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Assessment of Goats Performance Fed Varying Levels of Chopped Palm Fronds Supplemented with Concentrate Diets

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ABSTRACT: *This study evaluated the performance of West African Dwarf (WAD) goats fed diets with varying levels of chopped palm fronds supplemented with a concentrate diet. The objectives were to analyze the proximate nutrient composition, evaluate feed intake, assess weight gain, and determine the feed conversion ratio (FCR) across different feeding regimens. Twenty goats with an initial body weight of 6.23-6.45 kg were assigned to five treatments in a completely randomized design: T1 (100% concentrate), T2 (20% palm frond + 80% concentrate), T3 (40% palm frond + 60% concentrate), T4 (60% palm frond + 40% concentrate), and T5 (80% palm frond + 20% concentrate), The concentrate diet consisted of 40% pullet droppings, 20.5% wheat offal, 23.5% palm kernel cake, 5% limestone, 1% salt, and 10% Alfa-Safe, was fed for 12 weeks. Results showed significant differences ($p<0.05$) in growth performance. Goats on T3 achieved the highest final body weight (9.35 kg), total body weight gain (3.25 kg), and average daily weight gain (0.05 kg), with the best FCR (5.91). Total feed intake did not differ significantly ($p>0.05$) across treatments, ranging from 26.17 to 28.51 kg. The findings suggest that a diet of 40% palm frond and 60% concentrate optimizes growth performance and feed efficiency in WAD goats, offering a balanced and cost-effective feeding strategy for goat production.*

Keywords: *Goats, Feed intake, WAD Goat, concentrate, Weight gain*
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INTRODUCTION

The growing demand for animal protein, particularly from small ruminants, has led to increased interest in improving the productivity of goats through the optimization of feeding strategies. Among the small ruminants, the West African Dwarf (WAD) goat holds significant economic and cultural importance particularly in West Africa. It is known for its ability to survive in harsh environments, disease resistance, and its low-quality forages utilization ability, the WAD goat is an essential source of meat, milk, and income for rural households (Oseni *et al*., 2018). However, optimal productivity of this goat is often met with poor quality feed resources, particularly during the dry season when forage availability is reduced.

The increasing cost and utilization of conventional feed ingredients for ruminant animals has prompted the search for Alternative feed resources. Alternative feed resources, such as Oil palm (*Elaeis guineensis)* frond (OPF) is a residue from the harvesting and pruning management of oil palm fruit bunches. However, OPF has very low protein, and it requires supplementation to enhance the growth rates of ruminants feeding on OPF based diet (Dahlan *et al*., 2000). However, high fibre content, low digestibility, and poor crude protein levels of oil palm fronds, it requires supplementation with concentrates to meet the nutritional needs of goats (Halim *et al*., 2013). While, Nasir et al. (1997) observes that OPF silage alone does not support the maintenance requirement of milking goats due to low intake, Dahlan *et al*. (2000) reports that OPF can efficiently be used as a roughage source when used together with concentrate supplement. The use of OPF, provides a sustainable and cost-effective alternative for goat feeding (Ogunjimi *et al*., 2012).

Studies have shown that the inclusion of concentrates in diets with fibrous feed components enhances nutrient availability, increases weight gain, and boosts overall productivity (Devendra, 2011; Olaniyan *et al*., 2018). Inadequate feed processing often leads to wastage and poor feed conversion efficiency, which negatively affects

goat performance, such as growth rates, reproductive success, and overall health (Bamikole and Ikhatua, 2007). This inefficiency, combined with rising costs of labour and feed, poses a serious challenge to farmers seeking to maximize profits from their goat enterprises (Abegunde *et al*., 2019). This study focuses on assessing the growth performance and feed utilization of WAD goats fed varying levels of chopped palm fronds supplemented with concentrate diets. The findings from this study will contribute to addressing the challenges of feed scarcity and high feed costs, particularly in regions where oil palm cultivation is prevalent. Hence, the objective of the study is to evaluate the performance of goats fed varying levels of chopped palm fronds supplemented with concentrates diets, with a focus on improving productivity and sustainability in goat farming.

MATERIALS AND METHODS

Twenty-four (24) West African dwarf goats of both sexes and weight were purchased from reputable farmers, Grass chopping machine was bought. The animals were subjected to two (2) weeks acclimatization period. Palm fronds were harvested and chopped using the grass chopping machine. The concentrate was formulated using pullet droppings. The animals were housed intensively throughout the experimental period under similar condition.

Experimental Design and Treatment

A completely randomize design (CRD) was used, where 20 West Africa dwarf goat of similar weight were allotted randomly into five (5) treatments (T1, T2, T3, T4, and T5). The goats were replicated into two (2) and each had 2 goats thereby giving a total of 4 goats per treatment group.

Data collection

Feed intake: Daily feed offered and refused were recorded to determine the feed intake.

Weight changes: Goats were weighed at the start of the experiment and subsequently at daily intervals.

Feed conversion Ratio (FCR); FCR was calculated as feed intake divided by weight gain.

Statistical Analysis

Data was analyzed using ANOVA, and significant differences among means were determined using Duncan's Multiple Range Test at a 5% level of significance.

RESULTS AND DISCUSSIONS

The proximate analysis of the experimental diets, including palm fronds and pullet dropping concentrate feed, revealed significant differences in their nutrient content (Table 1). The crude protein content was 5.26% for palm frond and 16.73% for the pullet dropping concentrate feed, indicating that the concentrate feed is much richer source of protein, which is essential for growth, tissue repair and overall productivity in goats (Table 1). Crude fiber content was higher in palm fronds 9.30% compared to the pullet dropping concentrate feed 5.65%. This reflects the high structural carbohydrate content of palm fronds which supports rumen function but may reduce overall diet digestibility if not properly balanced.

Ash content which represents the total mineral component was 4.61% in palm fronds and 13.52% in pullet dropping concentrate feed. This indicates that the concentrate feed is more mineral-dense option, providing essential element for bone formation and various metabolic processes. Ether extract representing the fat or lipid content, was 1.16% in palm fronds and 6.63% in pullet dropping concentrate feed. This shows that the concentrate is a more energy-rich feed, which can improve overall feed efficiency. Nitrogen free extract (NFE), which includes easily digestible carbohydrate was significantly higher in palm fronds 64.47% compared to pullet dropping concentrate feed 47.22%, reflecting their role as a quick source. Dry matter (DM) content which measures the portion of the feed excluding moisture, was 84.35% for palm fronds and 89.75 for pullet dropping concentrate feed. This indicates that the concentrate is more nutrient dense feed when water is excluded.

Feed Conversion Ratio (FCR)

Feed conversion ratio (FCR) remains one of the most important performance indices in small ruminant production, as it provides a direct measure of the efficiency with which consumed feed is converted into body mass. A lower FCR reflects superior feed efficiency, as less feed is required to achieve a given weight gain (Okoruwa et al., 2014; Ososanya et al., 2020).

In the present study, FCR values varied significantly ($p < 0.01$) across the treatment groups, ranging from 5.91 in T3 to 8.12 in T5. Goats on the T3 diet achieved the best feed efficiency (5.91), meaning they required only 5.91 kg of feed to produce 1 kg of live weight gain. This superior performance is further corroborated by their highest **final** body weight (9.35 kg) and total weight gain (3.25 kg) (Table 2). These results suggest that the T3 diet provided an optimal nutrient profile, likely with a balanced energy–protein ratio and improved digestibility, which enhanced nutrient assimilation and growth (Okoruwa et al., 2015; Afolayan et al., 2023).

Conversely, goats on the T5 diet recorded the poorest

Table 1: Proximate composition (%) of experimental diets.

Proximate	Palm fronds	Pullet dropping concentrate
Crude protein	5.26	16.73
Crude fiber	9.30	5.65
Ash	4.16	13.52
Ether extract	1.16	6.63
Nitrogen free extract	64.47	47.22
Dry matter	84.35	89.75

Table 2: Performance of WAD Goats Fed Experimental Diet.

Parameters	T1	T2	T3	T4	T5	SEM	Sig
Initial body weight (kg)	6.24	6.23	6.45	6.28	6.37	0.18	0.36
Final body weight (kg)	8.27^{b}	8.68^{b}	9.35^{a}	8.58^{b}	7.56^{c}	0.19	0.01
Total body weight gain (kg)	2.03^{c}	2.45^{ab}	3.25^{a}	2.34^{b}	1.19^{c}	0.03	0.00
Average daily weight gain (kg)	0.03^{c}	0.04^{b}	0.05^{a}	0.04^{b}	0.03^{c}	0.00	0.00
Total feed intake(g)	28.48	28.51	26.86	26.67	26.17	0.69	0.07
Feed conversion ratio (FCR)	7.36^{ab}	7.26^{ab}	5.91^{c}	6.98^{b}	8.12^{b}	0.23	0.00

feed efficiency (FCR = 8.12) alongside the lowest final body weight (7.56 kg) and weight gain (1.19 kg). The relatively high FCR indicates inefficient nutrient utilizations despite a comparable feed intake to other treatments. This poor performance may be attributed to lower diet palatability, reduced digestibility, or an imbalanced nutrient composition, which could have led to higher maintenance energy costs and reduced partitioning of nutrients towards growth (Afolayan et al., 2023).

Intermediate FCR values were observed for T1 (7.36), T2 (7.26), and T4 (6.98). Although these groups exhibited reasonable growth, their feed conversion was less efficient than T3. This indicates that while feed intake levels were similar across treatments (26.17–28.51 g/day), differences in nutrient composition and bioavailability likely influenced the rate of weight gain and the efficiency of nutrient utilization (Okoruwa et al., 2015; Afolayan et al., 2023).
The results of this study are comparable to reported FCR ranges of 5.5–8.5 for WAD goats under intensive feeding regimes (Babayemi et al., 2014; Yusuf et al., 2017). The superior performance of T3 highlights the potential of well-balanced dietary formulations in improving feed efficiency and, by extension, reducing feed costs, which typically account for 60–70% of total production expenses in goat farming (Afolayan et al., 2023).

Overall, the significant variation in FCR across treatments underscores the importance of precise diet formulation in enhancing production efficiency. The T3 diet demonstrated both nutritional and economic advantages, whereas the T5 diet was the least effective, necessitating further evaluation of its nutrient balance and ingredient quality.

REFERENCES

Afolayan, F. O., Ogunbosoye, D. O., & Dare, O. A. (2023). Growth performance and economic benefits of West African dwarf goat fed diets containing treated rice husk (rh) as a replacement for wheat bran. Nigerian Journal of Animal Production, 50(6), 56-63.

Dahlan, I., Islam, M., & Rajion, M. A. (2000). Nutrient intake and digestibility of fresh, ensiled and pelleted oil palm (Elaeis guineensis) frond by goats. *Asian-Australasian Journal of Animal Sciences,* 13, 1407–1413.

Devendra, C. (2011). Oil palm by-products as a feed resource for livestock in Asia and the Pacific. *Asian-Australasian Journal of Animal Sciences*, 24(3), 303-312.

Halim, R. A., Shampazuraini, S., & Yusof, N. (2013). Potential of oil palm fronds as a feed resource for ruminants: A review. *Asian Journal of Animal Sciences*, 7(2), 42-55.

Nasir, H. M., Dahlan, I., & Alimon, A. R. (1997). Maintenance requirement of pen-fed Sannen goat in Malaysia. *Malaysian Journal of Animal Science*, 3, 47–51.

Okoruwa, M. I., & Bamigboye, F. O. (2015). Performance characteristics of west african dwarf goats fed sweet potato peels and cashew nut shell supplemented with ocimum gratissium leaves. Advances in Life Science and Technology, 35, 84-89.

Olaniyan, A. M., Arigbede, O. M., & Ogunwole, O. A. (2018). Effects of oil palm frond silage inclusion in goat diets on performance and digestibility. *Tropical Animal Health and Production,* 50(5), 1019-1025.

Oseni, S. O., & Ajayi, B. A. (2018). Small ruminant production and management in tropical Africa. *Nigerian Journal of Animal Science,* 20(1), 1-12.