
EFFECT OF NATURAL ANTIOXIDANTS ON GROWTH PERFORMANCE AND NUTRIENT DIGESTIBILITY IN GROWING RABBIT

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ABSTRACT

Antioxidants, known for their ability to neutralize harmful free radicals in the body, have been extensively studied for their health benefits in various species; however, there is a notable paucity of information regarding their specific effects and use in growing rabbits. Thirty (30) growing crossbred (Hyla X Black giant) rabbits were used to study the effect of natural antioxidant on their growth performance and nutrient digestibility. The rabbit were weighed and distributed into three (3) treatments of ten (10) rabbits each, with each rabbit serving as a replicate in a Completely Randomized Design Experiment, which lasted nine weeks. The test ingredients were Orego-stim (1ml to 4litres of water) and Oregoplus (1ml to 5litres of water). Treatment one was the control with zero inclusion of the test ingredient while orego-stim and oregoplus were administered orally to Treatments 2 and 3 respectively. The data collected on performance characteristics and nutrient digestibility were analyzed using one way analysis of variance. Results shows that Treatment 3 had higher ($p<0.05$) final weight (2781.32g), daily weight gain (21.87g) and lower feed:gain (4.80) compare to other treatments. The crude fibre digestibility in Treatment 2 (52.33%) and 3 (55.99%) are similar but both are significantly higher than T1 (42.87%). The Crude protein digestibility was comparable across the treatments. It may be concluded that compared, Oregoplus® improve weight gain and feed conversion ratio therefore, supplementation of Oregoplus® as feed additives in growing rabbit diet is very useful considering its direct impact on overall performance of rabbit.

Keywords: Growth performance, Nutrient digestibility, Growing rabbit, Orego-Stim, OregoPlus

INTRODUCTION

Rabbits have a comparatively higher efficiency in meat production than other livestock; hence they can be considered a veritable source of animal protein (Stephen *et al.*, 2013). They are efficient converters of feed to meat and can utilize up to 30% crude fibre as against 10% by most other livestock species (Egbo *et al.*, 2001).

The inclusion of feed additives in animal feed is one of the effective means of enhancing rapid growth and sustainability. Several alternatives such as probiotics, prebiotics, organic acids, herbs and herbal extracts, enzymes, proteins, fatty acids, vitamins, and selenium were tested in rabbits to stabilize and improve health, and to increase the ultimate production and economic viability of rabbit farms (Dalle Zotte *et al.*, 2016; Simonová *et al.*, 2020).

Oregano is a common species of *Origanum*, an aromatic herbal product, which, because of its highly potent chemical nature, has been used as an alternative growth promoter in the poultry industry. It contains mainly carvacrol, thymol, and their precursors (Lee *et al.*, 2004). Orego Plus® and Orego-Stim® are made using oregano essential oil, a eubiotic which is a natural herb extract from Oregano. The most important components of oregano essential oil are 81.89% Carvacrol, 5.1% γ -terpinene, 3.74% p-cymene and 2.42% Thymol. Karimi *et al.*, (2010) reported that an oregano product (oil extract or its dried leaf) has potential to promote animal performance and reduce bacterial inhabitants of the gastrointestinal tract such as *Clostridium perfringens* and *Escherichia coli*. These products have been widely used in poultry but there is paucity of information on its usage in Rabbit production. Therefore, this study was designed to examine the effect of two selected natural antioxidants on performance and nutrient digestibility of growing rabbits.

MATERIALS AND METHODS

Experimental site: The experiment was carried out at the Rabbit Production and Research Unit, Teaching and Research Farm of the Ladoke Akintola University of Technology, Ogbomoso, Nigeria.

Experimental Animals and Management: Thirty (30) growing cross rabbit breed (Hyla X Black giant) were used for the experiment. The animal were weighed and randomly divided into three (3) dietary treatments of ten (10) rabbits, each rabbit served as a replicate. Pelleted feed were offered twice daily using earthen pot feeders while clean water was served in concrete re-enforced drinkers while feed that met the growing rabbits requirements (Table 1) was fed throughout the experimental period of nine (9) weeks.

Table 1: Gross Composition of Experimental Diet

Ingredients	%
Maize	18.00
Soybean meal	18.50
Corn bran	20.00
Corn cob	3.00
Rice husk	12.50
Wheat offal	10.00
Cassava meal	6.00
Palm kernel cake	9.00
Bone meal	2.00
Methionine	0.25
*Premix	0.25
Lysine	0.25
Common salt	0.25
TOTAL	100.00
Calculated analysis	
Crude protein (%)	16.47
Metabolizable energy (kcal/kg)	2443.97
Crude fibre (%)	11.02
Ether extract (%)	4.21
Lysine (%)	0.76
Methionine (%)	0.24
Calcium (%)	0.53
Phosphorus (%)	1.34
Cost/kg (#)	240.35

**Premix composition*

Vitamins and trace minerals declaration: 2.5kg of Premix contains Vitamin A (iu) 10 000 000, Vitamin D3 (iu) 2000 000, Vitamin E(mg) 20 000, Vitamin K3 (mg)2000, Vitamin B1 (mg) 3000, Vitamin B2 (mg) 5 000, Niacin (mg) 45 000, Calcium Paniothenate (mg) 10 000, Vitamin B6 (mg) 4 000, Vitamin B12 (mg) 20, Choline Chloride (mg) 300 000, Folic Acid (mg) 1000, Biotin (mg) 50, Manganese (mg) 300 000, Iron (mg) 120 000, Zinc (mg) 80 000, Copper (mg) 8500, Iodine (mg) 1500, Cobalt (mg) 300, Selenium (mg) 120, Antioxidant (mg) 120 000.

Data collection

Performance characteristics

Growth parameters taken include the feed intake, weight changes and feed conversion ratio. Initial body weight(g) of the rabbits were taken on arrival with the use of a sensitive scale. Feed intake was calculated on daily basis as the difference between the feed offered and the left over. The difference in weight between the two was the quantity of feed consumed per day. Mean weight gain was calculated by deducting initial weight from the final weight (g).

Feed to Gain = Total Feed intake ÷ Total Weight gained while the

Feed cost per kilogram weight gain = cost of feed per kilogram x feed to gain ratio

Digestibility study: At the 9th week of experiment, Three (3) rabbits from each treatment were transferred to metabolic cages for digestibility study. The animals were acclimatized for five (5) days after which the faecal samples were collected for three days. The wet as well as the dry weight of faecal were taken. The corresponding feed intake for the three (3) days was also recorded. The samples for the three days were bulked together and sub samples were taken for proximate analysis.

$$\text{Nutrient digestibility coefficient \%} = \frac{\text{Nutrient intake} - \text{nutrient voided}}{\text{Nutrient intake}} \times 100$$

$$\text{Digestible nutrient \%} = \frac{\% \text{ Nutrient digestibility coefficient} \times \% \text{ Nutrient in diet}}{100}$$

Feed and faecal samples were analyzed to determine the proximate composition according to the procedures of AOAC (2000).

Data Analysis: The data collected was subjected to analysis of variance using the general linear procedure (GLM) of SAS (2010) and means was compared using Duncan's multiple range test of the same package.

RESULTS AND DISCUSSION

The performance of rabbits is presented in Table 2. The results indicated that significant ($p < 0.05$) differences were observed in the parameters measured except daily water intake and Feed cost. The increased weight of the rabbits offered Oregoplus could be due to the improvement in the environment of digestive tract of the rabbits (Abo-Eid *et al.*, 2019). Similar weight was observed in the daily weight gain. These results were consistent with those obtained by Abo-Donia *et al.*, (2005).

Table 2: Effect of natural antioxidant on growth performance of growing rabbits

Parameters	T1	T2	T3	SEM	P-value
Initial weight (g)	1403.70	1450.72	1403.71	27.02	0.38
Final weight (g)	2279.74 ^b	2392.30 ^b	2781.32 ^a	86.55	0.01
Daily weight gain (g)	13.90 ^b	14.95 ^b	21.87 ^a	1.38	0.01
Daily feed intake (g)	100.27 ^b	103.97 ^a	103.77 ^a	0.73	0.03
Feed cost/kg	239.26	239.26	239.26	0.00	1.00
Feed: Gain	7.26 ^a	6.99 ^a	4.80 ^b	0.43	0.01
FC/kgwt gain	1737.03 ^a	1672.43 ^a	1148.45 ^b	0.31	0.01
Daily water intake (ml)	268.10	275.58	277.08	10.84	0.15

^{ab}Means within each row with different superscripts are significantly different ($p < 0.05$)

The result of nutrient digestibility is presented in Table 3. No significant ($p > 0.05$) difference was observed in values obtained for dry matter digestibility, crude protein digestibility and Ether extract digestibility but significant ($p < 0.05$) difference was observed in values obtained for crude fibre digestibility and Nitrogen Free extract digestibility which contradict the findings of Chowdhury *et al.*, (2022) who reported a significant effect of antioxidants on crude protein digestibility in growing rabbits. Rabbit fed Oregoplus in Treatment 3 digested Nitrogen free extract better (80.85%) compare with the control which had lowest value of Nitrogen free extract (72.34%).

Table 3: Effect of Natural antioxidant on Nutrient Digestibility of growing rabbits

Parameters	T1	T2	T3	SEM	P-value
Dry matter (%)	71.54	76.16	77.33	1.55	0.25
Crude protein (%)	67.81	72.31	73.84	1.70	0.37
Crude fibre (%)	42.87 ^b	52.33 ^a	55.99 ^a	3.16	0.02
Ether extract (%)	88.71	89.74	89.98	0.60	0.18
Ether extract (%)	72.21	76.94	78.88	1.56	0.21
GE (kcal/g)	1.87 ^b	1.88 ^b	1.90 ^a	0.01	0.01
ME (kcal/kg)	30.21 ^b	30.30 ^a	30.39 ^a	0.03	0.01
NFE (%)	72.34 ^b	78.17 ^{ab}	80.85 ^a	1.57	0.04

^{ab}Means within each row with different superscripts are significantly different ($p < 0.05$).

Feeding natural antioxidant had no significant ($p > 0.05$) influence on dry matter digestibility, crude protein digestibility and Ether extract digestibility but crude fibre digestibility, Nitrogen Free Extract digestibility and metabolizable energy were significantly ($p < 0.05$) affected by natural antioxidant types which corroborate the report of Chowdhury *et al.* (2022). The higher crude fibre indicates that the animals had lower risk of hemorrhoid and small pouches in the colon (Khalid *et al.*, 2022).

Rabbit on control diet had significantly ($p<0.05$) low crude fibre digestibility (42.87%) when compared with rabbit on T2 and T3 (52.33% and 55.99% respectively).

CONCLUSION:

It may be concluded that rabbits on OregoPlus[®], had improve weight gain and feed conversion ratio. Therefore, supplementation of Oregoplus[®] as oral additives in growing rabbit will improve the overall performance of rabbits.

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