to grass silage alone due to higher crude protein, vitamins and essential mineral contents (Wilkin, 2001). However there is dearth of information in literature on the use of grass-legume silage in Nigeria .The objectives of this study was therefore to study the effects of feeding sole grasses and mixed grasses-legumes silages on growth performance of Yankasa rams.

MATERIALS AND METHOD

Description of experimental site:The study was carried out at the Experimental Site of Small Ruminants Research Programme, National Animal Production Research Institute, Shika, Zaria, Nigeria.

Experimental animals and management:Thirty (30) growing Yankasa rams with average initial weight of 21.5kg obtained from the National Animal Production Research Institute, were quarantined for two weeks before study. During this period the animals were given prophylactic treatment against internal and external parasites. The rams were housed in individual pens, which were cleaned and disinfected before their arrival. They were balanced for their weights and allotted to 6 dietary treatments with 5 rams per treatment in a Completely Randomized Design. The rams were offered concentrate feeding diets (Table 1)

at 1 % of their body weight and experimental diet *ad-libitum* (sole grasses or mixed grass-legume silages in a ratio of 70:30) immediately after feeding concentrate diet in the morning at 08:00am. Clean freshwater and mineral salt were offered at free choice daily. Daily feed offered (concentrate and silage) and orts (left over) were weighed and recorded. Voluntary feed intake was determined by subtracting the ort from feed offered. The rams were weighed every two weeks to determine their live weight changes and adjusted for feed offered. The experiment lasted for 90 days. Feed conversion ratio was determined by dividing feed intake by weight gain.

Chemical analysis: Samples of the sole grass and mixed grass-legume silages were subjected to chemical analysis. The dried samples of forages material were ground using a hammer mill and passed through 1-2 mm sieve. Proximate analysis was carried out to determine according to (AOAC, 2005). Neutral Detergent Fiber (NDF) by calculation, Acid Detergent Fibre (ADF), hemicelluloses, cellulose and acid detergent lignin (ADL) by method of Van-Soest *et al.* (1991). Organic matter (OM) was determined as the difference between dry matter and ash content (Table 2).

Statistical Analysis :The data collected were subjected to Analysis of Variance using the General Linear Model (GLM) Procedure of SAS, 2005. Significant ($P<0.05$) differences among treatment means were compared using the Dunnet's Test and Duncan Multiple Range Test as applicable using the SAS package.

RESULTS AND DISCUSSION

The effect of feeding sole grasses and grass-legume silage mixtures on growth performance of growing Yankasa rams fed a basal diet of sole grasses, mixed grass–legume silages with supplement of concentrate diet is presented in Table 3. Yankasa rams fed silage diet containing mixed MM concentrate diet recorded significantly ($P<0.05$) higher total feed intake (3617.00 g) followed by ML (3330.00g), EM (3326.00 g) EL (3071.00 g) and SM (3178.00 g) silage diet in that order. This result could be due to higher palatability and good fermentation characteristics of the feed which make the rams to consume more amounts of maize-mucuna silage or due to the chemical composition of the maize-mucuna silage (Okoruwa *et. al.,* 2012). However the value reported in this study was slightly lower than that of Khaing *et al., (*2015), who fed whole corn plant silage and Napier grass to goats.

The total feed intake obtained in this experiment was lower than the result of Santana *et al.,* (2019) in their experiment of sheep intake of mixed silage of king grass and forage legumes. The average fed intake was slightly lower than the range of 39.38 kg – 48.47 kg reported by Munza (2021) who fed a basal diet of sorghum silage to Yankasa rams. This might be as a result of different forage materials fed to the rams and the feeding regime of the diet. Higher total feed intake recorded in rams fed maize-mucuna silage mixture may be due to the higher intake of silage due to higher crude protein (CP) and Acid Detergent Fibre digestibility. Yankasa rams fed mixtures of maize-mucuna (2675.00 g) and maize-lablab (2625.00 g) recorded higher ($P<0.05$) final weight compared to other treatments. Consequently, rams fed mixtures of maize-mucuna had the highest significant body weight gain (5250.00 g) compared with SM had least value of gain (1000 g). This may be due to higher Metabolizable Energy content in maize and CP content of legumes. This result obtained agrees with the research findings of Gemechu *et. al.,* (2020) who reported higher final body weight of rams fed elephant grass ensiled with different proportions of Dolicho's lablab compared to those on sole Elephant grass silage. Rams fed sole maize silage had the lowest body weight gain and final weight thus might be as a result of low intake of concentrate by the rams. While Yankasa rams fed sole elephant grass silage perform better than those fed sole maize silage. This is not in agreement with the report of Akinola (2018) that good silage is made from elephant grass although inferior to that from maize and sorghum. The feed conversion ratio of the compounded silage fed to the Yankasa rams ranged from 7.28 – 8.87. The best FCR recorded in rams fed maize-mucuna silage which may be as a result of higher CP in the legume.

CONCLUSION

Yankasa rams fed mixed maize-mucuna and maize-lablab mixed silages (70:30) recorded 18% and 81% higher total feed intake and total weight gain, respectively compared to sole maize silage. Livestock farmers

should be encouraged to feed mixtures of maize-mucuna and maize-lablab for better growth rates and digestibility in Yankasa rams.

Table 1: Ingredients and chemical composition of concentrate diet

Parameters	(%)
Ingredients	
Maize	22.00
Rice offal	28.00
Maize offal	23.00
Cottonseed cake	23.00
Salt	0.50
Premix	2.00
Crude protein	14.00
Crude fibre	15.54
Ether extract	3.52
ADF	19.5
NDF	47.31
ASH	6.5
Metabolizable Energy (ME:kcal per kg)	1, 803.4

The ME values of the experimental feeds ingredients were calculated using bomb colarometre Alderman et *al.* (1985) as follows: ME= (MJ/kg DM) 11.78+ 0.00654CP+ (0.000665EE) ^{2} – CF (0.00414EE) -0.0118A.

Table 2: Proximate and mineral composition of grass-legume silage mixtures

Parameters (%)	SM	ML	MM	SE	EM	EL	SEM	LOS
Dry matter	94.63	94.96	93.14	95.16	94.05	94.99	0.71	NS
Crude protein	9.90^{c}	15.36^{a}	10.17^{b}	10.92^{b}	10.31^{b}	11.02^{b}	1.72	*
Crude fibre	29.44	37.32	26.21	37.60	33.62	30.65	5.88	NS
Ash	8.21^{bc}	19.59^{a}	5.17^{c}	14.58^{ab}	12.33^{b}	11.47^{bc}	2.11	*
ADL	4.18	5.20	4.47	5.54	5.76	5.63	1.59	NS
ADF	33.47^{b}	44.50^{a}	34.90^{ab}	37.66^{ab}	38.32^{ab}	38.05^{ab}	4.94	*
NDF	51.16^{ab}	58.96^{a}	52.36^{ab}	47.84^{b}	49.20^{ab}	54.45^{ab}	5.14	*
HC	17.89^{a}	14.46^{ab}	17.40^{a}	10.17^{b}	10.88^{b}	17.26^{a}	3.11	*
CNLS	29.09^{b}	39.30^{a}	27.09^{b}	32.42^{ab}	32.26^{ab}	32.18^{ab}	4.43	*

^{a,b,c}, Means with different superscripts along rows differ significantly at (P<0.05) ML= Maize lablab, MM=Maize Mucuna, EL= Elephant grass lablab, EM= Elephant grass Mucuna, SM= sole maize silage, SE= sole Elephant grass silage, ADF= Acid Detergent Fibre, ADL=Acid Detergent Lignin, NDF= Neutral Detergent Fibre, HC= Hemicellulose, CNLS=Cellulose Nitrogen SEM= standard error of mean.

Table 3: Growth performance of Yankasa rams fed different grass - legume silage mixtures

Parameters	SM	SE	MM	ML	EL	EM	SEM	LOS
Daily con. Intake (g)	199.86^{c}	208.46^{b}	214.55^{b}	219.17^{a}	210^{b}	210^{b}	3.81	*
Daily silage Intake (g)	329.86^{b}	346.50^{b}	388.35^{a}	337.33^{b}	301.76^{b}	344.84^{b}	10.59	*
Total Feed Intake (kg)	31.78^{c}	33.30^{b}	36.17^{a}	33.39^{b}	30.71^{c}	33.26^{b}	0.72	*
Total water Intake (l/day)	2.33^{b}	2.35^{b}	2.21^{ab}	2.49^{ab}	2.56^{a}	2.64^{a}	0.30	*
Average daily feed Intake (g/day)	530^{d}	555^{b}	603^{a}	556^{b}	511^{e}	554^{c}	0.01	*
Initial weight (kg)	21.50	21.62	21.50	22.00	21.00	21.00	0.67	NS
Final weight (kg)	22.50^{c}	24.00^{b}	26.75^{a}	26.25^{a}	22.88^{c}	24.50^{b}	0.92	
BWG	1.00^{c}	2.38^{bc}	5.25^{a}	4.25^{ab}	1.88c	3.50^{b}	0.62	
Average daily weight gain (g)	16.6^{F}	39.5^{d}	87.5^{a}	70.8^{b}	31.25^{e}	58.30^{c}	0.01	*

FCR	8.87[a]	7.57[b]	7.28[c]	8.18[a]	7.58[b]	7.36[bc]	0.67

a,b,c=Means bearing different superscripts differ significantly (P<0.05), SEM = Standard Error of Means;*= P<0.05, LOS = Level of significance; Kg =Kilogramme, g=gramme,l = litre; % = percent; NS = Not significant, ML= Maize lablab, MM=Maize Mucuna, EL= Elephant grass lablab, EM= Elephant grass Mucuna, SM= sole maize silage, SL= sole Elephant grass silage, BWG= Body weight gain SEM= standard error of mean.

REFERENCES

Adediran, A.S. (2002). Evaluation of the Nutritional value of cowpea (*Vigna Unguiculata* Linn) shells using goats in Nigeria. A thesis submitted to the Department of Animal Science, ABU. Zaria. Pp 67-69.

Akinola, J.O. (2018). Essentials of the commoner fronic pasture species ISBN 978-136-689-3 published by Obafemi Awolowo University Press. Ile Ife Nigeria 90-94.

Alikwe, P.C.N., Faremi, A.Y., Fajemisin, A.N. and Akinsoyinu, A.O. (2011). Performance and nitrogen utilization of West African Dwarf goats fed soya bean and dry poultry waste- based concentrate as supplements to *Cynodon nlemfuensis* basal diet. *Journal of Applied Science and Environmental Sanitation,* 6:pp181-189.

AOAC, (2005). Official Method of Analysis International, 24th edition. Association of Official Analytical Chemists, 24th edition Washington, DC.USA.pp200-210.

Gemechu T., Girma, M. and Eshetu, M. (2020). Effect of Elephant grass (*Pennisetum purpureum*) ensiled with different proportions of *Dolichos lablab* (*Lablabpurpureus*) on intake, digestibility and growth performance of Horro sheep. *Nigerian Journal of Animal Science and Technology* 3 (4):1 – 19.

Kallah, M. S., Baba. M., Alawa J.P., Muhammed, I. R, and Tanko, R. J. (1997). Ensiling Quality of Columbus Grass (*Sorghumalmum*) in Northern Nigeria, *Animal Feed Science and Technology,* 68: pp 153-163.

Khaing, K. T., Loh, T. C., Ghizan, S., Halim, R.A. and Samsudin, A. A. (2015). Feed intake, growth performance and digestibility in goats fed whole corn plant silage and Napier grass. *Malaysian Journal of Animal Science.* 18(1): 87 – 89.

Munza, B.M. (2021). Effect of feeding regime of concentrate supplement on growth performance, metabolism and rumen indices of growing Yankasa Rams fed a basal diet of grain Sorghum Hay and Silage. A PhD seminar presented at Department of Animal Science, ABU Zaria. Pp 12 – 13.

Okoruwa, M.I., Igene, F.U. and Isika, M.A. (2012). Replacement value of cassava peels with rice husk for guinea grass in the diet of West African Dwarf (WAD) sheep. . *Journal of Agriculture Science* 4(7): 254-261.

Paez Laman, S., Egea, V., Grilli, D., Fucili, M. nd Allegre, V. (2013). Growth and economic performance of Kids production under rearing systems and slaughter ages in Arid areas of Argentina. *Small Ruminant Research.* 110: 9 – 14.

Santana, A. A., Cheng, L.,Verdecia, D. M., Ramirez, J. L., Lopez, S., Cisneros, M. V., Rugoho, I., Maxwell, T. M. R. and Al Marashdeh, O.(2019). Effect of a mixed silage of king grass (*Cenchrus purpureus*) and forage legume(*Leucaena leucocephala* or *Gliricidia sepium*) on sheep intake, digestibility and nitrogen balance. *Animal Production Science.* Retrieved from https://doi.org/10.1071/AN18559.

SAS, (2005). Statistical Analysis Software (CD-ROM) Version 8.1. SAS Institute Inc., Cary, N. C., USA.

Van soest, P.J., Robertson, J.B. and Lewis, B.A. (1991). Method for dietary fiber, neutral detergent fiber and non-starch polysaccharides in relation to animal nutrition. *Journal of Dairy Science,* 74: 3583 – 3597.

Wilkins, R.J. (2001). Legume silage for Animal Production, Increasing Profits with forage legumes. Proceeding FAK held at a workshop in Braun Schweig in July 2001.*Christian Paul Institute of Crop and Grassland Science,* FAI., Bundesallee 50, D-38116 Brainschweig, Germany