



REPRODUCTIVE PERFORMANCE AND HAEMATOLOGY OF RABBITS FED DIET CONTAINING KOREAN GINSENG

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ABSTRACT

The study was conducted to determine the effect of dietary inclusion of Korean Ginseng on reproductive performance and haematology of rabbit. Fifteen mature rabbits (average body weight of 1.8 -2.0kg) were used for the study. The rabbits were randomly divided into three treatments comprising of five rabbits. They were assigned to three dietary treatments as follow T₀ T₁ and T₂ containing panax ginseng at 0, 1, and 2 g/kg feed respectively. Routine management practices were carried out as at when due and the experiment lasted for eight weeks. The result obtained from reproduction performance showed that there were significant ($p < 0.05$) differences in litter size at birth, total body weight of bunnies at one week, average weight of bunny at one week, average weight of bunny at three weeks, average weight per bunny at one month. The haematological indices showed that there were no differences ($P > 0.05$) in the haemoglobin, red blood cell, white blood cell, MCH (mean corpuscular haemoglobin), mean corpuscular haemoglobin concentration and packed cell volume. The study concluded that inclusion of 2g/kg feed of panax ginseng improved reproductive performance of rabbits without any negative influence.

Key words: Korean ginseng, Rabbits, growth performance, haematology.

INTRODUCTION

There is a global awareness on the level of shortage of animal protein supply in the tropics (Adekunle and Ajani, 1999). Nigeria statistically remains among the least consumers of animal protein in the world (Egbunike, 1997). It have been found from researches that the average consumption of animal protein in the country is estimated at 4.5g/head/day as against a minimum requirement of 35g/head/day recommended by the food and Agricultural organization of the United Nations (Atsu, 2002). To meet the increasing demand for animal protein there is a need to give more emphasis to non-conventional source of meat such as rabbit. Its production can help to bridge the wide gap in the dietary intake in Nigeria.

Rabbit have been recognized to have a very important role to play in the supply of animal protein to Nigeria especially in the rural and urban areas. Several advantages derived from rabbit keeping include relatively low cost of production, high efficiency in converting forages to meat and its ability to digest large amount of fibrous materials in the caecum (Egbo, 2001). Rabbit also mature early, their meat is white, finely grained, delicate and appetizing (Olubumo, 2000). It is lean, easily digestible, very nutritious, rich in proteins of high biological value, low in cholesterol and sodium level (Omole *et al.*, 2005). Despite these attributes, factors such as low knowledge of rabbit genetics/production techniques, high ambient temperature, oxidative stress, cancer (wounds) etc are some factors that hinder proper performance of rabbit. To ensure protein supply in our country, great consideration has been put into place to help minimize losses due to the stated factors and disease attack.

Ginseng (*Panax ginseng* Meyer) is a perennial plant that grows in shaded and humid areas throughout Korea, Japan, and China. Several researches have well documented that ginseng contains saponins, antioxidants, peptides, polysaccharides, alkaloids, lignin etc. Among these, saponins (ginsenoside) are considered to be the principal bioactive ingredients (Palazon *et al.*, 2003). Saponins are believed to boost the immune system and to provide pharmaceutical and antioxidant benefits to humans and animals (Kim and In, 2010; Yildirim *et al.*, 2013). These positive properties could be explored for better rabbit productivity. Therefore, the objective of the experiment was to determine the effect of ginseng on reproductive performance and haematology of rabbits.

MATERIALS AND METHODS



Location of the experiment

The experiment was carried out at the rabbitry Unit of the Teaching and Research Farm, Department of Animal Science, University of Nigeria, Nsukka in Enugu State, Nigeria. The study lasted for a period of eight weeks.

Experimental diets, animals and management

A total of fifteen (15) mature mixed rabbits were used in a completely randomized design consisting of three dietary treatments and five replicate per treatment. Each treatment had five rabbits per replicate. The rabbits were housed singly in wooden hutches and were provided with adequate feeders and drinkers. Routine management practices including vaccination and drug administration where necessary were observed with water and feed provided *ad libitum*. Three treatment diets were formulated which were

T₀ = Rabbits in this treatment received 0g ginseng per kg feed (control).

T₁ = Rabbits in this treatment received 1g ginseng per kg feed inclusion in their diet.

T₂ = Rabbits in this treatment received 2g ginseng per kg feed Inclusion in their diet.

Initial and final weights of birds were taken at the beginning and at the end of the experiment. Daily feed intake and weekly weight gain were measured and recorded per group. Data on feed intake, water intake, body weight gain, feed conversion ratio and mortality were recorded as they occurred.

Haematology

At the end of eight weeks, three rabbits were randomly selected from each treatment. 5 mls blood samples were taken from each rabbit and then placed in a bottle containing EDTA and taken to the laboratory for haematological study. The samples were analysed for packed cell volume (PCV), Haemoglobin (Hb), white blood cell (WBC) red blood cell (RBC), Mean corpuscular volume (MCV), Mean corpuscular haemoglobin (MCH), Mean corpuscular haemoglobin (MCHC)

Statistical Analysis

All data collected were subjected to analysis of variance using SPSS (2013) and means separation was done using Duncan's New Multiple Range Test (DNMRT) (Duncan, 1955) and accepted 5 or 1% level of probability.

Table 1. Percentage composition of experimental diet

Ingredients	(%)
Maize	41.50
Wheat Offal	20.00
Palm kernel meal	12.30
Soybean meal	7.00
Groundnut cake	12.20
Fish meal	2.00
Salt	0.25
Bone Meal	4.00
Vit-Min Premix*	0.25
Lysine	0.25
Methionine	0.25
Total	100
Calculated composition:	
Crude protein (%)	19
Energy (Mcal/kgME)	2.90

* Vit A – 10,000.00 iu., D₃-2,000 iu., B₁-0.75g., B₂-5g., Nicotinic acid – 25g., Calcium pantothenate 12.5g., B₁₂-0.015g., K₃-2.5g., E-25g., Biotin – 0.050g., Folic acid –1g., Manganese 64g., Choline chloride 250g., Cobalt-0.8g., Copper 8g., Manganese 64g., Iron –32G., Zn-40g., Iodine-0.8g., Flavomycin-100g., Spiramycin 5g., Dl-methionie-50g, Selenium 0.6g., Lysine 120g., BAT-5g.

RESULTS AND DISCUSSION



Reproductive performance of rabbits fed diets containing varying levels of Korean ginseng is presented in Table 2.

TABLE 1 EFFECT OF GINSENG EXTRACT ON REPRODUCTIVE PERFORMANCE OF RABBIT (DOE)

Parameters	T ₀	T ₁	T ₂	Probability
Initial body wt of Doe (kg)	1.80 ± 0.10	1.95 ± 0.12	2.00 ± 0.05	0.33 ^{NS}
Doe body wt at mating (kg)	1.60 ± 0.11	1.89 ± 0.14	1.78 ± 0.08	0.23 ^{NS}
Gestation length (days)	30.25 ± 0.48	30.50 ± 0.29	29.50 ± 0.29	0.18 ^{NS}
Gestation body wt gain (kg)	0.22 ± 0.03	0.30 ± 0.04	0.32 ± 0.02	0.12 ^{NS}
Litter size at birth (No)	3.50 ± 0.29 ^b	5.75 ± 0.48 ^a	4.75 ± 0.25 ^{ab}	0.00**
Total body wt of bunnies at birth (g)	219.00 ± 33.69 ^b	303.25 ± 26.70 ^a	322.60 ± 19.16 ^a	0.04*
Average wt per bunny at birth (g)	62.67 ± 8.19	52.68 ± 0.32	68.53 ± 4.13	0.16 ^{NS}
Total body wt of bunnies at 1 week (g)	573.00 ± 157.18 ^{ab}	720.00 ± 51.28 ^a	460.10 ± 52.60 ^b	0.040*
Average wt per bunny at 1 week (g)	166.62 ± 24.92 ^a	128.04 ± 9.97 ^{ab}	96.29 ± 7.88 ^b	0.038*
Total litters body wt at 3 weeks (g)	754.25 ± 81.84	855.25 ± 11.99	711.00 ± 58.37	0.250 ^{NS}
Average wt per bunny at 3 weeks (g)	216.81 ± 18.98 ^a	151.34 ± 10.82 ^b	150.85 ± 13.59 ^b	0.017**
Total body wt of litters at 1 month (g)	1079.00 ± 83.97 ^b	1124.00 ± 20.68 ^b	1262.25 ± 96.00 ^a	0.40*
Average wt per bunny at 1 month (g)	308.96 ± 34.39 ^a	196.68 ± 18.19 ^b	265.88 ± 13.06 ^{ab}	0.002**

^{a,b,c} = in the same rows with different superscripts are statistically significant at probability (*P<0.05) ^{NS}= not significant, T = Treatments, wt – weight, kg = kilograms, g = grams.

Result shows that there was no significant (P>0.05) difference among treatments in doe body weight at mating, gestation length and gestation body weight gain. Gestation length is genetically determined and does not change much in animals. This is in agreement with the findings of Hasana *et al.*, 1996 who reported the nutrition had no effect on gestation length.

Results reveal that ginseng had significant (P<0.05) effect on litter size at birth. Reactive Oxygen Species (ROS) are generated during normal embryo metabolism and must be continuously inactivated in embryos. ROS are implicated in the control of capacitation, acrosomal reaction (de Lamirande *et al.*, 1998) and fertilization (Miesel *et al.*, 1993) processes. Furthermore, ROS are probably implicated in regulating the speed of pre-implantation embryo development (Yamashita *et al.*, 1997). Increase in litter size observed in the treated groups may be attributed to the anti oxidative properties of ginseng. Significant (P<0.05) differences were seen in total body weight of bunnies at birth, at weaning and average weight of bunnies at week 1, 3 and at weaning. Irrespective of the large litter size observed in the ginseng treated groups, the average weight of bunnies in T₂ (2g ginseng) compared favourably with those in T₁ (control) at weaning. This improvement may be attributed or seen as an indication that ginseng inclusion during gestation and lactation alleviated oxidative stress on the does which led to improvement in the doe's ability to produce sufficient amount of milk without much stress.

Table 3: The result of the effect of Korean ginseng inclusion on haematological indices of rabbits

Parameters	T ₀	T ₁	T ₂	Probability
PCV (%)	21.00 ± 2.00	22.50 ± 6.50	27.50 ± 0.5	0.54 ^{NS}
Hb (g/dl)	3.07 ± 0.08	3.31 ± 0.16	3.63 ± 0.16	0.14 ^{NS}
RBC (10 ⁶ /μL)	4.49 ± 0.65	6.82 ± 3.11	5.445 ± 0.85	0.71 ^{NS}
WBC (10 ³ /μL)	5.18 ± 0.73	6.98 ± 0.03	6.73 ± 0.58	0.17 ^{NS}
MCV (FL)	55.90 ± 6.40	56.15 ± 6.95	51.90 ± 9.00	0.29 ^{NS}
MCH (pg)	6.96 ± 0.83	6.27 ± 3.09	6.78 ± 0.77	0.96 ^{NS}



MCHC (g/dl)	14.73 ± 1.02	16.28 ± 5.42	13.20±0.81	0.81 ^{NS}
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PCV (g/dl) = packed cell volume, Hb = Haemoglobin (g/dl), RBC = Red blood cell ($10^6/\mu\text{L}$), WBC ($10^3/\mu\text{L}$) = White blood cell, MCV (FL) = Mean corpuscular volume pg = pictogram, MCH (pg) = Mean corpuscular haemoglobin, MCHC (g/dl) = Mean corpuscular haemoglobin

Blood represent a means of assessing clinical and nutritional health of animals in feeding trials (Agbede and Aletor 2003). The result above shows there was no significant difference ($P>0.05$) between treatments in all parameters studied. This shows that ginseng inclusion had no negative effect on the animals. This result is similar to the results presented by Tolba, (2015).

CONCLUSION

The present study shows that the inclusion of Korean ginseng at 2g/kg diet improved reproductive performance without any negative effect on the animals.

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