



Original Article

## Impact of Vitamins C and E on the Gonadal Hormone of Adult Rabbits in the Humid Tropics

M.A. Yahaya<sup>1</sup>, S.N. Wekhe<sup>1</sup>, O.O. Ukpai<sup>1</sup>, P.K. Ajuogu<sup>2,\*</sup> and L. Ndor<sup>1</sup>

<sup>1</sup>Department of Animal Science, Faculty of Agriculture, Rivers State University of Science and Technology, Nkpulu Orowurukwu Diobu, Port Harcourt, Rivers State, Nigeria

<sup>2</sup>Department of Animal Science, Faculty of Agriculture, University of Port Harcourt, P.M.B.5323 East west road Choba, Port Harcourt, Rivers State, Nigeria

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**Corresponding Author:**

P.K. Ajuogu  
[peter.ajuogu@uniport.edu.ng](mailto:peter.ajuogu@uniport.edu.ng)

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### ABSTRACT

Research work was carried out to determine the impact of vitamin C, E and their synergism on estrogen and testosterone status of rabbits. Twenty four (24) adult rabbits comprising 50:50 ratio of both sexes were used in this study, they were randomly allocated into four Treatment groups designated A, B, C and D with the vitamins added at the following levels 0.00/kg vitamins, 500mg/kg Vitamin C, 3000iu vitamin E/kg and 6000iu vitamin E/kg and 1000mg vitamin C/kg respectively in a Complete Randomized Design (CRD). The study lasted for six (6) weeks with two (2) weeks serving as stabilization period. The results revealed significant impact on the estrogen status amongst the treatment groups ( $P < 0.05$ ). On the hand, there were no significant difference between the treatment groups on the Testosterone status probed ( $P > 0.05$ ). It was therefore concluded that Vitamine C and E can be used to improve the profile of estrogen of rabbit does.

**Keywords:** Vitamin E and C, synergism, Testosterone, Estrogen, Rabbits.

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## INTRODUCTION

Feed additive refers to certain chemicals added in very small quantities to animal ration as supplement. Several substances has been tried as performance enhancers in commercial farm animal production, ranging from plant extracts (Wekhe and Njoku, 2002; Wekhe, 2002; Yahaya, 2010; Yahaya ana Ajuogu, 2011), antibiotics and antifungi (Wekhe and Olowu, 1994; Wekhe and Taylor, 1992) and other

exogenous products (Akintola *et al.*, 2011a and b). Recently, Researchers have swung interest on the use of vitamins to improve Reproductive health of farm animals (Ukpai *et al.*, 2011; Yousel *et al.*, 2003; Rao and Sharma, 2001; Eskenzi *et al.*, 2005). But regrettably little or no attention has been given on the hormonal influence of vitamins of farm animals.

Vitamin C is found in citrus (orange, tangerine etc), black currents, paw paw, leafy green vegetables, guava etc. it is an optically active compound with strong reducing properties which appear fundamental to its biological functions. It is soluble in water; it functions as a co-substrate in the hydrogenation of proline to collagen, gum function and connective tissue formation (Edgar 1992) Vitamin E (α-tocopherols) which is lipid soluble was recognized as organic soluble compound that prevented sterility in rats. Its function has not been clearly stated or established but its favorite theory is that it is an antioxidant that prevents pre-oxidation of poly-unsaturated fatty acid *in-vitro* and can be replaced by antioxidant (Dennis et al, 1995). Therefore, it functions in reproduction of farm animals and its deficiency, leads to abortion and sterility in animals. The richest dietary sources of vitamin E are eggs, milk, margarine (15mg), wheat germ oil, corn oil, cotton seed oil and leafy vegetables.

The hormone testosterone, which is produced by the host of the male animals, is the most important androgen that promotes the production of the functional sperm, maintains the secretory glands of the male reproductive tract, stimulates growth and determines secondary male characteristics such as distribution of facial hair and body fact. It also influences the brain through neural development and activity. It is produced by the interstitial cell upon action by ICSH (Geoffery, 1995).

Estrogen is a female hormone secreted by the graafian follicles in the female animals which aids growth (puberty in the female animal, helps in vaginal secretion, bring about ovulation, estrous period, development of mammary gland and mucus secretion in the females (William, 1995).

The objective of this study is to determine the impact of vitamin C, E and its synergism on the status of estrogen and testosterone of adult rabbits.

## MATERIALS AND METHODS

The study was carried out in the Teaching and Research farm of Rivers State University of Science and Technology, Port Harcourt. Twenty four (24) adult rabbits of New Zealand White and Chinchilla breed were used in this study, comprising equal number of Bucks and Does,

They were randomly allocated into four experimental groups of A, B, C, and D with group A as control free of the additive, while groups B,C and D with additive vitamin as follows: 500mg vitamin C/kg feed, 3000iu vitamin E /kg feed and combination of 1000mg vitamin C and 6000iu vitamin E per kilogram daily respectively. Complete Randomized Design (CRD) was employed in this study that lasted for six (6) weeks out of which two weeks were used for acclimatization period.

The vitamins C used were product of New-foods-Bloomingsdals, 1260108 in USA, NAFDAC Reg: A7-0225, and Manson vitamin incorporated, Miami Lakes, FL33014, 1-888-860-5376. [www.mansonvitamins.com](http://www.mansonvitamins.com); for vitamin E. The animals were offered weighed quantities of respective treatment rations to meet the nutrient requirements (ICAR, 1998). They were fed for a period of 60 days with respective diets and at the termination of the experiment, five mills blood were collected using sterile syringe and hypodermic needles were used from the jugular vein of the animals. One syringe and needle was used per goat to avoid mix-up or contaminations of blood samples, and were shared into two to obtain two replicate of the samples. The samples collected were decanted immediately into an EDTA re-enforced sterile sample bottles, properly labeled for identification. Eight (8) rabbits of four blacks and four does were scarified and blood samples were collected into test tube free of EDTA, properly labeled and sent to University of Port Harcourt, teaching hospital for laboratory analysis.

## RESULTS

There were no significant difference ( $P>0.05$ ) in the observed mean values of testosterone produced among all the treated groups of rabbits. The mean valves ranged from 1.20-1.5mg/ml among the groups. Significant differences ( $p<0.05$ ) were observed in the mean values of estrogen treated group D (etc) recorded the highest mean value; seconded by treated group C (vitamin E) while treated group B and the control group a had lower mean value that were statistically the same.

**Table 1: Effects of Vitamin C and E on Reproductive of Adult Rabbits + Sem**

Parameters	Treatment				SEM
	A Control	B (vit.C)	C (vit. E)	D vit.C+E)	
Testosterone (mg/ml)	1.15	1.00	1.10	1.05	0.20
Oestrogen (pg/ml)	44.00 <sup>b</sup>	44.00 <sup>b</sup>	65.00 <sup>a</sup>	67.50 <sup>a</sup>	0.18

Within rows, means  $\pm$  SEM with difference superscript differs significantly at  $P < 0.05$ . SEM: Standard Error Mean.

## DISCUSSION

Vitamin C supplementation can help the stressed animals by maintaining the normal metabolic functions of the body (Carr and Frei, 1999; Lebas, 2000) and/or by improving disease resistance via optimizing the function of the immune system (Amakye-Anim *et al.*, 2000). Vitamin E is a primary antioxidant that plays an important role in protecting cells against toxicity by inactivating free radicals generated following pesticides exposure.

The result obtained from the test animal in this study revealed no significant effects ( $P > 0.05$ ), between the control and the treated group. Vitamin E is known to function in enhancing reproductive efficiency and its deficiency leads to abortion and sterility in animals, however, vitamin E additive fed to rabbits on group C could not significantly increase the testosterone production in that group. The no significant effect observed could also be attributed to the low dosage of vitamin E and short experimental duration in this study. Similar result was obtained by Ogbuewu *et al.*, (2009) who fed rabbits with mean leaf extracts and reported that the additive inhibited spermatogenesis, decreased sperm motility, count and cessation of fertility. These conditions were reversed by the withdrawal of the test products 4-6 weeks later (Sandre *et al.*, 1983). Dawson *et al.*, (1990). Fraga *et al.*, (1991) and Luck *et al.*, (1995) reported that men who consumed supplemental ascorbate showed improved sperm quality and therefore concludes that the antioxidant properties of Ascorbic Acid are essential to maintain membranes and the genetic integrity of sperm cells by preventing oxidative damage to sperm DNA. Also, Yahaya (2010), reported increased testosterone production of adults rabbits fed additive (*Laguncularia racemosa*). Wekhe (2002) similarly reported that, ingestion of powdered

*Alchornea cordifolia* root bark in broilers (1.5ky/kg of feeds) caused hypertrophy of the gonads, which was induced by early increased testosterone production and or elaboration.

Significant differences ( $P > 0.05$ ) observed in the mean values of estrogen amongst the treated groups C and D could imply that Vitamin C and E have the capacity to increase estrogen status of rabbits. According to Delema and Duala (2007) Ascorbic acid excretion is increased and declines immediately prior to ovulation, and then immediately increases again just after temperature rises post-ovulation. These ascorbic acid levels are stimulatory to the hormones progesterone and oxytocin, and have been found in high concentrations in the corpus luteum.

High levels of ascorbic acid present in the ovaries may be responsible for collagen synthesis, which is required for follicle and corpus luteum growth, as well as repair of the ovary (Delema and Delema 2007). Also Abdel-Monem (2012) reported that Vitamin E is a primary antioxidant that plays an important role in protecting cells against toxicity by inactivating free radicals. Vitamin C supplementation can help the stressed animals by maintaining the normal metabolic functions of the body (Carr and Frei 1999; Lebas, 2000) and/or by improving disease resistance via optimizing the function of the immune system (Amakye-Anim *et al.*, 2000).

## CONCLUSION

Vitamin E alone and the synergistic effects of vitamin C influences estrogen production at the inclusion levels used in this study but could not significantly influences the testosterone production. It is therefore recommended an increased inclusion levels and experimental period to investigate the possibility of vitamin E and C and their synergism to influence testosterone production.

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