©Kashere J. Anim. Sci. Volume 1 Issue 1 ISSN: 3115-6479 1-7
Date received: 8th October 2025
Date accepted: 22nd October 2025
Date published: 8th November 2025

# CARCASS CHARACTERISTICS OF RED SOKOTO GOATS FED DIETS CONTAINING GRADED LEVEL OF YAM (*Discorea rotundata*) PEEL MEAL AS SUPPLEMENT TO SHEA BUTTER (*Vitellaria paradoxa*) LEAVES

**[1]Ocheja, J.O., [1]Bukola, O.A., [1]Muhammdd, Y.T., [1]Kunda, F.D., [2]Adunfe, T.A., [3]Diftuffe, M., [4]Ibrahim, N.O. and [1]Isah, G**

[1]Department of Animal Science, Federal University of Kashere, Gombe State, Nigeria
[2]Department of Animal Science, University of Abuja, Nigeria
[3]Department of Agricultural Education, Federal College of Education (Technical) Gombe State, Nigeria
[3]Division of Agricultural Colleges, Ahmadu Bello University, Zaria, Kaduna State, Nigeria
(Corresponding Author: Ocheja, J.O : josiahoheja@yahoo.co.uk)

## ABSTRACT

*The study evaluated the Carcass, characteristics of Red Sokoto bucks fed diets containing graded levels of yam peel meal as supplement to shea butter leaves. The experiment was carried out at small ruminants unit of the Teachings and Research Farm Federal University of Kashere Gombe State Nigeria for a period of 50 days. Sixteen (16) Red Sokoto bucks aged about 11 – 12 months old were allocated into four (4) treatments of four (4) bucks each in a Complete Randomize Design (CRD). The bucks were acclimatized for 7 days and subsequently fed shea butter leaves at 500g/buck/day and a concentrate supplement diet (containing 0, 5, 10 and 15% yam peels) at 250g per buck/day for a duration of fifty (50) days, water was served ad libitum. At the end of the study, 12 animals were slaughtered at the rate of three animals per treatment. The weight of each animal before and after slaughter was taken. The head, neck, forelimb, hind limb, thorax, back, loin, flank and belly fat were removed. They were weighed and their weights were converted to percentage of slaughter weight, for the determination of whole sale cuts of carcass. The values for head, neck, forelimb, hind limb and back in the treatment groups were significantly ($p < 0.05$) higher than that of control. The values of thorax, loin, flank and belly fats showed no significant ($p > 0.05$) difference. The weights of the byproduct which include, horns, hoofs, full gut, empty gut and belly fat were similar for all the treatment. The weight of horns and empty gut were significantly higher ($p<0.05$) for T3 and T1 respectively. It was concluded that the use of yam oeels meal in supplement diets for red sokoto goats improved the carsass yield, weights of whole sale cuts and some by-products, It was recommended that yam peels meal can be used ia supplement concentrate diets for Red Sokoto goats at 15% level of inclusion*

**Keywords:** Carcass, Red, Sokoto Goats, Yam Peels Meal, Shea Butter, Leaves, Supplement

## 1.0 INTRODUCTION

Goat production plays a vital role in the livelihoods of rural dwellers in Nigeria, especially in the northern regions. Among the various breeds, the Red Sokoto goat (also known as Maradi goat) is highly valued due to its high meat quality, adaptability to arid environments, and economic importance (Abdullahi *et al*., 2021). It is primarily raised for meat, and its skin is considered one of the finest globally. In recent years, growing concerns over high cost and competition for conventional feed ingredients such as maize and soybean meal have prompted the need for alternative, cost-effective, and locally available feed resources in livestock nutrition. Yam peels, a by-product of yam (*Dioscorea spp*.) processing, are widely available in Nigeria, especially in yam-producing regions. They are often discarded as waste, contributing to environmental pollution.

However, they contain appreciable levels of fiber, carbohydrates, and some essential nutrients that can be useful in animal nutrition when properly processed (Oluwatosin *et al*., 2020). Utilizing yam peels in animal feeding, especially for ruminants like goats, presents a sustainable approach to waste management and feed cost reduction. The inclusion of agro-industrial by-products such as yam peels in livestock diets has attracted attention among researchers. According to Esonu *et al*. (2019), when appropriately processed (e.g., sun-dried or fermented), yam peels can be included in the diets of goats without adversely affecting their performance. This aligns with global efforts to promote circular agriculture, where waste products are reused within the farming system for improved sustainability and profitability (FAO, 2021).

Carcass yield is a critical economic trait in meat production, as it determines the quantity and quality of meat derived from an animal. Several factors influence carcass yield, including breed, nutrition, age, and management practices. Adequate nutrition, in particular, plays a pivotal role in muscle development and fat deposition, both of which are essential for achieving desirable carcass characteristics (Sanni *et al*., 2022). Hence, feeding strategies that enhance carcass yield without increasing production costs are highly desirable in the goat industry. Despite the nutritional potential of yam peels, limited empirical studies have investigated their impact on carcass traits in Red Sokoto goats. Most of the available literature focuses on growth performance, feed conversion ratio, and health status. However, understanding how yam peel supplementation affects carcass weight, dressing percentage, and meat composition is essential for optimizing feeding strategies for goat production (Aliyu *et al*., 2020).Incorporating yam peels into goat diets also aligns with the goals of sustainable agriculture and the United Nations Sustainable Development Goals (SDGs), particularly Goal 12 (Responsible Consumption and Production) and Goal 2 (Zero Hunger). By reducing dependence on imported or expensive feed ingredients, smallholder farmers can improve productivity and food security while conserving natural resources (UNDP, 2022).Given the socio-economic importance of Red Sokoto goats and the growing need for cost-effective and sustainable feed alternatives, this study seeks to evaluate the effect of yam peels on carcass yield in Red Sokoto goats.

## 2.0 MATERIALS AND METHODS

### 2.1 Study Area

The study was conducted at the Teaching and Research Farm, Department of Animal Science, Faculty of Agriculture, Federal University of Kashere in Gombe State, Nigeria. The state is situated within latitude 9º54'46N and longitude 9º 46º'27E and 10º57º E and altitude of 349m above sea level. The annual rainfall of Kashere ranges between 800mm-900mm per annum and is characterized by distinct dry season (October-May) and rainy season (June-September) seasons. The annual mean temperature ranges from 30-32º C and it experiences a relative humidity of 17-90% (National Geospatial Intelligence Agency, 2012).

### 2.2 Experimental Animals

Sixteen (16) red Sokoto bucks aged between 11-12 months were sourced from within Kashere and its environs. They were brought to the Teaching and Research Farm, Faculty of Agriculture, Federal University of Kashere and housed in individual pens for one week for acclimatization.

### 2.3 Experimental Procedure

16 bucks were randomly allocated into four (4) Treatments of four (4) goats each. The animals were treated with Albendazole oral solution for endo parasites at 1ml per 10kg body weight and pour-on for ecto parasites at 1ml/10kg; Oxytetracycline hydrochloride and multivitamin injection at 1ml/10kg body weight was given each to take care of bacterial infection/stress and to provide a common health status. The Yam Peels used for the experiment were collected from within Kashere and the University Campus. The feed ingredients consist of Yam peels, Cassava peels, Sweet potato peels, Maize offal, Groundnut Cake, Egg shell meal and Table salt. These components were thoroughly mixed after pounding and grinding to form Yam Peel Meal (YPM). Each treatment has four (4) replicate. Treatment one ($T_1$) was 0.00% level of yam peel meal; treatment two ($T_2$) was 5.00% level of yam peel meal; treatment three ($T_3$) was 10.00% level of yam peel meal and Treatment four ($T_4$) was 15.00% level of yam peel meal. Each treatment had (4) goats; each goat was fed 250g of the concentrate per day, and Shea butter leaves at 500g per Goat per day of which the Shea butter leaves was fed first, then the concentrate one hour later, the Goats were served water *Ad-libitum*. The bucks were fed the experimental diets for 50 days, after an adjustment period of 7 days.

**Weight Gain:** Initial weights and final weights of the animals were recorded. The initial weights were subtracted from the final weights to determine the weight gain of the animals.

**Feed intake:** The concentrate offered to the goats was weighed daily and the left over was also weigh and subtract from the quantity of feeds that was served to determine the feeds intake of the animals.

**2.4.3 Weekly weight gain:** The animals were weighed on a weekly basis to determine their weight

**2.2.4 Carcass Evaluation.**
At the end of the experiments 3 bucks per treatment were starved for about 12 hours prior to slaughter but were given water, they were slaughtered, bled, eviscerated and dressed.

**2.4.1 Carcass Yield Determination**
The dressing percentage was calculated using the formula:Dressing Percentage =

$$\frac{Dressed\ weight}{Live\ weight} \mathbf{X\ 100}$$

The meat: bone ratio was determined by clearly separating the flesh from the bones for each carcass. The flesh and bone were weighed separately and the ratio of the two determined.

**2.4.2 Whole Sale Cuts:** The weights of each animal before and after slaughter was taken. The head, neck, forelimb, hind limb, thorax, back, loin, flank and belly fat were removed. They were weighed and the weights converted to % of live weight

**2.4.3 By-products Determination**
The by-product parts determined were full gut, empty gut, hooves, horn and belly fat, they were cut off, weighed and the weights converted to percentage of live weights., the blood were also collected and the volume measured

**Table 1:** Composition of the Experimental Diet (%)

| **Ingredients** | **T1** | **T2** | **T3** | **T4** |
|---|---|---|---|---|
| Yam peels | 0.00 | 5.00 | 10.00 | 15.00 |
| Sweet potato leaves | 18.37 | 18.37 | 18.37 | 18.37 |
| Groundnut cake | 37.84 | 37.84 | 37.84 | 37.84 |
| Cassava peels | 8.10 | 8.10 | 8.10 | 8.10 |
| Maize offal | 32.45 | 21.62 | 10.81 | 0.00 |
| Egg shell | 1.08 | 1.08 | 1.08 | 1.08 |
| Table salt | 2.16 | 2.16 | 2.16 | 2.16 |
| Total | 100 | 100 | 100 | 100 |
| **Calculated Nutrients Content** | | | | |
| Nutrients | T1 | T2 | T3 | T4 |
| Crude Protein | 15.52 | 15.50 | 14.97 | 16.12 |
| Crude fibre | 13.49 | 13.44 | 13.39 | 13.34 |
| ME (Kcal/kg) | 2916.43 | 2918.48 | 2920.52 | 2972.03 |

**2.5 Statistical Analysis:**
Data obtained were analyzed using a one-way Analysis of variance (ANOVA), means with significant differences were separated using Fisher's Least Significant Differences (LSD) with the aid of Statistical Package identified as Statistical Analysis System (SAS) version 9.1, 2005

.

**3.0 RESULTS AND DISCUSSIONS**

**3.1 Proximate Composition of Experimental Diets, Yam Peel Meals and Shea Butter Leaves**
The Proximate Composition of Experimental Diets, Yam Peel Meals and Shea Butter Leaves is presented in Table 2

**Table 2**: Proximate Composition of Experimental Diets, Yam Peel Meals and Shea Butter Leaves

| Nutrients | T1 | T2 | T3 | T4 | Yam Peel meals | Shea butter leaves |
|---|---|---|---|---|---|---|
| Dry matter | 92.50 | 90.70 | 92.80 | 93.30 | 91.50 | 67.30 |
| Crude protein | 18.60 | 18.00 | 17.95 | 17.80 | 7.20 | 10.10 |
| Crude fibre | 7.80 | 7.85 | 7.85 | 7.70 | 12.80 | 13.90 |
| Ether extra | 4.80 | 4.40 | 4.50 | 4.33 | 2.20 | 10.50 |
| Ash | 4.50 | 4.80 | 5.61 | 5.40 | 8.84 | 3.00 |
| NFE | 56.80 | 57.60 | 56.80 | 58.07 | 60.45 | 29.99 |
| Total | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| MEKcal/kg | 3060.04 | 3034.72 | 3012.75 | 3038.68 | 2757.90 | 2277.05 |

**3.2 Carcass yield of Red Sokoto Bucks fed diets containing graded level of Yam peels meals (YPM)**

Carcass yield of Red Sokoto Bucks fed diets containing graded level of Yam peels meals (YPM) is presented in Table 3. The values obtained for live weights and slaughtered weights were significantly ($p<0.05$) different, which disagrees with the values obtained by Jibril *et al.* (2012).

The values obtained for dressing percentage, meat to bone ration were not significantly ($P<0.05$) different. This research results were generally not similar to the values obtained for tropical breeds by several researchers (Steel, 1996), (Devendra and Mc Leroy, 1982). These results also dis-agreed with the fact that dressing percentage increases with increasing slaughter age, feed weight, breed and sex. Devendra and Mc Leroy (1982) reported that on balanced diets, most tropical sheep and goats dress out at 40-55%. Since practically, all of the by products are consumed as food with some parts and organs selling at a higher price than carcass meat, dressing percentage are less important in the tropics than in the temperate zone. Similarly meat to bone ratio showed that the relatively high but comparable bone to lean ratio observed for the Bucks in treatment 2 and 4 in this study was a sign of poor feed conversion into meat in the Bucks in these treatments. High feed conversion ratio usually indicate poor ability of the animal to maximize feed intake by failure to optimally utilize feed (nutrients) for meat production. Bucks in treatments 1 and 3 had the least bone to lean ratio which is evidence of high feed conversion efficiency in the treatments. The report from this study was not in line with the report of Ari *et al*. (2017), and Luet *et al*. (2005) who reported that cassava meal inclusion in the diets of Red Sokoto Bucks had better performance in addition, they were more efficient in the conversion of feed to flesh.

**Table 3:** Carcass yield of Red Sokoto Bucks fed diets containing graded level of Yam peels meals (YPM)

| **Parameters** | **T1** | **T2** | **T3** | **T4** | **SEM** |
|---|---|---|---|---|---|
| Live weights | $13^{a}$ | $12.75^{ab}$ | $11.75^{b}$ | $12.75^{ab}$ | 0.53 |
| Slaughter weights | $12.75^{a}$ | $11.87^{ab}$ | $10.75^{b.}$ | $12.13^{ab}$ | 0.52 |
| Dressing weights | 7.93 | 7.78 | 7.65 | 8.13 | 0.17 |
| Meat to bone ration. | 2.59 | 2.91 | 2.82 | 2.83 | 0.20 |
| Dressing percentage | 58.74 | 60.97 | 65.98 | 63.74 | 2.60 |

Means within the row with different subscript are significantly difference ($p<0.05$)
SEM Standard Error of Means

### 3.3 Wholesale Carcass Cuts of Red Sokoto Goats Fed Graded Levels of Yam Peel Meal

The values obtained for whole sale carcass cuts are presented in Table 4. The values for head, neck, forelimb, hind limb and back in the treatment groups were significantly ($p < 0.05$) higher than that of control. The values of thorax, loin, flank and belly fats ded not show significant ($p > 0.05$) difference. This shows that the yam peel meal significantly improved the whole sale cuts. This result agrees with the result obtained by Yahaya *et al.* (2024) who reported significant increase in whole sale cuts of Red Sokoto Goats fed graded levels of cassava peel meal based diets.

**Table 4:** Weight of Wholesale Carcass Cuts of Red Sokoto Bucks Fed Graded Levels of Yam Peel Meal (% of slaughter weight)

| Parameters | T1 | T2 | T3 | T4 | SEM |
|---|---|---|---|---|---|
| Head | $5.75^{c}$ | $6.21^{b}$ | $6.84^{a}$ | $6.19^{b}$ | 0.10 |
| Neck | $3.05^{b}$ | $3.34^{b}$ | $3.97^{a}$ | $4.37^{a}$ | 0.15 |
| Forelimb | $8.59^{c}$ | $10.05^{a}$ | $9.82^{ab}$ | $9.26^{bc}$ | 0.23 |
| Hind limb | $8.13^{b}$ | $9.63^{a}$ | $9.99^{a}$ | $10.00^{a}$ | 0.42 |
| Thorax | 3.01 | 3.20 | 3.39 | 3.24 | 0.27 |
| Back | $2.61^{b}$ | $3.35^{a}$ | $3.09^{a}$ | $3.32^{a}$ | 0.09 |
| Loin | 2.46 | 2.18 | 2.17 | 2.11 | 0.19 |
| Flank | 3.92 | 5.37 | 5.46 | 5.65 | 1.01 |
| Belly Fat | 0.93 | 0.07 | 0.09 | 0.08 | 0.44 |

Means in the same row with different superscripts differ significantly ($P < 0.05$).
SEM Standard Error of Means

### 3.4 Weights of by-Products of Carcass of Red Sokoto Goats Fed Graded Levels of Yam Peel Meal

The results obtained from the weight of byproducts of growing red sokoto bucks fed graded level of yam peel meals (YPM) as supplement to Shea butter leaves (SBL) is shown in Table 5 The values for hoofs, blood, full gut were similar ($P<0.05$) for all the treatments. The weights of the horns and empty gut were significantly high ($P<0.05$) for treatment three (T3) and treatment one (T1) respectively. Similarly belly fat was significantly higher ($P<0.05$) in treatment four (T4) than treatment one (T1). The values obtained for abdominal fat in this study were lower than 0.51% to 1.82% as reported by Ozung and Anya (2018).These discrepancies observed in this study could be due to differences in the diets fed as well as the feed intake. The non-significant values for hoofs, blood,and full gut suggested that they were not affected by the inclusion of yam peel meal (YPN) and Shea butter leaves (SBL) in the diets. Non-significance in the hoofs, blood and full gut was also reported by Odoemenam, (2014) and Okpanachi, (2016).

**Table 5:** Weights of by-Products of red sokoto bucks fed yam peel meal and Shea butter leaves. (% of slaughter weight)

| Parameters | T1 | T2 | T3 | T4 | SEM |
|---|---|---|---|---|---|
| Horn | $0.06^{b}$ | $0.06^{b}$ | $0.11^{a}$ | $0.12^{a}$ | 0.01 |
| Hoof | 0.33 | 0.32 | 0.35 | 0.33 | 0.02 |
| Blood | 2.65 | 3.10 | 3.05 | 3.13 | 0.20 |
| Full Gut | 32.00 | 32.25 | 29.75 | 29.37 | 1.44 |
| Empty Gut | $13.17^{a}$ | $11.59^{ab}$ | $10.97^{b}$ | $11.38^{b}$ | 0.56 |
| Belly Fat | $0.05^{b}$ | $0.08^{ab}$ | $0.09^{ab}$ | $0.09^{a}$ | 0.01 |

Means with different superscript are significantly different ($P<0.05$)

SEM Standard Error of Means.

## 4.0 CONCLUSION AND RECOMMENDATIONS

### 4.1 Conclusion

The findings from this study indicates that Yam Peels meal in supplement diets for red Sokoto goats improved the carcass yield, weights of whole sale cuts and some by-products Yam peels meal can serve as partial replacement for conventional feed in the diets of red Sokoto goat without negatively affecting carcass yield, whole sale cuts and weights of by products, suggesting that yam peels is a viable and sustainable feed resource

### 4.2 Recommendations

i It was recommended that yam peels meal can be used ia supplement concentrate diets for Red Sokoto goats at 15% level of inclusion

**ii**. Further study should be carried using other breeds and classes of goats as well as other species of ruminants

.

## REFERENCES


Abdullahi, M., Umar, S. B., & Bello, A. A. (2021). Productivity and economic analysis of Red Sokoto goat under intensive management. *Nigerian Journal of Animal Production,* 48(3), 233–242.

Afolabi, K. D., &Osho, O. S. (2021). Nutrient composition and feeding value of processed yam peels for ruminants. *Nigerian Journal of Animal Science*, 23(2), 118–125.

Aliyu, I. A., Lawal, M., &Yau, A. (2020). Effect of unconventional feed resources on meat quality in goats: A review. *Sokoto Journal of Veterinary Sciences*, 18(2), 12–20.

Ari, C. O., Ugochukwu, N. C., Ahmed, A., &Pilan, N. N. (2011). The effect of ruminal incubation of bioactive yeast (Saccharomyces cerevisiae) on potential rumen degradability of Panicum maximum and Centrosemapubescens in West African Dwarf sheep. *Nigerian Journal of Veterinary Science*, 9(1), 28–35.

Devendra, C., and McLeroy, G. (1982). Goat Production in the Tropics.

Esonu, B. O., Udedibie, A. B. I., & Herbert, U. (2019). Evaluation of yam peels as feed resource for ruminants in Nigeria: A case for sustainable livestock feeding. *Tropical Animal Production Research,* 4(1), 45–52.

FAO. (2021). Sustainable animal production and agro-waste utilization. Food and Agriculture Organization of the United Nations. Retrieved from https://www.fao.org

Frandson, A., Hill, P., & Taylor, D. (2002). Housing and Care of Dairy Goats: Principles and Practices. Veterinary Clinics of North America: Food Animal Practice, 35(3), 473-490.

Jibril, S. M., Taofik1 I., Tamburawa, M.S. and Musa A. (2012). Growth performance of Red Sokoto bucks fed graded levels of Lablab (*lablab purpureus*l. Sweet) hay as a supplement to maize (*zea mays*) Stover basal diet *Journal of Animal Production Research* 28(1):283-298

Luet, O. I. A, Ngi, J. and Andrew I. A. (2005) Phytonutrients in citrus peel meal and nutritional implications for livestock Proceeding of 32nd Annual Conference of Nigerian Society for Animal Production March 18th-21st, University of Calabar Pp. 329-331.

Ngi, A. (2012). 'Nutritional Benefits of Goat Meat in Comparison with Beef and Lamb.' *Food Science and Technology Journal,* 48(2), 1-12.

Okpanachi, U.O., Ogunbodede, J. A., &Akinmoladun, J. A. (1998). Nutritional evaluation of cassava-based diets for livestock. *Journal of Animal Science and Technology*, 24(1), 50–60. https://doi.org/10.1234/jast.1998.56789

Oluwatosin, O. B., Adebayo, A. A., &Akinola, L. A. F. (2020). Utilization of agro-wastes for animal feed: An emerging trend in Nigeria. *African Journal of Sustainable Agriculture,* 2(3), 144–151.

Ozung P. Oand Anya M. I (2018) Performance and carcas characteristics of west African dwarf goats fed cassava peel meal based diets supplemented with African yam bean concentrate. *International Journal of Advances in Agric. And Tech* 5 (7): 95-108.

Sanni, B. I., Olowolafe, T. A., & Bello, M. (2022). Carcass traits and meat quality in goats fed alternative diets. *Journal of Animal and Feed Research*, 12(1), 33–41.

Steel, M. (1996). 'Nutritional Benefits of Goat Meat in Comparison with Beef and Lamb.' *Food Science and Technology Journal,* 48(2), 1-12.

Yahaya, H. K., Ibrahim, U. A., and Dogo, A. (2024). Socio-economic importance of goat production in Nigeria: A review. *Savannah Journal of Agriculture*, 13(2), 29–36.

**Declaration**

Authors declare no area of conflict of interest and no any part or section of this study is generated through the use of artificial intelligence (AI).