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ENHANCING NUTRIENT INTAKE AND DIGESTIBILITY IN WEST AFRICAN DWARF GOAT BUCKS THROUGH ENSILED MAIZE STOVER AND BROWSE FODDER MIXTURES

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ABSTRACT

The incorporation of browsing legume fodders as silage, in conjunction with various ratios of maize stover residues, exhibits elevated protein efficiency and total digestible nutrients. This study assessed the nutritional consumption and digestibility of West African dwarf developing bucks fed maize stover residues (MSR) ensiled with certain browse plant species at the Teaching and Research Farm of Oyo State College of Agriculture and Technology, Igboora, Nigeria. Sixteen growing WAD bucks, aged 6-9 months and weighing between 6.00-10.00 kg, were randomly assigned to four dietary treatments: T1 (100% MSRS silage + 300g concentrate), T2 (MSR70GS30 silage + 300g concentrate), T3 (MSR70FT30 silage + 300g concentrate), and T4 (MSR70GA30 silage + 300g concentrate). Each diet was administered at 3% of the individual animals' body weight. Notable differences ($P<0.05$) in nutrient consumption and digestibility were detected. The maximum dry matter (DM) intake was seen in T1 (214.36g/d), whereas the minimum was in T3 (193.73g/d). Buck fed T3 exhibited the highest crude protein (CP) intake at 103.05g/d, whereas the lowest CP intake was recorded in T1 at 32.65g/d. The maximum DM digestibility (45.84%) was recorded in T3, while the peak crude fiber digestibility (50.00%) was noted in T4. The findings indicate that the integration of MSR with certain browse fodders enhances nutritional absorption and digestibility, particularly with a composition of 70% MSR and 30% F. thonningii fodder.

Keywords: Maize stover residues, Browse fodders, WAD bucks, Nutrient intake, Digestibility

INTRODUCTION

A significant challenge confronting cattle producers in tropical nations is the provision of adequate Approximately two-thirds of the global rural populace participates in mixed crop-livestock systems (MCLS), contributing roughly 50%, 60%, and 75% of the world's grains, meat, and milk, respectively (Paul *et al*., 2020). In Nigeria, MCLS account for 80% and 87% of the milk and meat production, respectively. Seventy-two percent of the national ruminant population resides in MCLS, with cattle comprising 70 to 90% of the livestock-holding households (Shapiro *et al*., 2015). In numerous emerging nations, such as Nigeria, forecasts indicate that the demand for animal-sourced foods (ASFs) would quadruple by 2050, attributed to population expansion, urbanization, and increasing incomes. Consequently, the rise in demand for roughages corresponding to the growth in ASFs is unavoidable. However, the inconsistent availability of both quantity and quality livestock feed significantly constrains farmers in MCLS within Sub-Saharan Africa (SSA), including Nigeria, particularly during the dry season (Paul *et al*., 2020). In Nigeria, the feed requirement is projected at 126.35 million tons annually on a dry matter basis, however the actual availability is 99.5 million tons per year (FAO, 2018). Feed expenses are 70% of the overall costs associated with animal production (FAO, 2019). Despite a significant deficiency of lush green forage throughout the arid season and considerable variability in pasture yield, small ruminant producers do not implement advanced feed conservation techniques beyond hay production (Assefa *et al*., 2017). The rising trend of dairy and meat production in Nigeria (Efa *et al*., 2017) and other emerging nations (Hawu *et al*., 2022) necessitates the preservation of excess fodder during the growing season. The prices of commercial concentrate feed are increasing with time. The inflation rate for animal feed (45–55%) exceeded that of food (24.1%) in some African nations (Negash, 2022), necessitating the exploration of alternatives. The majority of grasses utilized have poor protein content (Kebede *et al*., 2016), and diets only composed of grass fail to satisfy the nutritional needs of small ruminants, necessitating supplementation with fermentable nitrogen and energy sources (Ofori and Nartey, 2018). Trees, browse, and herbaceous legumes serve various functions, such as preserving the natural resource base via soil stabilization, averting soil erosion, enhancing soil fertility through microbial nitrogen fixation and organic matter, and mitigating climate change through carbon sequestration (Hanson and Ellis, 2020). Maize stover residues are among the favored crop residues utilized by smallholder ruminant farmers in underdeveloped nations for animal feed. The nutritional value of maize stover residues can be enhanced by integrating certain browse and legume fodders (Hawu *et al*., 2022). However, there is limited evidence regarding the nutritional quality of maize stover silage that includes protein-rich tree and herbaceous legumes in Nigeria. This study investigated the impact of incorporating varying levels of Gliricidia sepium, Ficus thonnigi, and Gmelina arborea fodders into maize stover silage on nutritional intake and digestibility in West African dwarf growing goats.

MATERIALS and METHODS

Experimental site and animals

The experiment was carried out at the Sheep and Goat Unit of the Teaching and Research Farm at Oyo State College of Agriculture and Technology, Igboora. Sixteen (16) West African dwarf bucks, aged 6 to 9 months and weighing between 6.00 and 10.00 kg, were utilized. The bucks were treated with anthelmintics (Albendazole®) to manage endoparasites; oxytetracycline and multivitamin preparations were supplied at a dosage of 1 mL per 10 kg body weight via the intramuscular route for preventative purposes. The homologous Peste des petits ruminants (PPR) vaccine was delivered to combat PPR disease and was acclimatized for 28 days prior to the initiation of the trial. Guinea grass and cassava peels were provided to the animals throughout the acclimatization phase. Pristine and uncontaminated water was consistently provided during the experiment.

Collection of Maize stover residues and Browse fodder plants

The *Gliricidia sepium*, *Ficus thonningii* and *Gmelina arborea* forages were obtained from matured woodlots at the college farm. The forages which include (leaves and twigs) were harvested by hand-cutting while maize stover residues were collected from maize production plots immediately after harvesting the green maize cobs at the College farms.

Silage production and experimental diets

The forages were finely chopped with a sharp cutlass into segments of 2 to 3 cm for compaction, wilted for 6 hours to decrease moisture content, and then meticulously combined with varying quantities of selected browsing fodder plants prior to ensiling. 200 grams of molasses were diluted in 4 liters of water and uniformly applied to the chopped material. The mixture was packed, crushed, and sealed in thick polyethylene bags to establish anaerobic conditions for optimal fermentation. The silage was stored for 21 days before being opened.

Experimental layout, design and feeding method

The animals were assigned by weight into four treatments, each consisting of four bucks, with two bucks serving as replicates in a completely randomized design (CRD). The experimental diet was administered at 3% of the individual animal's body weight, whereas maize stover residues ensiled with a combination of browse fodders were provided in varying quantities alongside the concentrate diet. The bucks received their designated experimental meals (500g of silage) at 8:00 AM and 300g of concentrate each buck daily at 2:00 PM, along with 3 liters of fresh, clean water provided each day. The experimental diets (ED) tested were: T1 (100% MSRS silage + 300g concentrate), T2 (MSR70GS30 silage + 300g concentrate), T3 (MSR70FT30 silage + 300g concentrate), and T4 (MSR70GA30 silage + 300g concentrate), with their proximate composition presented in Table 2. Each group of animals was allocated to a specific experimental diet.

Table 1: Composition of formulated low-cost concentrate for experimental West African Dwarf growing bucks

INGREDIENTS	LEVEL (%)
Palm kernel cake	60.00
Wheat offal	20.00
Corn bran	9.75
Groundnut cake	8.00
Bone meal	2.00
Salt	0.25
	100

Data Collection and Analysis

Nutrient Digestibility Study

Following a 90-day feeding trial, two bucks from each treatment group were relocated to clean metabolic cages for the distinct collection of feces and urine. A 7-day acclimatization period was followed by a 7-day fecal collection. Urine and feces were collected separately from each animal everyday throughout the final seven days of the experiment in metabolic cages. Daily morning collections of total fecal output were weighed and well mixed. The feces sample collected was aggregated and oven-dried at 800°C until a consistent weight was attained. Twenty percent (20%) formaldehyde was used to inhibit additional bacterial activity, and the fecal samples were preserved at -40°C. A complete urine production for a 24-hour period was gathered. Plastic containers containing 10 mL of 0.1N H_2SO_4 were positioned beneath the metabolic crates. Ten percent (10%) of the daily urine output from each buck was collected and refrigerated at -20°C for further examination. The fecal samples underwent chemical analysis according to the A.O.A.C. protocol (AOAC, 1995), while the fiber fractions (NDF, ADF, and ADL) were assessed using the Van-Soest (1991) method. All data on nutrient consumption an d digestibility were analyzed using one-way analysis of variance (SAS, 2013). The means were differentiated utilizing Duncan's multiple range test (Duncan, 1955). The nutrients intake was calculated as follows:

Statistical analysis

The data underwent a one-way Analysis of Variance (ANOVA) using SAS version 9.4 (SAS, 2013). Variations among treatment means were evaluated utilizing Duncan's Multiple Range Test (DMRT) (Duncan 1955).

RESULTS AND DISCUSSION

The proximate composition and fibre fractions of silages produced from different browse fodders in equal proportion with maize stover residues and concentrate diets fed developing bucks is reported in Table 2. Dry matter content achieved in this study was higher than 23% and 21.2% reported in similar MS-silages by Moran (2005) and Ashbell *et al*., (2002) but lower than 37.02% reported by Elkholy *et al*. (2009). The noticeable discrepancies in the various values may be in the differential proportions of morphological parts i.e stem to leaf ratio. Crude protein content of roughly 6 to 7% (Smith 1993) is essential for maintenance of ruminants and low-quality forages are classified as those with less than 8% CP (Leng, 1990). Low quality forages adversely affect rumen microbial activity (Van Soest 1982). Accordingly, the silages prepared from these maize stover wastes ensiled with selected browses in diets T2, T3 and T4 can serve to meet maintenance requirements of ruminants. The CP concentrations of maize stover residues-browse trees silages (14.89 to 16.50 % DM) were above the minimum required for growth (11.3 % DM) in ruminant animals (ARC, 1984). The CP values found for silage diets in T2, T3 and T4 respectively in this study were greater than to the CP range of 8.46 to 10.72% published by Binuomote *et al*. (2019) for elephant grass ensiled with cassava peels and fowl The rise in ash content of silages in response to browsing legumes addition could be a sign of high mineral concentration (Kebede *et al*., 2016). The ash concentration of maize stover residues ensiled with specific browse fodder silages varied from 8.96 to 10.12%, aligning with the results of Nurhayu *et al*. (2021) and Tesfaye as al. (2019). The concentration of ash in forage fluctuates based on parameters like plant developmental stage, morphological components, meteorological circumstances, soil properties, and fertilization practices (Zewdu, 2007). Albayrak and Turk (2013) elucidated that forage legumes possess a lesser fiber content compared to grasses, which often exhibit higher levels of NDF and ADF. As anticipated from maize stover residues-browse fodder mixed silages, our investigations demonstrated that higher levels of forage legumes led to a reduction in NDF and ADF concentrations. The decrease in fiber content may be attributed to the hydrolysis of NDF-bound nitrogen (Jaakkola *et al*., 2006) during fermentation. Reduced NDF and ADF readings indicate high-quality silage (Senjaya *et al*., 2010). Nurhayu *et al*. (2021) similarly showed an increase in lignin concentration with varying degrees of legume addition. Lignin is regarded as an anti-nutritional element in forage due to its detrimental effect on the nutrient accessibility of plant fiber (Moore and Jung 2001).

Table 2: Proximate composition (%) of Maize stover residues ensiled with varying levels of selected browse fodder plants and concentrate diets fed to growing WAD bucks

	T1 100MSRS	**T2 MSR70GS30**	**T3 MSR70FT30**	**T4 MSR70GA30**	Concentrate
DM	35.06	31.72	31.02	31.57	94.48
CP	5.34	15.26	16.50	14.89	17.57
CF	37.82	16.30	14.38	18.40	8 .75
EE	3.24	3.07	3.32	3.43	10.39
Ash	9.27	9.38	10.12	8.96	5.85
NFE	30.04	27.46	28.11	27.82	50.21
NDF	64.51	52.89	48.85	54.79	30.34
ADF	32.62	31.75	30.56	31.90	16.05
ADL	13.54	13.06	12.35	13.10	5.65
*ME(Kcal/Kg)	1529.03	1790.58	1879.99	1819.11	3282.45

*DM= Dry Matter, CP= Crude Protein, CF= Crude Fibre, EE= Ether Extract, NFE=Nitrogen Free Extract, NDF= Neutral detergent fibre, ADF= Acid detergent fibre, ADL= Acid detergent lignin, *ME= Calculated Metabolizable energy,* MSRS=*Maize stover residue silage, GS= Gliricidia sepium, FT=Ficus thonningii, GA=Gmelina arborea*

Table 3 presents the physical characteristics and fermentation quality of the silages. The color variation between the maize stover residues-only silage and the maize stover residues-browse legume fodder mixture silages seen in our study can be ascribed to the incorporation of browse legumes in the latter. The physical attributes and temperature values of the silages documented in the recent studies fall within the permissible parameters for high-quality silage (Khota *et al*. 2018; Dongxia *et al*., 2019). pH serves as a critical indicator of silage quality; typically, a lower pH signifies enhanced preservation and stability of the silage, as evidenced by our findings (maize stover residues silage = 4.30; maize stover residues-browse legume mixture silages ranged from 4.40 to 4.60) (Jusoh *et al*., 2016). Matlabe *et al*. (2022) contended that pH values below 4.80 are suitable for optimal silage production quality. Various research findings attributed increases in pH levels to the introduction of browse fodders. Their incorporation at various levels is associated with the substantial buffering capacity of legumes, principally attributed to the presence of cations (K+, Ca2+, and Mg2+) (Wang *et al*., 2017). The cations interact with organic acids produced during fermentation, neutralizing them and averting a decrease in pH (Da Silva Brito *et al*., 2020). Elevated temperatures in silage do not consistently facilitate good fermentation, since they diminish quality, expedite protein degradation, and impede the rapid decline of pH necessary for effective decomposition (Rahjerdi *et al*., 2015). The temperature range (27.53 – 28.30°C) observed in maize stover residues solely silage in the T1 diet and in the compounded maize stover residues-browse fodders mixture silages in diets T2, T3, and T4 is higher than the temperature range (16.62 – 19.52°C) reported for maize stover silage derived from the Arganie variety (Abebaye *et al*., 2020). Contrary to our findings, previous research have indicated elevated silage temperatures (29 – 40°C) (Naeini *et al*., 2014); this discrepancy may be attributed to the climatic conditions during the silage trials.

Table 3: Fermentative characteristics, pH and temperature of maize stover residues ensiled with selected browse fodder plants mixtures

Parameters	T1 100MSRS	T2 MSR70GS30	T3 MSR70FT30	T4 MSR70GA30
Colour	Pale yellow	Olive-green	Yellow-green	Yellowish-green
Smell	Pleasant	Nice	Pleasant	Sweet-sour
Taste	Sour	Vinegar	Vinegar	Sour
pH	4.30	4.50	4.60	4.40
Tempt(^{0}C)	28.30	27.53	27.82	27.60

MSRS=*Maize stover residue silage, GS= Gliricidia sepium, FT=Ficus thonningii, GA=Gmelina arborea Tempt=Temperature*

Table 4 presents the nutrient intake of WAD bucks that were fed maize stover residues ensiled with certain browse fodder combinations alongside concentrate diets. A substantial difference (p<0.05) in dry matter consumption was observed, with values ranging from 193.73 to 214.36 g/day. The crude protein intake values were considerably varied (p<0.05) across all diets. The crude protein intake for bucks on diet T1 was lower, recorded at 32.65 g/day. A substantial difference (p<0.05) was seen in NDF intake among the diets, with values ranging from 305.08 to 394.43 g/day. In this study, ADF intake considerably differed (p<0.05) among the diets, with values ranging from 190.86 to 201.02 g/day. The dry matter intake (DMI) in this study, which varied from 193.73 to 214.36 g/day, was lower and inconsistent with the intake values (567.00 – 950.00 g/day) reported by Abdulazeez *et al*. (2020) for sheep fed maize cobs treated with urea and wood ash. Furthermore, the values in this study were inferior to the total DMI range of 313.61 to 338.43 g/day reported by Adebisi *et al*. (2020) for West African Dwarf rams consuming Cajanus cajan leaf meal, and 513.64 to 576.10 g/day documented by Mijinyawa *et al*. (2020) for Yankasa rams fed untreated and urea-treated sorghum stover with supplements. The crude protein intake values in this study align with the range reported by Mijinyawa *et al*. (2020), which is 95.12 – 149.78 g/day for Yankasa rams fed untreated and treated sorghum stover with supplements, and the 86.00 - 133.10 g/day reported by Akinbode *et al*. (2020) for West African Dwarf sheep fed sugarcane tops treated with various nitrogen sources. A range of values between 80.5 and 133.4 g/day was found by Abdulazeez *et al*. (2020) for sheep fed cobs treated with urea and wood ash, except for the bucks on the control diet T1, which consisted exclusively of maize stover residue silage and exhibited a lower crude protein intake of 32.65 g/day. The ash intake levels recorded in this study, ranging from 56.46 to 63.20 g/day, exceeded the 39.31 to 49.59 g/day reported by Mbahi *et al*. (2019) for Yankasa rams fed ensiled rice straw with molasses. Nonetheless, the range of values (15.83 – 27.01 g/day) reported by Saka *et al*. (2020) for West African Dwarf goats consuming diets with varying quantities of alkaline-treated malted sorghum sprout is inconsistent with that. The neutral detergent fibre intake (NDFI) values in this study varied from 305.08 g/day to 394.43 g/day, exhibiting significant differences (p<0.05) across the diets, and were somewhat higher than the findings (263.81 – 307 g/day) published by Mijinyawa *et al*. (2020). The values in this study exceeded the range of 180.81 – 215.2 g/day reported by Saka *et al*. (2020) for West African Dwarf goats consuming diets with varying quantities of alkaline-treated malted sorghum sprout. Nonetheless, the findings are inferior to the 372.0 – 530.0 g/day documented by Abdulazeez *et al*. (2020) for sheep consuming cobs treated with urea and wood ash. The intake of acid detergent fibre (ADFI) in this study varied from 190.86 to 201.02 g/day, exhibiting significant differences (p<0.05) among the diets. The values fell below the range (206.99 – 255.70 g/day) reported by Mijinyawa *et al*. (2020) for Yankasa rams fed treated and untreated sorghum stover with various supplements. Nonetheless, the results acquired in this investigation exceeded the ranges of 9.56 – 11.46 and 130.86 – 143.05 g/day documented by Saka *et al*. (2020) for West African Dwarf goats consuming a diet with varying quantities of alkaline-treated malted sorghum sprout.

Table 4: Nutrient intake of WAD growing bucks fed Maize stover residues ensiled with varying levels of selected browse fodder plants and concentrate diets (g/day)

Parameters(g/day)	T_1 100MSRS	T_2 MSR70GS30	T_3 MSR70FT30	T_4 MSR70GA30	SEM (±)
DFI	550.28^{cd}	556.62^{bc}	562.08^{b}	567.14^{a}	10.28
DMI	214.36^{a}	196.18^{bc}	193.73^{c}	198.94^{b}	10.27
CPI	32.65^{c}	94.38^{b}	103.05^{a}	93.83^{bc}	6.80
CFI	231.24^{a}	100.81^{c}	89.81^{d}	115.95^{b}	4.10
EE intake	19.81^{b}	18.99^{c}	20.73^{ab}	21.61^{a}	0.88
Ash intake	56.68^{c}	58.01^{b}	63.20^{a}	56.46^{d}	2.22
NFE intake	183.67^{a}	169.83^{b}	175.56^{ab}	175.31^{ab}	6.24
NDF intake	394.43^{a}	327.10^{c}	305.08^{d}	345.26^{b}	1.92
ADF intake	199.45^{b}	196.36^{c}	190.86^{d}	201.02^{a}	3.32
ADL intake	52.70^{b}	51.75^{ab}	49.69^{c}	53.44^{a}	1.15

^{abcd} Means on the same row with different superscript are significantly different (P< 0.05). DMI= Dry Matter intake, CPI= Crude Protein intake, CFI= Crude Fibre intake, EEI= Ether Extract intake, NFEI=Nitrogen Free Extract intake, NDFI= Neutral detergent fibre intake, ADFI= Acid detergent fibre intake, ADLI= Acid detergent lignin intake, MSRS=Maize stover residue silage, GS= Gliricidia sepium, FT=Ficus thonningii, GA=Gmelina arborea

The nutrient digestibility of WAD developing bucks consuming maize stover wastes ensiled with certain browse fodders is illustrated in Table 5. A substantial difference (p<0.05) was detected in the digestibility of all nutrients. Dry matter digestibility was maximal in bucks on T3 (45.84%) and minimal in T4 (40.89%). Crude protein digestibility varied significantly (p<0.05) across the diets. The maximum value of 63.82% was recorded in diet 3, while the minimum was observed in T1 at 39.88%. The digestibility of Neutral Detergent Fibre (NDF) was also considerably affected (p<0.05). The digestibility of Neutral Detergent Fibre (NDF) varied considerably (p<0.05) among the dietary groups. The diet 3 for bucks had the highest NDF digestibility at 61.86%, whilst the lowest was noted in T1 at 52.78%. The dry matter digestibility values reported in this investigation were significantly different (p<0.05). This may come from the rumen-modifying effects of the addition (molasses) in conjunction with various browse species, as shown in rumen ecology. The values acquired in this study, ranging from 42.67% to 45.84%, were inferior to the 56.82% to 64.97% reported by Chana *et al*. (2020) for mixed-breed goats fed sorrel seed meal supplemented with groundnut hay, and the 59.12% to 68.02% reported by Abdulazeez *et al*. (2020) for sheep fed cobs treated with a combination of urea and wood ash. The minor reduction in dry matter digestibility seen in this study may be attributed to the physical and chemical properties of the provided meals that enhanced their consumption. This aligns with the findings of Romney and Gill (2003), who asserted that the nutritional values of feed affect its digestibility. The authors additionally indicated that the dry matter digestibility of urea-treated millet stover was superior when the stover was crushed and chopped (64.1% and 65.0%, respectively) in comparison to untreated stover (56.5% and 52.4%, respectively). The crude protein digestibility value was superior for meal 3 (63.82%), indicating that a mixture of 70% maize stover residues ensiled with 30% Ficus thonnigii fodders, supplemented with a 300g concentrate meal, improved crude protein digestibility. The values were inferior to the 75.91 to 79.34 range reported by Chana *et al*. (2020) for mixed breeds of goats given sorrel seed meal supplemented with groundnut hay, as well as the 64.96 to 76.68% reported by Adamu *et al*. (2020) for Red Sokoto bucks receiving varying inclusion levels of Albizia labeck. Significant disparities in crude fibre (CF) digestibility were observed between treatments. Bucks consuming exclusively a 100% MSRS diet supplemented with 300g of concentrate exhibited significantly reduced CF digestibility (35.06%), whereas the maximum CF digestibility was seen in bucks fed diet T4. This outcome demonstrated that elevated levels of crude protein (CP) in legume forage silage mixtures positively affected crude fiber (CF) digestibility, corroborating the findings of Fasae *et al*. (2005) and Okah *et al*. (2012), which revealed that both CF and CP digestibility improve with increased dietary CP levels. The recorded ash digestibility content varied from 43.80% to 66.07%. This suggests that ash digestibility is valuable for evaluating food quality and provides insight into the mineral content of the leaves (Smart, 1996). The figure derived from this investigation exceeded 10.90%, surpassing the 10.90% reported by Ibeawuchi *et al*. (2002) and the 6.29% recorded by Mecha and Adegboola (1980). This indicates that maize stover residues ensiled with specific browse species may serve as a superior source of key minerals necessary for optimal metabolism, hence improving the production of small ruminants. The digestibility of the higher fiber fractions (NDF and ADF) was 61.86% and 53.37%, respectively, in diet T3 (MSR70%FT30%) in this study, which did not exceed 70% on a dry matter basis. This may be attributed to the supplementation of maize stover residues ensiled with selected browse species and a concentrate diet. This finding aligns with McDonald *et al*. (1998), who reported that feed digestibility is influenced not only by its composition but also by the composition of other feeds consumed concurrently. Mesgenew (2014) observed no difference in the digestibility of NDF and ADF across different sheep breeds and feed types. Likewise, the results of the current study contradicted the findings of Nourou (2010), who reported enhanced NDF and ADF digestibility following the supplementation of millet stover-based diets with groundnut haulms and cereal brans, affecting feed intake and growth performance in sheep. The disparity noted in this study relative to prior research may stem from the use of distinct basal and supplementary diets.

Table 5: Nutrient digestibility of WAD growing bucks fed Maize stover residues ensiled with varying levels of selected browse fodder plants and concentrate diets (%)

Parameters(g/day)	T_1 100MSRS	T_2 MSR70GS30	T_3 MSR70FT30	T_4 MSR70G30	SEM (±)
DMD	42.67^{b}	43.16^{ab}	45.84^{a}	40.89^{c}	1.14
CPD	39.88^{c}	58.72^{b}	63.82^{a}	61.85^{ab}	1.38
CFD	35.06^{d}	37.24^{c}	43.95^{b}	50.00^{a}	7.01
EED	46.91^{c}	41.37^{d}	56.33^{a}	53.94^{b}	4.89
Ash D	43.80^{d}	50.32^{c}	61.46^{b}	66.07^{a}	8.94
NFED	33.09^{d}	59.87^{b}	63.57^{a}	52.77^{c}	6.38
NDFD	52.78^{c}	59.50^{b}	61.86^{a}	58.73^{bc}	7.84
ADFD	45.16^{d}	47.15^{c}	53.37^{a}	50.47^{b}	6.46
ADLD	44.17^{d}	53.37^{b}	54.09^{a}	47.56^{c}	6.92

[abcd] means on the same row with different superscript are significantly different (P< 0.05).
DMD= Dry Matter Digestibility, CPD= Crude Protein Digestibility, CFD= Crude Fibre Digestibility, EED= Ether Extract Digestibility, NFED=Nitrogen Free Extract Digestibility, Neutral detergent fibre Digestibility, Acid detergent fibre digestibility, Acid detergent lignin digestibility, MSRS=Maize stover residue silage, GS= Gliricidia sepium, FT=Ficus thonningii, GA=Gmelina arborea

CONCLUSION

The study's results demonstrated that a diet comprising ensiled maize stover residues and selected browse fodder plants improved dry matter and nutrient intake, as well as enhanced digestibility in growing West African Dwarf bucks fed a combination of 70% maize stover residues and 30% Ficus thonningii silage, supplemented with a 300g concentrate diet.

RECOMMENDATIONS

It is recommended that underutilized crop leftovers, such as maize stover, be mixed with browse fodders in silage production as preserved feed for growing bucks to improve animal performance. The combination ratio may depend on the animal's production status and the quality of both the maize stover residues and the browse plant type. Further investigation may be required about the ratio of maize stover residues to browse fodder species optimal for silage production, as well as the varying production statuses of bucks with differing grades of both maize stover residues and browse fodders.

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