

Production metrics and morphological indices of *Yankasa* rams supplemented with synthetic selenium and vitamin E

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ABSTRACT

This study investigated the effects of selenium (Se) and vitamin E (Vit. E) supplementation on feed utilization and morphometry of *Yankasa* rams. Sixteen yearling rams (average 22.5 kg) were randomly assigned to four dietary treatments in a Completely Randomized Design (CRD) for nine weeks: T1 (control), T2 (0.6 mg Se), T3 (0.6 mg Se + 2 g Vit. E), and T4 (2 g Vit. E). Supplements were delivered daily via 50 g wheat offal. Feed intake, body weight, feed conversion ratio (FCR), and morphometric traits (withers height, chest circumference, body length, scrotal circumference) were measured and analyzed using SAS (2004). Results showed no significant differences ($P > 0.05$) among treatments for growth performance or morphometry. However, the Se + Vit. E group recorded a numerically lower FCR, while the Vit. E group had the highest withers height increase. These trends suggest possible antioxidant support for growth, though effects were marginal within the study period. It was concluded that supplementation with Se (0.6 mg/day) and Vit. E (2 g/day) did not significantly improve growth or morphometry of *Yankasa* rams, but slight numerical advantages indicate potential benefits under different conditions, warranting further investigation with larger sample sizes and longer durations.

Keywords: *Yankasa* rams, Selenium, Vitamin E, Morphometry

Description of problem

Livestock production in Nigeria's semi-arid regions, especially *Yankasa* rams, is constrained by seasonal feed scarcity and nutrient deficiencies that compromise health and productivity (1). These stressors trigger oxidative stress through imbalance between reactive oxygen species and antioxidants, impairing growth, reproduction, and meat quality, thus reducing economic potential (2). Selenium (Se) and Vitamin E (Vit E) are vital micronutrients with potent antioxidant and synergistic effects against oxidative damage (3). Vitamin E, mainly alpha-tocopherol, protects membranes and enhances muscle integrity and meat quality (4). Evidence shows Se and Vit E supplementation improves growth and meat traits (5). Evaluating their combined effects in *Yankasa* rams is essential for productivity and food security.

MATERIALS AND METHODS

Experimental Site

The study was conducted at the Livestock Teaching and Research Farm, Usmanu Danfodiyo University, Sokoto, Nigeria, located in the Sudan savannah zone at 292 m altitude (6). The region is characterized by alternating wet and dry seasons, with an annual rainfall of about 500 mm. Rainfall extends from May to September, while the dry season lasts over seven months. Temperatures range from 41°C in April to 12°C in January (7), and the state is among Nigeria's major livestock-producing areas.

Experimental Animals and their Management

Sixteen yearling *Yankasa* rams averaging 22.5 kg body weight were used. Animals were purchased locally, given prophylactic treatments, and provided with feed and water

ad libitum. They were housed in well-ventilated pens and fed a complete ration formulated according to NRC (2007) standards.

Treatments and Experimental Design

The experiment was laid in a Completely Randomized Design (CRD) with four treatments and four replications, each animal serving as a replicate. After a 14-day

acclimatization, rams were offered the basal diet *ad libitum*. Supplements were delivered via 50 g wheat offal per head daily. Treatments included: T1 (control), T2 (0.6 mg Se), T3 (0.6 mg Se + 2 g vitamin E), and T4 (2 g vitamin E). Supplements were mixed biweekly to minimize vitamin E oxidation. The feeding trial lasted nine weeks (63 days).

Table 1. Composition of experimental diet fed to Yankasa rams

Ingredients	Percentage inclusion (%)
Groundnut haulm	10
Soyabean meal	10
Cottonseed cake	18
Rice offal	3
Wheat offal	30
Cowpea husk	10
Maize Bran	18.5
Salt	0.5
Total	100
Calculated Chemical Composition	
Energy (Kcal/Kg Metabolizable Energy)	2327
Crude Protein (%)	18.95
Crude Fiber (%)	16.75
Crude Fat (%)	2.5

Data Collection

Daily intake was determined by subtracting left over feed from the feed offered the previous day. Body weight was determined by weighing the animals weekly using a digital scale. Feed conversion ratio was obtained on a weekly basis by dividing the mean feed intake per animal in grams by the mean live weight gain in grams per ram for each replicate. Morphometric measurements included withers height (thoracic vertebrae to ground), body length (humerus to ischial tuberosity), chest circumference (just behind forelegs), and scrotal circumference (widest point). Measurements were taken with tape or ruler, with animals held in correct standing posture (8).

Data analysis

Data generated were analyzed using SAS (SAS Institute, 2004). ANCOVA was applied to adjust for baseline differences, while ANOVA tested treatment effects. Least Significant Difference (LSD) was used to separate means at the 5% level of significance.

RESULTS

Effects of selenium and vitamin E supplementation on performance of Yankasa rams

Table 2 shows the effects of selenium and vitamin E, alone or combined, on Yankasa ram performance. Measured parameters—initial and final body weight, feed intake, daily gain, feed conversion ratio (FCR), and total weight gain—were not significantly different ($P > 0.05$) across treatments. This indicates that supplementation did not significantly affect feed utilization under the study conditions. However, the Se + Vit. E group recorded a 9.5% lower FCR (8.58) than the control (9.48), suggesting possible synergistic benefits warranting further research with larger samples or longer trials.

Effects of selenium and vitamin E supplementation on morphometry of Yankasa rams

Table 3 shows the effects of selenium and vitamin E, alone or combined, on Yankasa ram morphometry. Parameters measured were

withers height, chest circumference, body length, and scrotal circumference at the start and end of the trial. No significant differences ($P > 0.05$) were observed across treatments, even after adjusting for weight gain. Numerical increases occurred, with the

greatest changes in the Vit. E and Se + Vit. E groups, but none were statistically significant. These results suggest supplementation may support growth trends, though improvements were not conclusive within the study period.

Table 2 Feed utilization of Yankasa rams fed diets supplemented with selenium and vitamin E

Parameters	Treatments				SEM	P-value
	Control	Se	Se + Vit. E	Vit. E		
Initial Body weight (kg)	23.00	22.50	22.17	22.83	0.07	0.9990
Final weight (kg)	30.98	29.85	30.83	31.25	0.11	0.9898
TWG (kg)	7.98	7.35	8.67	8.42	0.14	0.6165
Average daily gain (g)	126.59	126.19	137.56	133.60	1.27	0.6165
ADFI (g)	1200.00	1195.00	1180.00	1212.00	6.24	0.7982
FCR	9.48	9.47	8.58	9.07	0.16	0.2282

SEM= mean standard error of means; ADFI= average daily feed intake; FCR= feed conversion ratio; TWG= total weight gain

Table 3: Morphometry of Yankasa rams fed diets supplemented with selenium and vitamin E

Parameter (cm)	Treatment				SEM	P-value
	Control	Se	Se + Vit E	Vit E		
Withers Height Change	2.32	2.32	2.42	2.45	0.415	0.995
Chest circumference Change	5.30	5.45	5.40	5.35	0.107	0.973
Body length Change	3.18	3.23	3.18	3.20	0.139	0.999
Scrotal circumference Change	2.00	2.43	2.38	2.65	0.112	0.235

SEM= mean standard error of means

Discussion

Effects of selenium and vitamin E supplementation on performance of Yankasa rams

Studies on selenium and vitamin E supplementation show mixed effects on feed utilization in ruminants. This study found no significant differences in Yankasa ram growth, consistent with Silva *et al.* (10). However, other research reports benefits under certain conditions. Chauhan *et al.* (11) observed that Se and Vit. E improved intake and weight gain in lambs under heat stress, while Gabryszak and Klewicz (12) noted improved daily gains in lambs. Conversely, Vignola *et al.* (13) found no effect on feed-to-gain ratio in lambs. These contrasting results suggest that supplementation outcomes depend on species, environmental stressors, diet quality, and physiological status.

Effects of selenium and vitamin E supplementation on morphometry of Yankasa rams

The vitamin E group showed the highest numerical increase in withers height, while the

Se group had the greatest body length gain, though differences were not significant. These trends suggest antioxidants may support skeletal growth by reducing oxidative stress (4), but effects appeared marginal under the study conditions. Unlike some studies reporting improved body conformation with Se and Vit. E (14), the lack of response here may relate to dosage, duration, breed, or baseline nutritional status, with animals already sufficient in antioxidants showing limited improvement.

Conclusion and Application

Selenium and vitamin E supplementation did not significantly affect growth or morphometry of Yankasa rams, though slight numerical improvements were observed. Further studies with larger samples, longer trials, and varied dosages are recommended.

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