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Research Article

Performance and Economic Analysis of Yankasa Rams Fed Guinea Grass Supplemented with Graded Levels of Wild Purslane (*Portulaca oleracea L.*)

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ABSTRACT
The study evaluated the performance and economic implications of feeding Yankasa rams guinea grass supplemented with different levels of wild purslane (*Portulaca oleracea* L.). Twelve rams with an average initial weight of 15.7 kg were used in a 62-day feeding trial. They were randomly assigned to four dietary treatments in a Completely Randomized Design (CRD), with three animals per treatment. Each animal was fed individually twice daily, and feed intake was monitored by recording leftovers. The treatments included: T_1 (control) – guinea grass ad libitum + 100 g maize offal (MO); T_2 – guinea grass ad libitum + 100 g fresh purslane + 100 g MO; T_3 – guinea grass ad libitum + 200 g fresh purslane + 100 g MO; and T_4 – guinea grass ad libitum + 300 g fresh purslane + 100 g MO. Data collected were analyzed using Analysis of Variance (ANOVA), and treatment means were compared with Duncan's Multiple Range Test (DMRT). Results indicated that rams fed T_4 (300 g purslane) recorded significantly higher ($P<0.05$) final body weight, average daily weight gain, and total dry matter intake compared to other treatments. However, feed conversion ratio (FCR) did not differ significantly ($P>0.05$) across groups. In terms of cost, the highest production expense (₦555.21) occurred in T_1, while inclusion of purslane reduced feeding costs. In conclusion, supplementing guinea grass with up to 300 g/day of wild purslane enhanced growth performance and lowered production costs in Yankasa rams, making it a viable feed strategy for sheep production.

Keywords: Economic; Graded levels; Guinea grass; Performance; Wild Purslane; Yankasa rams

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INTRODUCTION

The poor quality of the feed resources available to ruminants results in low plane of nutrition with attendant low productivity of our indigenous animals (Otaru *et al*., 2011). The poor condition of livestock in the tropics is more likely as a result of inefficient digestion in the rumen and inefficient utilization of the nutrients absorbed from low quality feeds. Several attempts which have been made to improve the nutritive quality of this class of livestock feeds include physical, chemical and biological treatments, use of feeds additives as well as supplementation

with non-protein nitrogen sources such as urea and molasses (Ajiji *et al.,* 2013). Nyako (2010) pointed out that there has been a growing trend in many regions throughout the world to identify potentially important feed sources among shrubs and tree leaves and to explore possibilities of including them in ruminant diets. Fresh Purslane has been used as antibacterial, antifungal, anti-inflammatory and analgesic activity in ruminant (Chan *et al*., 2013). Fresh Purslane (*Portulaca oleracea L*.) is a common weed that grows wild all over the world and is one of the most widespread weed species in summer crops which may reach 40 cm in height (Okafor and Ezejindu, 2014), it's rich source of protein, minerals, and essential amino acids that are beneficial for the growth and development of ruminants. The protein content of fresh Wild Purslane (*Portulaca oleracea L.*) Stem and Leaves can help improve the muscle development and body weight gain in rams, resulting in better productive performance (Ezekwe *et al.,* 1999). A protein level of up to 22-25%, comparable to other forage or vegetable food crops traditionally used as protein sources for animal consumption (Trupti *et al.*, 2018**).**

MATERIALS AND METHODS

The study was conducted at the Teaching and Research Farm of the Department of Animal Science and Range Management, Modibbo Adama University, Yola, Adamawa State. Twelve (12) Yankasa rams with an average live weight of 15.7 kg were used for the study which lasted for 62 days. The animals were sourced from the local market of (Ngurore) Adamawa State. They were quarantined, dewormed and administered with prophylaxis prior to the experiment. The animals were allotted to four (4) dietary treatments in a Complete Randomized Design (CRD) with three replications per treatment. The animals were fed individually twice daily at 8:00 am to 8: 30 am and 3:30 am to 4:00 pm. The experimental diets consist of: Treatment T_1 – Fresh Guinea grass + 0g Fresh Wild Purslane (*Portulaca oleracea L.)* (control), T_2–Fresh Guinea grass + 100g Fresh Wild Purslane *(Portulaca oleracea L.*), T_3 –fresh Guinea grass + 200g fresh Wild Purslane (*Portulaca oleracea L.*) and T_4–fresh Guinea grass + 300g fresh Wild Purslane (*Portulaca oleracea L.);* that is 100g in the morning and 100g in the evening. The following parameters were taken: Feed intake, weight gain, and feed conversion ratio.

Feed Intake

The daily record of feed intake was obtained by subtracting the quantity of left-over feed from the feed offered in the previous feeding before next day feeding to determine the daily intake.

Live Weight Gain

The live weight changes were determined by subtracting the initial weight from the final weight of the animals.

Feed Conversion Ratio (FCR)

This was determined by dividing the weight of feed intake with weight gained by the animal.

Data Analysis

All data collected from the experimental animals were subjected to Analysis of Variance (ANOVA) using SAS package (SAS, 2002) and the means were separated using Duncan Multiple Rage Test (DMRT).

RESULTS

The results of chemical composition of Guines grass (*Panicum maximum*) and Wild Purslane (*Portulaca oleracea L.)* are presented in Table 1. According to the result of the study, Guinea grass (*Panicum maximum*) was recorded to have 92.65, 7.35, 11.65, 38.70 and 0.35% as dry matter contents, moisture level, crude protein, crude fiber and ether extract, respectively. On the other hand, 90.45, 9.55, 17.70, 18.81 and 4.19% were recorded as mean values of dry matter contents, moisture level, crude protein, crude fiber and ether extract of Wild Purslane (*Portulaca oleracea L.)*. Furthermore, 6.33, 35.65 and 73.65% were recorded as total ash, NFE and NDF of Guinea grass (*Panicum maximum*) among others whereas 9.72, 40.03 and 78.43% were recorded in Wild Purslane (*Portulaca oleracea L.).*

The results of the performance of Yankasa rams are presented in Table 2. According to the results of the study, the initial live body weight does not show any ($P>0.05$) significant difference among the treatments. Ram on treatment four (T_4) differ ($P<0.01$) significantly in final body weight when compared with those on the other treatments. The total weight gain does not ($P>0.05$) differ statistically among the treatments. However, rams on treatment four (T_4) differ significantly ($P<0.05$) in average daily weight gain, supplement and total water intake, respectively. No significant ($P>0.05$) differences were observed in

feed conversion ratio (FCR) and average daily water intake across the treatments but recorded in total dry matter intake where ram on treatment four (T_4) had significantly (P<0.01) higher mean value.

The cost benefit analysis is presented in Table 3 below. The highest cost of production (N 1665.65) was recorded in rams on treatment one (T_1), whereas those on treatment two and three were recorded with N 1579.42 and N 1564.62, respectively. The lowest production cost (N 152.46) was recorded in rams placed on treatment four (T_4). The feed production cost of N 136.0 and N 101.05 was recorded in T_1 and T_2 whereas T_3 and T_4 were reported with N98.78 and N 68.66, respectively.

Table 1: Chemical Composition of Guinea grass (*Panicum maximum*) and Wild Purslane (*Portulaca oleracea L.)*

Parameters	Guinea grass (*Panicum maximum*)	Wild Purslane Leave and Stem (*Portulaca oleracea L.*)
Dry matter (% DM)	92.65	90.45
Moisture (% MO)	7.35	9.55
Crude Protein (CP %)	11.65	17.70
Crude Fiber (CF %)	38.70	18.81
Ether Extract (EE %)	0.35	4.19
Total Ash (ASH%)	6.33	9.72
NFE (%)	35.62	40.03
NDF (%)	73.65	78.43
ADF (%)	42.46	64.35
Lignin (%)	18.71	18.81
Cellulose (%)	23.75	45.54
Hemicellulose (%)	28.60	14.08
Organic Matter (OM)	52.20	57.08

Table 2: Performance of Yankasa Rams Fed fresh Guinea Grass (*Panicum maximum*) Supplemented with fresh Wild Purslane (*Portulaca oleracea L.)* Leaves and stems

Parameter	Treatments				
	T_1	T_2	T_3	T_4	SEM
Initial live weight (kg)	15.03	15.66	15.68	15.33	18.66
Final body weight (kg)	19.92^{b}	20.87^{b}	20.96^{b}	22.75^{a}	1.13**
Total weight gain (kg)	4.89	5.21	5.28	7.42	18.98^{NS}
Average daily weight gain (g/a/day)	54.33^{b}	57.89^{b}	58.67^{b}	82.44^{a}	18.15*
Basal Feed Intake (g/day)	564.50^{c}	$572.17b^{c}$	584.8^{ab}	597.17^{a}	15.63*
Supplement Intake (g/day)	----	100^{c}	200^{b}	300^{a}	1.77*
Total dry matter intake (g/h/day)	564.50^{d}	672.17^{c}	784.83^{b}	897.17^{a}	13.08**
Feed conversion ratio (FCR)	10.40	11.61	13.40	9.67	17.94
Total water Intake (L)	103.50^{d}	111.60^{c}	122.40^{b}	136.80^{a}	5.42*
Average daily water intake (L/a/day)	2.15	2.24	2.36	1.52	2.37

Key: Means within the same row with different superscripts differs significantly. *P<0.05 = Least Significant difference, **P<0.01 = Highly Significant difference, SEM = Standard Error Mean, LSD =Least significant difference and NS= No significant different.

Table 3: Cost Benefit Analysis of Yankasa Rams fed Fresh Guinea grass Supplemented with Fresh Wild Purslane (*Portulaca oleracea L.*) Leaves and stems

Parameters	Treatments			
	T_1	T_2	T_3	T_4

Cost of Guinea grass (N/kg)	54.17	54.17	54.17	54.17
Cost of maize offal (N/kg)	150	150	150	150
Cost of Wild Purslane (N/kg)	62.5	62.5	62.5	62.5
Quantity of Guinea grass consumed (kg)	11.08	10.40	10.30	9.99
Quantity of maize offal consumed (kg)	30.67	28.79	28.41	27.67
Quantity of Wild Purslane consumed (kg)	12.78	11.99	11.84	11.53
Total Cost of Guinea grass consumed (N)	600.20	563.37	557.95	541.15
Total Cost of maize offal consumed (N)	600.5	4318.5	4261.5	4152.0
Total Cost of Wild Purslane consumed (N)	798.75	749.38	740.0	720.63
Total cost of production (N)	1665.62	1579.42	1564.62	1528.46
Cost of production per animal (N)	555.21	526.47	521.54	509.49
Body weight gain (kg)	4.89	5.21	5.28	7.42
Feed production cost N/ Body weight gain (kg)	136.0	101.05	98.78	68.66

Key: ₦ = Naira; Kg = Kilogram

DISCUSSION

The results of the chemical composition of this research recorded a dry matter contents Guinea grass (*Panicum maximum*) and Wild Purslane (*Portulaca oleracea L.*) as 92.65.0 and 90.45%. This is higher than the values (28.16 and 31.24%) reported by Yerima *et al*. (2020) in Guinea grass and *Fedherbia albida* pod which can be caused by environmental and genetic differences. Moreover, 11.65 and 17.70% were recorded as crude protein contents of experimental diets which's higher than the recommended range of 9 to 14% as minimum requirements for maintenance and production for animals as reported by Aduku (2005) and higher than the value of 12.6%, as recommended by Yerima *et al.* (2020) for supplementary diet. Therefore, the crude protein content of the experimental materials has shown that the nutritional value of the diet is enough to meet the optimum requirement of the animals. The ash contents recorded in Guinea grass and Wild purslane recorded (6.33 and 9.72%) in this research is higher than the value (5.4%) reported by Yerima *et al*. (2020), but lower than 11.75% obtained by Yakubu *et al*. (2017). This means that higher vitamins and minerals were available in the diets which improved the performance of the animal.

The performance of the rams showed that the live weight gain values (4.89 - 7.42kg) obtained in this research fall within the range of 4.63 to 10.30 kg as reported by Yarima *et al.* (2022) in ram, but higher than 3.13kg to 3.88 kg as reported by Ochepo (2024) in rams fed with Gamba grass and ensiled urea treated groundnut shell meal levels as supplementary diet. High weight gain was reported to be as a result of high dry matter intake as reported by Jocob *et al.* (2021). The higher weight gain of animals recorded in this research might be an indication of better nutrient utilization of maize offal and fresh wild Purslane leaves and stems as supported by Khan *et al*. (2017). The higher values obtained in this research might be attributed to better feed utilization of supplemented Wild Purslane (Leaves and Stems) and maize offal that improved feed conversion efficiency due to the relatively higher nutrient composition of diets. The Feed conversion ratio (9.67 to 13.40) obtained in this research fall slightly within the range of 7.17 to 12.53 and 10.06 to 16.7 as reported by Yarima *et al.* (2022) and Abdullahi *et al*. (2021) in Yankasa rams. The utilization of feeds might be as a result of palatability of the diets which improved the weight gain of the animals. The average daily water intake values of Yankasa rams (1.15 to 2.36 Litre/animal/day) recorded in this research were lower than the values reported by Nyako *et al*., (2015). The lower values might be attributed to high relative moisture content of fresh Guinea grass (70 to 80%) and fresh Purslane Leaves and Stems (60 to 70%) which resulted to low quantity of water consumed by the animals which corroborated the findings of Ohepo *et al.* (2024).

The economic analysis showed that the cost of feedings was lower in rams placed on T_4 (N509.49), while control recorded the higher values T_1 (N555.21). This might be attributed due to the variation in the amount of feeds intake and feed cost as Maigandi *et al*. (2002) reported a similar trend. However, higher costs of feeds per kilogram weight observed in T_1 (N555.21) could be attributed to poor utilization of the diets that consequently affected the feed efficiency and weight gain of the rams. The values obtained in this study was higher than that of

Sani *et al.* (2022) who recorded the highest feed cost of ₦ 71.32 while determining the production economy of Yankasa rams fed diets containing urea and cotton seed cake. The lower cost of feed/kg (N509.49) obtained in this study is evidence that the combine use of Guinea grass, Wild Purslane, and maize offal reduces the cost of livestock production which agreed with the views of Abdullahi (2021).

CONCLUSION

Feeding Guinea grass supplemented with up to 300g/day of Wild Purslane improved performance in terms of dry mater intake (DMI), live weight gain (LWG) and feed conversion ratio (FCR) of the animals and significantly reduced production cost in Yankasa rams.

Based on the results of the study, it's recommended that Yankasa ram should be fed with Guinea grass supplemented with Wild Purslane stems and leaves as it encourages production at lower cost. Serum biochemistry profile should be checked to ascertain physiological parameters. Farmers should be encouraged to practice this procedure for better production along the chain of the economic value. Further research should evaluate the long-term health effects of wild Purslane supplementation on, and its impact on meat quality.

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