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Effects of Varying Protein Levels on the Hematology and Serum Biochemical Components of Non Descript Rabbits

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ABSTRACT

An experiment was conducted at the Police Force Mounted Training Centre, Bukuru, Jos, Plateau State to evaluate the effects of varying protein levels on the haematology and serum biochemical components of farm cross rabbits in a twelve weeks feeding trial. Thirty weaner rabbits of farm cross origin weighing an average of 1000g were allotted to three dietary treatment groups of ten rabbits per treatment in a completely randomized design. Diets were formulated at 13%, 18% crude protein levels and the control (growers mash). Blood samples were collected forth nightly through the ear vein of the individual rabbits (2mls) for haematology and serum biochemical assays. The results from haematology shows that parameters measured (white blood cell, neutrophil, lymphocyte, monocyte, basophils, pack cell volume, haemoglobin, mean corpuscular volume, mean corpuscular haemoglobin concentration, mean corpuscular haemoglobin and platelets) did not differ significantly ($p>0.05$) between treatment groups of 13%cp, 18%cp and the control. The serum biochemical parameters measured in the study did not differ significantly ($p<0.05$) for rabbits fed 13% dietary protein except HDL and triglyceride demonstrated significant difference compared to the control. The results for both parameters measured (haematology and serum biochemistry) on rabbit groups fed 13%, 18% dietary protein and the control were within the normal physiological range for healthy rabbits, suggesting that dietary treatments used for the study were good for the feeding of rabbits.

Keywords: *Dietary proteins, Haematology, Serum profile, Non descript rabbit.*

INTRODUCTION

The quest for protein sufficiency is highly desirable due to increase in the world population and Nigeria in particular has aggravated the growing demand for animal protein. F.A.O (2006) recommended an average animal protein consumption of 35g/caput/day.

However, consumption rate for an average Nigerian adult was estimated at 7.4g/caput /day compared to 30g/caput /day of animal protein consumed in South Africa. According to F.A.O (2004), the average Nigerian consumption of animal protein has been estimated to be less than the recommended minimum for daily maintenance.

The average daily intake of one person in Nigerian is 34.6g of which only 10.6g (19.4%) is of animal origin while the other 24.0g (80.6%) is of plant origin. It is equally a well known fact that Nigeria has not been able to provide animal protein in sufficient quantity to meet the animal protein requirement of the populace (World Bank, 2007). An effective long term solution to this problem is one that will make Nigerians self-sufficient in meat production.

This will require embarking on accelerated livestock production using animal species with short generation interval, high fecundity rate, low cost of investment, small body size which makes it suitable for backyard rearing and easily consumable by a family (Abubakar et al., 2011; Aduku and Olukosi, 1990) to this end rabbits fit these descriptions. A hematology and serum biochemical assay of any giving animal determines the physiological disposition of the animals to their nutrition. According to Esonu et al., (2001), hematological constituents reflect the physiological responsiveness of the animals to their internal and external environment which includes feed and feeding hence the importance of this study. The study is therefore, designed to determine the effects of varying dietary protein levels on the hematology and serum biochemical components of non descript of rabbits. .

MATERIALS & METHODS

Experimental Site

The experiment which lasted for a period of 90 days was conducted at the Police Force Mounted Training Centre, Bukuru, Jos, and Plateau State. Bukuru is the headquarters of Jos south Local Government with coordinates of 090 481N 080 521E and an elevation of 1,230m (4,035ft) above sea level (Daniel, 2002).

The average annual rainfall ranges between 1250 and 1650mm.The raining season extends from April to October with peak rainfall in July-August. There is little or no rainfall in the dry season November-March. The mean air temperature ranges from 19^0c and 33^0c, compared with the surrounding low-land the climate has, described by Mbap and Ngere (1989) as being sub-tropical.

Source and Preparation of Experimental Material

The ingredients were sourced locally from the popular kugia, Bukuru market in Jos south Local Government of plateau state. The kulikuli was purchased whole, grinded and sundried to reduce the oily content and guide against rancidity in the feed.

Similarly, the brewers dried grain was collected from the local burukutu sellers and dried for days depending on weather condition per given time. The feed was compounded with other ingredients at protein percentages of 13, 18 and the control group respectively.

Experimental Animals and Management

A total of thirty (30) non descript rabbits of different genetic origin about 6-8 weeks old, used for this study were obtained from the Bukuru market and its environs. The rabbits were randomly allotted to three dietary treatments of ten rabbits each. Each treatment was replicated five times, with a male and female rabbit to make up a replicates in a completely randomized designed arrangement.

Upon randomization of individual rabbit to their hutches, they were deformed by treated with 2mls of ivomectin to guide against endo and ecto parasites. The rabbits were weighed initially to obtain an average weight of 1000g.

Rabbit were allowed to feed and clean drinking water provided ad-libitum. Routine mgt practices were strictly adhered/ observed. The study lasted for 90 days had an initial adjustment period for 14 days.

EXPERIMENTAL TREATMENT

Three diets were formulated at 13%, 18% crude protein and the control group. The rabbits were fed daily from the hours of 8.00 am – 8.45 am.

The quantity of feed served the rabbits weighed daily and left over collected weighed and subtracted the next morning to establish the animal's daily feed intake and other production parameters.

Table1. *Ingredient Composition of experimental Diets (%)*

Ingredient	13% cp	18% cp	Control diet
Maize	58.30	44.46	Crude protein-14%
Groundnut cake	12.45	26.29	Crude Fat-8.00%
Brewers dried grain	8.00	8.00	Crude Fibre-15.00%
Bone meal/ash	3.00	3.00	Calcium-1.00 phosphorus-0.35%
Wheat offal	17.00	17.00	Amino acid
Vitamin premix	0.25	0.25	Vitamin premix
Methionine	0.25	0.25	Salt
Lysine	0.25	0.25	Anti oxidant probiotics
Common salt	0.50	0.50	Enzymes
Total	100.00	100.00	M.E/Kcal 2600 Kcal/kg

Calculated Values

Crude protein	15.292	20.274
Crude fibre	5.023	5.175
Ether extract	6.619	7.339
Ash	3.527	4.108
Me/kcal	2,741.111	2,625.276

Analyzed Values

Dry matter	91.30	92.50	91.30
Crude protein	13.13	15.77	14.80

Crude fibre	10.95	6.70	9.30
Ether extract	7.25	15.05	8.35
Ash	6.55	6.15	8.50
NFE	62.22	56.33	50.35
ME/kcal	2600	2685	2500

NFE- Nitrogen Free Extract = 100 – (%Cp +% CF +%E.E + %ASH) E.E-Ether Extract, CP- Crude Protein, CF- Crude Fibre.

Blood Analysis

Blood samples (2mls) were collected from each rabbit's forth nightly into two separate containers for hematology and serum biochemical analysis. Blood samples containing anti-coagulant (EDTA) for hematological analysis of packed cell volume (PCV), red blood cell (RBC), hemoglobin (HB), total leukocyte and the differential leukocyte counts were determined as described by Ewuola and Egbunike, (2008).The blood corpuscular constants; mean corpuscular volume (MCV), mean corpuscular hemoglobin concentration (MCHC) ,mean corpuscular hemoglobin (MCH) and platelets (pl) were determined using appropriate formulae as described by Jain,(1986). All these parameters were automatically analyzed using BC 2800 hematology analyzer at the National Veterinary Research Institute (NVRI) Vom. Blood samples collected into test tubes without anti-coagulant, were centrifuged at 3000 rpm for 10 minutes. The serum was collected and kept for 20oc and later analyzed for serum biochemical parameters (Total protein, Albumin, Globulin, Total Cholesterol, Triglyceride, High Density Lipoprotein and Low Density Lipoprotein).The serum total protein was determined by the burette method (Reinhold, 1953) using a commercial kit (Randox Laboratories Limited, U.K.), while the albumin values were obtained by bromocresol green method (Doumas, Watson & Biggs 1971). The globulin and albumin-globulin ratio were determined according to the method of Coles (1986).

Data Analysis

Data collected were subjected to analysis of variance technique (ANOVA) as described by (Steel and Torrie, 2000). Means were separated using the least significant difference (LSD) at 5% level of Probability.

Results and Discussion

All the Haematological components WBC, Neutrophil, Lymphocyte, Monocyte, Basophil, PCV, RBC, HGB, MCV, MCH, MCHC and platelets did not differ ($p>0.05$) between treatment groups and their Control (Table 2). They were however, within the normal physiological range values of a healthy rabbit (Vrecko, Mekusch & Aloia, 1988: Jenkins, 1993; Hillyer, 1994; Medi, rabbits, 2007; Nuhu, 2010).The serum biochemical components shows that rabbits fed 13% dietary protein levels decreased significantly ($p>0.05$) in total Protein Compared to rabbit groups fed the control diet and 18% crude protein level (Table 3).

There was a significant difference ($p>0.05$) in HDL Value of rabbits fed diet containing 18% dietary protein compared to those fed 13% crude protein level and the control group. This is an indication that the diet had the component of HDL in proportionate quantity to eliminate harmful cholesterol from the body and prevent the onset of pathological process in blood vessels, particularly in the heart of the animal (Madubike & Ekenyem, 2006).

Results obtained from study for total protein (50-75g/l) albumin (25-40 g/l). globulin (25-40 g/l) Albumin/globulin ratio (0.7-1.89), total cholesterol (35-60 mg/dl) triglyceride (82.37-106.82 mg/dl) and HDL (62.1-74.65%) were within the normal physiological range from healthy rabbits as reported by Vrecko, Mlekusch & Aloia, 1988; Jenkins, 1993; Hilliyer, 1994; medi rabbits, 2007; Nuhu, 2010).

Table2. *Hematological Parameters of Non descript Rabbits*

Parameters	Control Diet	13% cp	18% cp
WBC/ x10 ^{9}/l	8.66 ± 0.45	8.57 ± 0.60	8.35 ± 0.66
Neutrophil (%)	41.32 ± 1.26	44. 00 ± 1.79	42.14 ± 1.20
Lymphocyte (%)	48.27 ± 1.22	44.82 ± 1.59	45.77 ± 1.41
Monocyte (%)	9.95 ± 0.79^{b}	12.86 ± 1.25^{a}	12.18 ± 0.53^{a}
Basophil (%)	0.00	0.00	0.00
PCV (%)	30.54 ± 0.85	31.00 ± 0.78	33.22 ± 0.90
RBC (x10 ^{12}/l)	5.86 ± 0.11	5.47 ± 0.08	5.45 ± 0.28
HGB (g/dl)	63.35 ± 7.43 ^{a}	54.15 ± 6.42^{a}	31.54 ± 3.51^{b}

MCV (fl)	53.64 ± 0.59 [a]	51.55 ± 0.82 [b]	52.77 ± 0.58 [ab]
MCH (pg)	17.62 ± 0.19[a]	16.65 ± 0.30[b]	16.96 ± 0.39[ab]
MCHC (g/dl)	33.95 ± 1.86	32 .77 ± 1.18	32.48 ± 1.32
Platelets	266.36 ± 21.92	306.18 ± 26.40	322.23 ± 31.27

[ab] *Mean difference is significant at (0.05) level. Means in a row with common letter(s) superscript do not differ (p>0.05).cp-crude protein*

Table3. *Serum Biochemical Parameters of Non descript Rabbits*

Parameters	Control Diet	13% cp	18% cp
Total Protein (g/l)	69.16 ±1.16[a]	65.70 ±1.32[b]	71.43 ±1.17[a]
Albumin (g/l)	27.39±0.40[a]	26.29±0.39[b]	26.57 ± 0.29[ab]
Globulin (g/l)	41.79±1.48[ab]	39.51±1.54[b]	44.73 ±1.32[a]
Total cholesterol (mg/dl)	43.32±2.24[ab]	38.19 ± 2.70[b]	47.61 ±2.40[a]
Triglyceride (mg/dl)	62.02±3.07[a]	36.21 ± 2.52[b]	43.03±2.39[b]
HDL (mg/dl)	53.38±2.41[b]	51.99 ± 2.15[b]	71.14±3.38[a]
LDL (mg/dl)	39.37±2.14[ab]	34.01±2.72[b]	43.03±2.39[a]

[ab] *Mean difference is significant at (0.05) level. Means in a row with common letter(s) superscript do not differ (p>0.05). Cp- crude protein*

CONCLUSION

From the merits of this study, diets formulated at 13%, 18% and the control group used in the study indicates that the diets were balanced and supported the animal's performance to maintain a normal hematological and serum biochemical profile that explains the physiological status of the animal.

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