APRW -12

Assessment of Zinc Doses on the Internal Organs of Male Rabbits

O.A.C. Ogbu
Department of Agricultural Technology, Federal Polytechnic Oko, Anambra State, Nigeria
Corresponding author: O.A.C. Ogbu; E-mail: onyinyeanakebe@yahoo.com

Abstract
This paper examines the effect of different levels of dietary zinc on internal organ weight of male rabbits. Thirty-two (32) male rabbits of about two (2) months old weighing averagely 1.050 kg were randomly allotted to four (4) treatment groups of (T1: control), 50 ppm/kg as T2, 100 ppm/kg as T3 and 150 ppm/kg was T4. There were significant ($p<0.05$) difference on the liver, heart, spleen and lungs weight parameters measured. These differences did not take a definite trend and so could not be attributed to effect of zinc on the rabbits. It is therefore concluded that, using zinc as high as 100 ppm and 150 ppm has no detrimental effect on the internal organ weight of male rabbits.

Keywords: Zinc, rabbit, internal organs,

Introduction

Internal organs, like spleen, lungs, kidney, heart and liver are major detoxifying organs in the body (Ukachukwu, 2000). Toxins as anti-nutrients and over doses affect these organs. The liver alone is vital as well as largest organ in the animal body (Berry and Berry, 2007). It has a wide range of functions which includes detoxification, protein synthesis, production of biochemical substances necessary for digestion (Cotran *et al*., 2005) as well as hormone production (Maton *et al*., 1993).The kidney is a compounded tuber gland adapted to filtering wastes from the blood (Berry and Berry, 2007).Kidneys are important in the removal of nitrogenous waste, regulation of acid-base balance and recovery of usual metabolites. While the spleen functions in the removal of red blood cell (RBC), immune systems boaster and holds blood reserves (Mebius and Krall, 2005). The spleen also synthesizes antibiotics in its white pulp and removes antibody-coated bacteria (Loscualzo *et al*., 2008). The heart and lungs also play essential roles in the body. The heart, a myogenic muscular organ pumps oxygen and nutrients throughout the body (Lewis, 2016). The essentiality of the internal organs in the body of rabbits lives on the fact that any abnormality on one organ affects the others directly or indirectly (Anakebe, 2012). For instance, the heart pump blood all over the body, but when the liver is congested with toxins, it causes partial hypertension and may not permit blood to flow back to the heart from organs or even tissues (Jenkins, 2000). The normal weight range of rabbit internal organs as was described by Marenjak *et al*. (2009) are as follows; heart (3.20 to 10.89), liver (23.20 – 97.409), kidney (3.45-17.289) and spleen (0.08 – 3.20).

Zinc has so many positive attributes, for it plays essential roles in the body either as activator or an inhibitor of most enzymes' activities. It is required for the metabolic activity of about 300 of the body's enzymes and it is considered essential for cell division, protein and DNA synthesis (Clear Spring, 2009). Zinc has specific effects on the gene expression, appetite, growth, reproduction and immune functions (Wright, 2014). Toxicity from Zinc can occur from overdose or over exposure while under dose and deficiency affects the internal organs, (kidney and liver). It has therefore become imperative to evaluate the effect of zinc supplementation on internal organ weight was not out of place. This paper examines the effect of different levels of dietary zinc on internal organ weight of male rabbits

Materials and Methods

The experiment was conducted at the Livestock Unit of the Teaching and Research, Farm of Michael Okpara University of Agriculture, Umudike, Umuahia, Abia State Nigeria. Umudike is on an attitude of 120m above sea level with a mean annual rainfall of 2404 mm and average temperature of 22-36^{0}C depending on the season. A total of 32 Dutch belted of two (2) months old and weighing between 0.9 kg and 1.2 kg, sourced from a reputable farm in Umuahia were used for the experiment. The rabbits were randomly assigned into four (4) treatment groups. Each treatment was replicated three (3) times with two (2) male rabbits per replicate. The rabbits were housed in individual cages measuring 60x60x45cm. The experiment lasted for eighty four (84) days.

The rabbits were fed four experimental diets and water ad libitum. Treatment 2 (T_1) had no Zinc and served as control. Treatment 2 (T_2) had 50 ppm of Zinc per kg of feed, while treatment 3 (T_3) had 100 ppm of Zinc per kg of feed. Treatment 4 (T_4) comprised of 150 ppm of Zinc per kg of feed. Zinc (Mason Vitamin Inc., Miami Lakes USA) was bought in a pharmaceutical store in Umuahia town served as dietary supplement. Three (3) rabbits from each treatment were sacrificed at the end of the feeding trial. There internal organs were removed and weighted using Sartious digital scale.

The collected data was subjected to analysis of variance (ANOVA) Steel and Torrie (1980). The means were separated using Duncan New Multiple Range Test (Duncan, 1995).

Results and Discussion

The results of mean internal organ weights of male rabbits were shown in Table 1. The result shows that there were significant difference ($p<0.05$) in the weight of the liver, lungs, kidney and spleen measured. The liver significantly ($p<0.05$) increased in T1 (39.89 g) when compared to T2 (35.71 g), T3 (38.85 g) and T4 (34.38 g). The heart was significantly ($p<0.05$) bigger in T4 (4.24 g) and T3 (4.24 g) when compared to T1 (3.96 g) and T2 (3.73 g). The lungs also differed significantly ($p<0.05$) with T 2 (8.39 g) being higher than T3 (7.53 g) then T4 (7.10 g) and T1 (7.04). The size of the spleen increased significantly ($p<0.05$) in T1 (0.61 g) when compared with T2 (0.44 g), T3 (0.43 g) and T4 (0.36 g). The kidney did not vary significantly ($p>0.05$). The parameters were all within reported range by Marenjak *et al*. (2009). That is to assert that even as there were significant differences ($p<0.05$) among the treatments measured, the weight of the internal organs were still within normal range for rabbits therefore toxicity couldn't have occurred. Also the difference ($p<0.05$) did not take a definite trend that can be attributed to the increase in the level of zinc. Although significantly ($p<0.05$) bigger size of spleen in T1 (0.61) could mean that the organ increased in size so as to manufacture more red blood cells due to low level of zinc in the diet.

Table 1: Mean values of internal organs weight of rabbit bucks fed different levels of zinc supplemented diets

Parameters (g)	T1(0 ppm)	T2 (50 ppm)	T3 (100 ppm)	T4 (150 ppm)	SEM
Heart	3.96^{a}	3.73^{b}	4.24^{a}	4. 24^{a}	0.170
Lungs	7.04^{b}	8.39^{a}	7.53^{ab}	7.10^{b}	0.400
Kidney	10.12	8.98	8.93	10.45	0.300
Liver	39.89^{a}	35.71^{b}	38.85^{b}	34.38^{b}	1.000
Spleen	0.61^{a}	0.44^{b}	0.43^{b}	0.36^{b}	0.037

^{ab} means with different superscripts on the same roll are significantly different ($p < 0.05$).

Conclusion and Recommendation.

Using zinc as high as 150 ppm/kg of feed has no serious detrimental effect on the rabbit internal organs. I therefore recommend further research through histological studies weather zinc really affected the internal body cells.

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