WEIGHT GAINS OF FRIESIAN X BUNAJI CALVES AS AFFECTED BY FEED GRADE SELENIUM AND VITAMIN E SUPPLEMENTATION

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ABSTRACT

The experiment was carried out to determine the effect of supplementing feed grade selenium and vitamin -E on weight gains of Friesian x Bunaji calves. Twenty pregnant Bunaji cows inseminated with Friesian semen were used for the study. The animals were grouped into four treatments with each treatment consisting of five animals in a completely randomized design. Treatment I served as the control, treatment II Se (3mg), treatment III vitamin E (20mg) and treatment IV Se + Vitamin E (3mg + 20mg). At calving, the calves were weighed using a weighing scale and subsequently monthly until they were weaned. There were no significant differences ($p<0.05$) for the weights at calving, 1st and 2nd month after calving in all the treatments. Weight at weaning showed significant differences ($p<0.05$) in all the treatments with the control having the lowest (55.0 kg) while the Se + vitamin E treatment had the highest (65.8 kg) weight. It was concluded that selenium and vitamin E supplementation had no effect on calving weight, weight at 1st and 2nd month except at weaning with the combination of Se + vitamin E performing best.

Keywords: Selenium, Vitamin E, Friesian x Bunaji, Calves, Weight gains

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INTRODUCTION

The last months of gestation for cows represents the critical period for the selenium availability. The transfer of selenium to the fetus and subsequently to the calf occurs even when cows are deficient in selenium. Cows release selenium available to them to ensure adequate intake for newborns (Hefnawy and Tortora-Perez, 2010). This situation is explained by the fact that the renal selenium levels in the fetus remain unchanged whereas that of cows, at the end of pregnancy, decline (House and Bell, 1994). The mineral selenium is not well transferred into the milk (Pehrson *et al*., 1999), and thus is not efficient in maintaining adequate selenium status in calves. Compared to mineral selenium, use of organic selenium in foods was shown to cause better selenium transfer rates in calves (Ceballos *et al*., 2009). Nearly 70% of the selenium in the membrane is found to bind to the anion exchanger 1 (AE1) protein, which suggests that the integral protein AE1 is responsible for the membrane transport of selenium.

An increase of the immunoglobulin concentration in calves has been demonstrated to be caused by a selenium supplementation of cows before calving (Rowntree *et al*., 2004; Guyot *et al*., 2007). Indeed, strengthening of their immature immune system helps them to resist inadequate environmental conditions. At temperatures below 14.6^{0}C, newborn calves present sensitivity to cold (Schrama *et al*., 1993). To cope with this stress, the thermogenic response is generated by the metabolism of brown adipose tissue. The metabolism of the adipose tissue is regulated by T_3 hormone which is a seleno-dependent hormone (Rowntree *et al*., 2004). In cases of severe selenium deficiency in calves, it is advisable to administer aselenium injection incombination with a dietary selenium source as such practice helps to rapidly restore an adequate selenium status for a few months (Eversole *et al*., 1988). Selenium does not play a direct role in promoting growth in calves. However, it helps to remove all constraints that may delay or inhibit growth such as oxidative damage, stress, reactive forms of oxygen etc.

MATERIALS AND METHODS

Study Location

The study was conducted at the Dairy Research Programme farm of the National Animal Production Research Institute (NAPRI), Ahmadu Bello University, Shika-Zaria, Nigeria. Shika is located in the Northern Guinea Savanna and lies on latitudes 110 06' 40" N and longitudes 70 43' 21"E at an elevation of 644m above sea level, with an annual maximum and minimum temperature of 31.0 ± 3.2 0C and 18.0 ± 3.7 0C, respectively. Shika has an average annual rainfall of 1100 mm, usually lasting

from May to October with a mean relative humidity of 72 %. The dry season lasts from November to April with the mean daily temperature, ranging from 15 – 36 ^{0}C and mean relative humidity ranging from 20 – 37 % (IAR, 2017).

Experimental Design and Management of Animals

A total of twenty pregnant Bunaji cows with an average weight of 300 kg in the third trimester of pregnancy were used for the study. The study consisted of four treatments with five animals per treatment in a Completely Randomized Design (CRD). Treatment I was the Control without Selenium or Vitamin E supplementation. Treatment II was supplemented with 3 mg/kg feed of feed grade Selenium, treatment III with 20 mg/kg feed of feed grade Vitamin E. Treatment IV received a combination of 3 mg feed grade Selenium and 20 mg of Vitamin E. the treatments were given once a week until calving.

The animals were grazed on free range pastures and supplemented with concentrate diet consisting of 48 % Cotton Seed Cake, 13.7 % wheat bran, 35.3 % maize, 2 % bone meal, 1 % common salt, 88 % dry matter, 15 % crude protein and 55 % total digestible nutrients after grazing. Water was provided *ad-libitum*. All the experimental animals were ear-tagged for ease of identification. The animals were dipped twice a week for effective control of ectoparasites.

Calves were weighed at calving, first and second month after calving then at weaning using a weighing scale. The animals were weighed using an Avery large weighing scale prior to calving and postpartum. Data generated was analyzed using the general linear model of SAS (2002).

RESULTS AND DISCUSSION

Calving weight, weight after first and second month were similar ($p>0.05$). Weight at weaning was significantly different ($p<0.05$) for Friesian x Bunaji calves with Se, vitamin E and Se + vitamin E supplementation as shown on Table 1.

In ruminants, the transfer of selenium from cow to the newborn is via the placenta and milk but transfer via the placenta is more efficient than that made through the milk (Enjalbert *et al*., 1999). The higher weight at weaning for supplemented calves could be attributed to the antioxidative potency of mineral and vitamin supplementation which invariably improved immune system of calves, thereby resulting in growth and development, this is agreement with Salles *et al*. (2014). The improved immune system of the calves helps them to resist extreme environmental conditions of cold and heat especially in the tropical region.

Although Se does not play a direct role in promoting growth in calves, however, it helps to remove all constraints that may delay or inhibit growth. A selenium-deficient diet causes a reduction of triiodothyronine (T_3) and an increase of the tetraiodothyronine (T_4) and a decrease in the ratio T_3/T_4 levels in blood (Thompson *et al*., 1995). The reduction in T_3 and an increase in T_4 can influence growth rates since T_3 is an active form of T_4 which is known to be involved in the growth mechanisms (Thompson *et al*., 1995).

CONCLUSION

It was concluded that calving weight, weight at 1st and 2nd month were not affected by selenium and vitamin E supplementation except at weaning weight with Se + vitamin E performing better.

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Table 1: Effect of Selenium, Vitamin E and Selenium + Vitamin E supplementation on Fr x BJ calves' birth and weight changes.

Weight (Kg)	**Treatments**				SEM	P-Value
	Control	Se	Vit-E	Se + Vit-E		
At Calving	20.80	22.60	24.20	21.40	1.12	0.1878
1st month after calving	32.40	33.80	36.40	32.80	1.94	0.4803
2nd month after calving	40.00	44.80	49.00	45.40	2.30	0.0896
At weaning	55.00^{b}	63.20^{ab}	64.60^{ab}	65.80^{a}	2.37	0.0221

[ab]Means within the same row having different superscript are significantly (P<0.05) different. Se-Selenium, Vit-E-Vitamin E, SEM-Standard Error of Mean.