EFFECT OF RONOXYME HiPhos® SUPPLEMENTATION ON BLOOD PARAMETERS OF GROWER RABBITS FED SUNFLOWER SEED MEAL-BASED DIETS

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ABSTRACT

A 42 day experiment was conducted to evaluate the response of grower rabbits fed cooked sunflower seed meal (SFSM) supplemented with enzyme on blood parameters using 72 growing rabbits. Nine diets namely T1, T2, T3, T4, T5, T6, T7, T8 and T9 were compounded to be isocaloric (2500 kcal/kg, ME) and isonitrogenous (15%) having treatments T1, T2 and T3with 0% inclusion rate of SFS meal and 0, 150 and 250PPM of the enzyme supplementation. Treatments T4 to T6 and T7 to T9 had 10 and 20% levels of SFS meal inclusion rate, respectively but maintaining same levels of enzyme supplementation as in T1 to T3. This arrangement translated to T1, T4 and T7 serving as the control diets for T2 and T3, T5 and T6 and T8 to T9, respectively. The rabbits were randomized and allotted to the 9 treatments and each treatment was replicated 4 times giving rise to a 3x3 factorial arrangement fitted into CRD. The results show that enzyme supplementation significantly (P<0.05) improved RBC, the values increased from 5.23 x10^{12}/l for non-enzyme supplementation to 5.38 -5.73 x10^{12}/l. Similarly, haemoglobin (11.42 vs. 11.37 and 12.01 g/dl), cholesterol (3.83 vs. 4.33 and 4.31mmol/l) and triglyceride (0.95 vs. 1.16 and 1.03mmol/l) were improved (P<0.05) as the level of enzyme supplementation increased in the diets. In view of the significant improvement in some of the blood parameters recorded, rabbit farmers can use the 150 PPM of the enzyme in SFS meal based diets without affecting the health of the rabbits.

Keywords: Enzymesupplementation, grower rabbits, haematologicalindices, ronoxymeHiPhos®, serum biochemistry, sunflower seed meal

INTRODUCTION

Conventional feed stuffs are very expensive and scarce. This high cost and scarcity according to Esonu*et al.*,(2004), are derived from crippling realities which are characteristics of the economics of developing countries, conventional feed ingredients are expensive since they suffer stiff competition with channels in the food chain which command higher priority and can pay higher prices than the compound feed industry (Esonu*et al.*, 2004). Therefore, the use of cereal based feeds in livestock nutrition may not be sustainable especially in developing countries where cereal grains form a major staple in human diets.

Again, the challenge of anti-nutritional factors and anti-nutrients in most non-conventional feedstuffs has remained a major hindrance to their use. Exogenous enzyme supplementation has been advocated (Alu *et al.*, 2012) as one of the ways or methods of alleviating the problems of anti-nutritional factors in feeds. One of such non-conventional protein sources is the sunflower seed, (*Helianthus annuus* L.) which is one of the few crop species that originated in North America. Sunflower was probably first introduced to Europe through Spain, and spread as a curiosity until it reached Russia where it was readily adapted.Commercially available sunflower varieties contain from 39 to 49% oil in the seed. The main object of this research was to evaluate the effect of enzyme supplementation on the blood parameters of grower rabbits fed SFS meal-based diets.

MATERIALS AND METHODS

The study was carried out at the research and teaching farm of Faculty of Agriculture Nasarawa State University Keffi, Shabu-Lafia Campus. It is located in the Guinea Savanna Zone of North Central. It is found in latitude 08 35N and longitude 08 33E. The mean monthly maximum and minimum temperatures were 35.06°C and 20.16°C respectively at the time of the experiment while the mean monthly relative humidity and rainfall were 74.67% and 168-190mm, respectively (NIMET, 2017).

Source of test ingredient

Sunflower seed (SFS) which is the test ingredient was purchased at Gambali Unique Gardens Jos, Plateau State,cooked, sun-dried, crushed and mixed with other feed ingredients to compound the experimental diets.

Chemical analysis

Proximate analysis of SFS was done at Animal Science Laboratory of Faculty of Agriculture, Nasarawa State University, Keffi, Shabu-Lafia Campus, using the standard procedure of AOAC (2000). Nitrogen Free Extract (NFE) was calculated using the formula: NFE (%) = 100 – CP + CF + EE + Moisture + Ash.

Experimental diets and design

Nine experimental diets namely T1, T2, T3, T4, T5, T6, T7, T8 and T9 were compounded to be isocaloric (2500 kcal/kg, ME) and isonitrogenous (15%) having treatments T1, T2 and T3with 0% inclusion rate of SFS meal and 0, 150 and 250PPM of the enzyme supplementation. Treatments T4 to T6 and T7 to T9 had 10 and 20% levels of SFS meal inclusion rate, respectively but maintaining same levels of enzyme supplementation as in T1 to T3. This arrangement means that T1, T4 and T7 serve as the control diets for T2 and T3, T5 and T6 and T8 to T9, respectively. Other ingredients were added to meet the nutrient requirements of grower rabbits as described by Olomu*et al.,* (2019). The gross composition of the experimental diets is presented in Table 1.

Table 1: Percentage chemical and energy composition of experimental diets for grower rabbits

	DIETS								
Feed stuff	**T1**	**T2**	**T3**	**T4**	**T5**	**T6**	**T7**	**T8**	**T9**
Groundnut shell	10.00	10.00	10.00	13.00	13.00	13.00	21.00	21.00	21.00
Salt (Nacl)	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Maize Bran	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
Groundnuts Cake	8.00	8.00	8.00	4.00	4.00	4.00	4.00	4.00	4.00
SFS (Cooked 3h)	0.00	0.00	0.00	10.00	10.00	10.00	20.00	20.00	20.00
*Premix	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Maize	30.00	30.00	30.00	21.00	21.00	21.00	11.00	11.00	11.00
Rice Offal	25.00	25.00	25.00	25.00	25.00	25.00	20.00	20.00	20.00
Soybean (full fat)	17.00	17.00	17.00	17.00	17.00	17.00	14.00	14.00	14.00
Bone meal	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Lysine	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Enzymes(ppm)	0.00	150.00	250.00	0.00	150.00	250.00	0.00	150.00	250.00
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Calculated chemical and energy composition									
**Energy (kcal/kg, ME)	2515.83	2515.83	2515.83	2532.51	2532.51	2532.51	2579.36	2579.36	2579.36
Crude protein (%)	15.31	15.31	15.31	15.04	15.04	15.04	15.26	15.26	15.26
Crude fibre (%)	8.32	8.32	8.32	11.03	11.03	11.03	15.77	15.77	15.77
Ether Extract (%)	8.52	8.52	8.52	7.56	7.56	7.56	7.13	7.13	7.13
Ash (%)	6.72	6.72	6.72	7.00	7.00	7.00	6.52	6.52	6.52
Calcium (%)	1.32	1.32	1.32	1.28	1.28	1.28	1.30	1.30	1.30
Phosphorus (%)	0.88	0.88	0.88	0.88	0.88	0.88	0.87	0.87	0.87
Lysine (%)	0.92	0.92	0.92	0.98	0.98	0.98	1.03	1.03	1.03
Methionine (%)	0.46	0.46	0.46	0.49	0.49	0.49	0.51	0.51	0.51

*The vitamin – mineral premix supplied the following per 100kg of diet: Vitamin A, 15,000 I.U; Vitamin D_3,

300,000 I.U; Vitamin E 3,000 I.U; Vitamin K, 2.50mg; Thiamin (B_1), 200mg; Riboflavin (B_2), 600mg; Pyridoxine (B_6), 600mg; Niacin, 40.0mg; Vitamin B_{12}, 2mg; Pantothenic acid, 10.0mg; Folic acid, 100mg; Biotin, 8mg; Choline chloride, 50g; Anti-oxidant, 12.5g; Manganese, 96g; Zinc, 6g; Iron, 24g; Copper, 0.6g; Iodine, 0.14g; Selenium, 24mg; Cobalt, 214mg. ME kcal/ kg = 37 X %CP + 81.1 X %EE + 35.5 X %NFE.
**Pauzenga (1985).

Management of rabbits and experimental design

Seventy-two cross-bred growing rabbits of about 6-7 weeks old with a mean weight of 567g were obtained from Dagwam Farms, National Veterinary Research Institute (NVRI) Vom, Jos, and PlateauState. The rabbits were fed *ad-libitum* and had access to drinking water at all times and were administered anti-stress vitamin/mineral premix orally at the recommended dosage after randomization before the commencement of the experiment. Other management practices were adopted as described by Aduku (2004). The rabbits were paired and allotted to the 9 treatments and each treatment was replicated 4 times giving rise to a 3x3 factorial arrangement fitted into a Completely Randomized Design.

Hematological and serological parameters

At the end of the experiment2-5ml of blood samples from 3 randomly selected rabbits per treatment were collected for haematological and biochemical analyses. The first set of blood samples were collected and emptied into labeled sterile universal bottles containing anti-coagulant, ethylene diamine tetra acetic acid (EDTA) for the determination of haematological components while the other set of blood labeled sterile bottles without EDTA for the determination of serum biochemical components. The packed cell volume (PCV) was determined using the micro-haematocrit technique, the red blood cells (RBC) and white blood cells (WBC) counts using the improved Neubauerhematocytometer method, and haemoglobin (Hb) using the Cyanomethemoglobin method as described by Kelly (1979). Serum total proteinwas determined using Biuret method as described by Kohn and Allen (1995). Albumin was determined using Bromoscresol Green (BCG) method as described by Peter *et al.,* (1982). The globulin concentration was obtained by subtracting albumin from the total protein while the albumin/globulin ratio wasobtained by dividing the albumin value by the calculated globulin value.

Data analysis

All data obtained from the experiment were subjected to Two Way Analysis of Variance (ANOVA) and where significant differences are observed the means were separated using Duncan's Multiple Range Test (DMRT) using the Statistical Package for Social Sciences (SPSS) software.

RESULTS AND DISCUSSION

The results of the effect of the ronoxymeHiPhos® supplementation on blood parameters of grower rabbits fed SFS meal (Table 2) show that enzyme supplementation significantly ($P<0.05$) improved RBC. The values increased from 5.23 $x10^{12}$/l for non-enzyme supplementation to 5.38 -5.73 $x10^{12}$/l for enzyme supplemented diets. Similarly, haemoglobin (11.42 vs. 11.37 and 12.01 g/dl), cholesterol (3.83 vs. 4.33 and 4.31mmol/l) and triglyceride (0.95 vs. 1.16 and 1.03mmol/l) were significantly ($P<0.05$) improved as the level of enzyme supplementation increased in the diets. These observations are in tandem to the earlier findings of Alu *et al.,* (2014) who reported significant improvement in some blood parameters such as, Pack cell volume (PCV), White blood cells (WBC), Haemoglobin (Hb), Mean corpuscular volume (MCV),of finisher quails fed enzyme supplemented diets. The values obtained in the present study fell within the normal range of PVC (30-50%),WBC (4-10X10^3/uL) for mature rabbits (Olomu *et al.,* 2019; Alu, 2018).

Table 2. Effect of ronoxymeHiPhos® supplementation on bloodparameters of grower rabbits fed sunflower seed meal diets

Parameters	0PPM	150 PPM	250 PPM	SEM	LOS
PCV (%)	33.83	34.58	35.75	0.52	NS
RBC ($X10^{12}$/l)	5.23^{b}	5.38^{b}	5.73^{a}	0.12	*
WBC ($X10^{9}$/l)	10.08	9.59	11.48	0.61	NS
Hb (g/dl)	11.42^{b}	11.37^{b}	12.01^{a}	0.17	*
MCV(fl)	62.50	64.17	63.00	0.67	NS
MCH (pg)	19.78	20.18	20.25	0.37	NS
MCHC (g/dl)	31.59	31.68	32.48	0.41	NS
Cholesterol (mmol/l)	3.83^{b}	4.33^{a}	4.31^{a}	0.12	*
Triglyceride (mmol/l)	0.95^{b}	1.16^{a}	1.03^{ab}	0.05	*
Total protein (g/L)	41.00	42.92	43.08	1.36	NS
Albumin (g/L)	23.00	21.75	20.92	0.79	NS
Creatinine (mmol/L)	155.08	157.17	152.42	4.32	NS
Glucose (mmol/l)	9.19	8.23	8.80	0.49	NS

a,b = means on the same row having different superscript differ significantly (P<0.05), **NS** = not significantly different (P>0.05), **SEM** = standard error of means

CONCLUSION AND RECOMMENDATION

In view of the significant improvement in some of the blood parameters recorded in the present studies and the lack of difference in the 150 and 250 PPM of enzyme supplemented diets, rabbit farmers can use the 150 PPM of the ronoxyme HiPhos® in SFS meal based diets without affecting the health status of the rabbits.

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