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## CARCASS QUALITY AND ORGANOLEPTIC SENSORY ATTRIBUTES OF MEAT FROM RABBITS FED CONCENTRATE AND *SYNEDRELLA NODIFLORA*

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### ABSTRACT

As the demand for rabbit meat is increasing, efforts to meet cost effective nutritional requirement should as well increase. A ten-week feeding trial was carried out to assess the impact of incorporating *Synedrella nodiflora* into the diet of kit rabbits. Mixed-breed rabbits received concentrate along with varied *Synedrella nodiflora* supplementation. Kits with an initial average weight of 676.66g were randomly assigned to four treatment groups (A, B, C, and D) in a completely randomized design (CRD) with three replicates per treatment. Carcass values significantly improved ( $P < 0.05$ ) for rabbits on 25% and 50% *Synedrella nodiflora* levels compared to those on 0% and 75% inclusion. Organ weights showed no significant changes across all levels, except for the gastrointestinal tract, which exhibited a significant ( $p < 0.05$ ) effect based on plant inclusion, peaking at 75% inclusion (21.55g). No significant differences ( $P > 0.05$ ) were observed in appearance, taste, chewiness, and aroma at all inclusion levels. However, organoleptic parameters such as juiciness, texture, and acceptability were significantly ( $P < 0.05$ ) affected. Juiciness and texture were notably similar at 25% and 50% inclusion levels, superior to 0% and 75%. Acceptability peaked at 0% inclusion. The results suggest effective incorporation of *Synedrella nodiflora* into weaned rabbits' diets, with optimal utilization observed at 25% to 50% inclusion levels

**Keywords: Browse plant; Meat products; Meat quality; Nutrition; Rabbit production;**

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### INTRODUCTION

Various factors, including limited animal production, generational gaps in conventional livestock, inadequate management, disease outbreaks, and the high cost of meat, milk, and eggs, contribute to Nigeria's low animal protein consumption. Recently, the advantages of rabbit meat production in developing nations to address animal protein challenges have gained recognition (Cullere and Dalle Zotte, 2018). About 60–70% of total production costs in the livestock industry consist of feed input, limiting animal production significantly. Rabbit feed, a notable portion of which can be sourced from herbage crops and weeds, enhances growth rates, evidenced by higher weight gain and improved feed conversion (Dabai *et al.*, 2023). Rabbits on a mixed regime of free-choice forage and concentrate demonstrate superior weight gain, feed conversion, and dressing percentage compared to those on a concentrate-only regimen (Adeyemo *et al.*, 2013). *Synedrella nodiflora*, a prevalent plant in Nigeria, is recognized as an alternative feed source. Native to tropical America, it has spread globally, particularly thriving in the West African sub-region. In Nigeria, the plant is widely used for various purposes, including addressing cardiac issues, wounds, and bleeding. *S. nodiflora* has demonstrated analgesic, anticonvulsant, and sedative properties (Amoateng *et al.*, 2017). In an experiment by Isah *et al.* (2012), *S. nodiflora* proved to be a nutritious forage for browsing ruminants, outperforming other tested species and exhibiting the lowest potential for methane emission. This study investigates the impact of feeding rabbits graded levels of *S. nodiflora* on carcass and sensory characteristics, exploring its potential influence on rabbit meat.

## Materials and methods

**Location of the study:** The experiment was carried out at the Teaching and Research Farm of Ambrose Alli University, (AAU), Ekpoma, geographical location: Esan -West, Edo, Nigeria, Africa.

**Source of Ingredients:** Fresh *S. nodiflora* was harvested daily within and around the vicinity of the experimental site. The harvested plant was rinsed with water and chopped along with the stem before being fed to the experimental animals. Ingredients for the formulation of the concentrate ration were purchased in Ekpoma.

Table 1: Proximate composition of the concentrate and *Syndrenella nodiflora*

Parameters (%)	Concentrate	<i>Syndrenella nodiflora</i>
Dry matter	95.00	9.05
Crude protein	17.96	22.32
Ether extract	5.21	4.39
Nitrogen free extract	62.90	43.09
Ash	7.93	15.80
Crude fibre	6.00	14.40

**Experimental Diets:** Proximate composition of concentrate and Browse plant was determined at start of the feeding trial using AOAC (2000) method. Four treatment diets (A, B, C, and D) were formulated. Diet A comprised 100% concentrate (0% plant), while diets B, C, and D were formulated by replacing diet A with 25%, 50%, and 75% *S. nodiflora*, respectively.

**Experimental Design:** Forty-eight weaner kits, initially weighing an average of 676.66g, were randomly assigned to four treatment groups (A, B, C, and D) in a completely randomized design (CRD) with three replicates per treatment. During feeding trial, that lasted for 10 weeks, rabbits were provided with the experimental diets ad libitum. Before the experiment began, hutches, feeders, and drinkers were thoroughly washed and disinfected. Routine management and medication were consistently applied throughout the trial period.

**Carcass analysis:** One rabbit was randomly selected from each replicate and slaughtered after a 24-hour fasting period. The dressing process involved flaying, and the harvested organs, including the gastrointestinal tracts (GIT), were weighed after evisceration using a sensitive scale.

$$\text{Dressing percentage} = \frac{\text{Dressed weight}}{\text{Live weight}} \times 100\%$$

**Sensory Evaluation:** Meat from the lumbar region and hind limb was assessed post-slaughter. The meat was thawed with the bone intact and subsequently cooked in a conventional gas oven for 20 minutes. After cooking, the meat was allowed to cool for 10 minutes, de-boned, cubed, and then served to a selected panel consisting of members from the university community. Panelists were instructed to individually score each sample for juiciness, taste, texture, aroma, and overall acceptability using a modified Hedonic scale.

**Statistical analysis:** Data generated were subjected to a one-way analysis of variance (ANOVA) of a completely randomized designed model (Steel and Torrie, 1980). Means were separated by Duncan's new multiple range tests with the aid of SAS (1999) package.

## RESULTS AND DISCUSSION

Table 2 presents the results of carcass, indicating a significant ( $P < 0.05$ ) impact of the experimental diets on carcass characteristics. Average live weights, shrunken body weight (SBW), and eviscerated body weight (EBW) exhibited a notable increase ( $P < 0.05$ ) with inclusion level of browse plant in the diets, peaking at a 50% inclusion level before subsequently declining. The highest live weight (1500g), recorded in the diet containing 50% *S. nodiflora*. The observed higher live weight in kits fed diets with up to a 50% inclusion level of *S. nodiflora* may be attributed to improved nutrient utilization by the animals (Onuoha et al., 2020). Gidenne (2015) previously suggested that rabbits perform better on diets with adequate fiber, which could contribute to the observed carcass traits, given that *S. nodiflora* has a higher fiber content (14.40%) compared to the concentrate (6.00%).

The dressing percentage decreased significantly ( $P < 0.05$ ) as the level of *S. nodiflora* increased in the diets. The dressing percentage range (65.76–68.88%) recorded in rabbits fed *S. nodiflora* diet groups, surpassed the range of 51.50–58.70% reported by Ojali et al. (2020). Dressing percentage was,

however, similar to the value reported by Zepeda-Bastida et al. (2019). This study suggests that *S. nodiflora* browse plant could be a promising feed source for rabbit production.

Results for the relative organ weights revealed that the *S. nodiflora* level in the diets did not significantly ( $P>0.05$ ) affect most organs, this is consistent with Iso and Kennedy (2022). The lower carcass values at the 75% inclusion level could be attributed to excessive fiber content beyond the optimum, resulting in reduced feed intake, a lower growth rate, and slaughter yield (Bolarin et al., 2017). The spleen and liver, acting as lymphoid organs for detoxification, might show relative weight variation due to toxins in the diets and blood. However, the non-significant ( $P>0.05$ ) variation in spleen and liver weights in this study may indicate low levels of anti-nutritional substances in the plant.

**Table 2: Carcass and organs values of rabbits fed the experimental diets**

Parameters	Inclusion levels of <i>Synedrenella nodiflora</i> (%)				SEM ±
	0	25	50	75	
Live weight (g)	1450.00 <sup>b</sup>	1488.00 <sup>a</sup>	1500.00 <sup>a</sup>	1400.00 <sup>c</sup>	10.00
Shrunk body weight SBW (g)	1390.00 <sup>a</sup>	1420.00 <sup>a</sup>	1430.00 <sup>a</sup>	1313.33 <sup>b</sup>	12.91
Eviscerated weight (g)	1125.21 <sup>a</sup>	1148.35 <sup>a</sup>	1151.15 <sup>a</sup>	1030.32 <sup>b</sup>	19.94
Dressed weight (g)	1000.79 <sup>a</sup>	996.22 <sup>ab</sup>	1033.20 <sup>a</sup>	920.64 <sup>b</sup>	12.45
Dressing percentage (%)	69.02 <sup>a</sup>	66.95 <sup>ab</sup>	68.88 <sup>a</sup>	65.76 <sup>b</sup>	8.20
Spleen (%)	0.03	0.03	0.03	0.03	0.00
Liver (%)	3.78	3.81	3.84	3.86	0.05
Kidney (%)	0.47	0.47	0.51	0.46	0.01
Heart (%)	0.17	0.16	0.16	0.16	0.01
Lung (%)	0.32	0.33	0.34	0.34	0.01

a, b, c = Means with different superscript on the same row differed significantly ( $P<0.05$ ); SEM = standard Error of Mean

Table 3 presents organoleptic/sensory evaluation of rabbit meat from animals fed various levels of *S. nodiflora*. Findings indicate that juiciness, texture, and overall acceptability were significantly ( $P<0.05$ ) influenced by the plant's inclusion, whereas appearance, taste and aroma were not significantly ( $P>0.05$ ) affected. Values for appearance and taste decreased as the inclusion level increased from 0% to 75%. Juiciness and overall acceptability were similar and more favorable at 0% and 25% inclusion levels.

The non-significant trend in meat appearance observed in this study aligns with the findings of Volek et al. (2018). Values for texture increased as the level of plant supplementation rose. Mir et al. (2017) noted that texture is a crucial sensory attribute influencing meat quality, influenced by various biological and environmental factors. Non-significant results for taste, chewiness, and aroma suggest that the inclusion of *S. nodiflora* in rabbit diets may not have a detrimental impact on consumer preferences for rabbit meat.

**Table 3: Organoleptic sensory properties of rabbits fed the experimental diets**

Parameters	Inclusion levels of <i>Synedrenella nodiflora</i> in the diets (%)				SEM (±)
	0	25	50	75	
Appearance	4.00	3.95	3.95	3.90	0.18
Taste	3.80	3.75	3.70	3.60	0.20
Juiciness	3.80 <sup>a</sup>	3.70 <sup>a</sup>	3.40 <sup>b</sup>	3.22 <sup>b</sup>	0.15
Texture	3.70 <sup>b</sup>	3.97 <sup>a</sup>	4.10 <sup>a</sup>	4.13 <sup>a</sup>	0.12
Aroma	4.07	4.00	4.00	4.00	0.10
Acceptability	4.13 <sup>a</sup>	4.07 <sup>a</sup>	3.80 <sup>b</sup>	3.80 <sup>b</sup>	0.09

a, b = Means with different superscript on the same row differed significantly ( $P<0.05$ ); SEM = standard Error of Mean

## CONCLUSION:

The study showed that the browse plant *Syndrenella nodiflora* can be used effectively in rabbit's diets up to 50% inclusion without negative affect on the carcass, organ yields and overall acceptability of the meat by the consumers and therefore could be incorporated into weaned rabbits' diets at this level. In addition, the results of this study support the utilization of *S. nodiflora* as a valuable feed ingredient for enhancing rabbit production in developing nations, providing a sustainable and economically feasible approach to address challenges associated with animal protein production and consumption

## REFERENCES

- Adeyemo, A. A., Adeyemi, O. A., Ekunseitan, D. A., and Taiwo, O. S. (2013). Effect of concentrate to forage ratio on the performance and haematological parameters of growing rabbits. *Global Journal of Biology, Agriculture and Health Sciences*, 2(2), 114-118.
- Amoateng, P., Adjei, S., Osei-Safo, D., Kukuia, K. K., Bekoe, E. O., Karikari, T. K., and Kombian, S. B. (2017). Extract of *Synedrella nodiflora* (L) Gaertn exhibits antipsychotic properties in murine models of psychosis. *BMC complementary and alternative medicine*, 17, 1-14. <https://doi.org/10.1186/s12906-017-1901-2>.
- Bolarin, O., Oni, A. O., Olanite, J. A., and Onwuka, C. F. I. (2017). Performance, blood indices and carcass yield of grower rabbits fed diet containing, and leaf meals *Moringa oleifera* *Aspilia africana* *Azadirachta indica*. *Nigerian Journal of Animal Production*, 44 (4), 139-149.
- Cullere, M., and Dalle Zotte, A. (2018). Rabbit meat production and consumption: State of knowledge and future perspectives. *Meat science*, 143, 137-146.
- Dabai, S. A., Tanko, S. M., Yahaya, A., and Saidu A. A. 2023. Growth Performance of Indigenous Rabbits (*Oryctolagus cuniculus*) Fed with Graded Levels of *Gmelina Arborea* Leaf Meal. *Journal of Agriculture, Environmental Resource and Management ISSN2245-1800 (paper) ISSN 2245-2943 (online) 5 (5) 650-1220; Jan. 2023; pp754-758*.
- Isah, O. A., Fayemi, P. O., Gazaly, M. B., and Aderinboye, R. Y. (2012). Nutritional characteristics of four browse plants consumed by free-ranging ruminants in Western part of Nigeria. *African Journal of Agricultural Research*, 7(12), 1944-1949.
- Iso, I. E., and Kennedy, O. O. O. (2021). Growth performance, carcass and meat quality of rabbits fed mistletoe leaf meal diet. *Journal of Livestock Science*, (12): 220-228
- Mir, N. A., Rafiq, A., Kumar, F., Singh, V., and Shukla, V. (2017). Determinants of broiler chicken meat quality and factors affecting them: a review. *Journal of Food Science and Technology*, 54, 2997-3009. DOI 10.1007/s13197-017-2789-z
- Ojali, U. G., Jibrin, N., Zainab, O. Y., Juliet, O. U., Mohammed, L., Nuhu, D. A., and Onuh, A. E. (2020). Carcass Yield and Sensory Evaluation of Meat from Rabbits Fed Some Browse Plants Supplemented with a Concentrate Diet. *Animal and Veterinary Sciences*, 8(4), 76.
- Onuoha, C. H., Harry, B. J., Fayenuwo, J. O., and Durotoye, E. S. (2020). Reproductive and growth performance of rabbit fed different inclusion levels of african yam bean (*Sphenostylis stenocarpa*). *Open Journal of Animal Sciences*, 10(02), 301. DOI: [10.4236/ojas.2020.102018](https://doi.org/10.4236/ojas.2020.102018)
- S.A.S (1999). *Statistical Analysis System user's guide*. Statistics. SAS Institute Inc. Cary, NC 27513, USA.
- Steel R.D.G., and Torrie, J.H. (1980). *Principle and procedures of statistics*. McGraw Hill Book Corporation, NY. 137-139.
- Volek, Z., Bureš, D., and Uhlířová, L. (2018). Effect of dietary dehulled white lupine seed supplementation on the growth, carcass traits and chemical, physical and sensory meat quality parameters of growing-fattening rabbits. *Meat Science*, 141, 50-56. <https://doi.org/10.1016/j.meatsci.2018.03.013>.
- Zepeda-Bastida, A., Martínez, M. A., and Simental, S. S. (2019). Carcass and meat quality of rabbits fed *Tithonia tubaeformis* weed. *Revista Brasileira de Zootecnia*, 48.