

Varying Dietary Protein Levels and Its Effect on Haematology and Serum Biochemical Components of Crossbred Rabbits

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Abstract: - An experiment was conducted at the Police Force Mounted Training Centre, Bukuru, Jos South Local Government Area of Plateau State to evaluate the effects of varying dietary protein levels on haematology and serum biochemical indices of crossbred rabbits in a twelve-week feeding trial. Thirty crossbred, weaned rabbits with an average weight of 1.0kg were allotted to three dietary treatment groups of ten rabbits per group, in a completely randomized design. Diets were formulated to contain 13 and 18% crude protein levels and a control (growers mash 14%) diet. Blood samples were collected forth nightly through the ear vein of individual rabbit for haematology and serum biochemical assays. Data were analysed using ANOVA at $\alpha 0.05$.

The results from haematology shows that the parameters assessed (WBC, Neutrophil, Lymphocyte, Monocyte, Basophil, PVC, RBC, HGB, MCV, MCH, MCHC and platelets) did not differ significantly ($P > 0.05$) regardless of the dietary protein level. The serum biochemical values of rabbits fed 13 % dietary protein were significantly lower ($p < 0.05$) compared to values obtained for other treatments groups. Also, Total cholesterol, HDL and triglyceride differed significantly ($p < 0.05$). Values obtained for haematology and serum biochemical indices were within normal physiological ranges documented for healthy rabbits. Feeding, dietary protein level as low as 13% had no effect on haematology and serum biochemical indices of weaned rabbits

Keywords: Dietary proteins, Haematology, Serum profile, Farm cross

I. INTRODUCTION

Nigeria and many other developing countries in the world are currently facing problems of inadequate animal protein supply (Fasanya and Ijaiya 2002). 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 Nigeria 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 to explore viable alternatives geared towards self-sufficiency 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 and small body size suitable for backyard rearing and can easily consumed by a family (Aduku and Olukosi, 1990; Abubakar et al., 2011). To this end rabbits fit these descriptions. The haematology and serum biochemical assay of any given animal determines the physiological disposition of the animals to their nutrition. According to Esonu et al., (2001), haematological 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 haematology and serum biochemical components of farm cross of rabbits.

II. MATERIALS AND 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 (please is the highlighted section relevant to the research)

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 oil content to prevent rancidity of feed. Similarly, the brewers dried grain was collected from the local burukutu sellers and dried.. 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) farms cross weaner rabbits of different genetic origin about 6-8 weeks old, used for this study were obtained from a reputable dealer. 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 replicate in a completely randomised designed arrangement. Upon randomization of rabbits to their hutches rabbits were given the necessary veterinary management. The rabbits were weighed initially to obtain an average weight of 1kg. Rabbits were offered weighed amounts of feed daily and drinking water provided ad-libitum. Routine management practices were strictly observed. The study lasted for 90 days with an acclimatization period of 14 days.

Experimental diets

Three diets containing 13, 18% crude protein and 14% (growers mash), grower mash served as control diet. .. Feed intake was calculated as the difference in amount of feed offered and feed refused.

Blood Analysis

Blood samples were collected from each rabbit's forth nightly into two separate containers for haematology and serum biochemical analyses. Blood samples containing anti-coagulant (EDTA) for haematological analysis of packed cell volume (PCV), red blood cell (RBC), haemoglobin (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 haemoglobin concentration (MCHC), mean corpuscular haemoglobin (MCH) and platelets were determined using appropriate formulae as described by Jain,(1986). All parameters were automatically analysed using BC 2800 haematology analyser at the National Veterinary Research Institute (NVRI) Vom.

Table 1 Composition of experimental Diets (%)

Ingredient	Levels of dietary protein (%)		Control diet
	13	18	
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/kg	2,741.111	2,625.276	
Analysed values			
Dry matter	91.30	92.50	91.30
Crude protein	13.13	17.77	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 samples collected into test tubes without anti-coagulant, were centrifuged at 3000 rpm for 10 minutes. The serum was collected and kept for 20°C and later analysed for serum biochemical parameters (Total protein, Albumin, Globulin, Albumin/Globulin ratio, Total Cholesterol, Triglyceride, High Density Lipoprotein (HDL) and Low Density Lipoprotein (LDL)). 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 *et al.*, 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 significance difference (LSD) at 5% level of Probability.

III. RESULTS AND DISCUSSION

All haematological components WBC, Neutrophil, Lymphocyte, Monocyte, Basophil, PVC, RBC, HGB, MCV, MCH, MCHC and platelets were not affected ($p > 0.05$) by the protein levels

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 control group. This result shows 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 Kotatnur, Kummerow and Scott (1958)

Table 2. Haematological parameters of rabbits fed different levels of dietary protein

Parameters	13% Dietary protein	18% Dietary protein	Control Diet (14%)% Dietary protein
WBC/ $\times 10^9/l$	8.57 \pm 0.60	8.35 \pm 0.66	8.66 \pm 0.45
Neutrophil (%)	44.00 \pm 1.79	42.14 \pm 1.20	41.32 \pm 1.26
Lymphocyte (%)	44.82 \pm 1.59	45.77 \pm 1.41	48.27 \pm 1.22
Monocyte (%)	12.86 \pm 1.25 ^a	12.18 \pm 0.53 ^a	9.95 \pm 0.79 ^b
Basophil (%)	0	0	0
PCV (%)	31.00 \pm 0.78	33.22 \pm 0.90	30.54 \pm 0.85
RBC ($\times 10^{12}/l$)	5.47 \pm 0.08	5.45 \pm 0.28	5.86 \pm 0.11
HGB (g/dl)	54.15 \pm 6.42 ^a	31.54 \pm 3.51 ^b	63.35 \pm 7.43 ^a
MCV (fl)	51.55 \pm 0.82 ^b	52.77 \pm 0.58 ^{ab}	53.64 \pm 0.59 ^a
MCH (pg)	16.65 \pm 0.30 ^b	16.96 \pm 0.39 ^{ab}	17.62 \pm 0.19 ^a
MCHC (g/dl)	32.77 \pm 1.18	32.48 \pm 1.32	33.95 \pm 1.86
Platelets	306.18 \pm 26.40	322.23 \pm 31.27	266.36 \pm 21.92

abc....Means in a row with common letter(s) superscript do not differ ($p > 0.05$).

Table 3. Serum biochemical indices of crossbred rabbits fed different dietary protein levels

Parameters	13% Dietary protein	18% Dietary protein	Control Diet (14%)% Dietary protein
Total Protein (g/l)	65.70 \pm 1.32 ^b	71.43 \pm 1.17 ^a	69.16 \pm 1.16 ^a
Albumin (g/l)	26.29 \pm 0.39 ^b	26.57 \pm 0.29 ^{ab}	27.39 \pm 0.40 ^a
Globulin (g/l)	39.51 \pm 1.54 ^b	44.73 \pm 1.32 ^a	41.79 \pm 1.48 ^{ab}
Total cholesterol	47.61 \pm 2.40 ^a	43.32 \pm 2.24 ^{ab}	38.19 \pm 2.70 ^b
Triglyceride (mg/dl)	36.21 \pm 2.52 ^b	43.03 \pm 2.39 ^b	62.02 \pm 3.07 ^a
HDL (mg/dl)	51.99 \pm 2.15 ^b	71.14 \pm 3.38 ^a	53.38 \pm 2.41 ^b
LDL (mg/dl)	34.01 \pm 2.72 ^b	43.03 \pm 2.39 ^a	39.37 \pm 2.14 ^{ab}

abc....Means in a row with common letter(s) superscript do not differ ($p > 0.05$).

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 and Aloia, 1988; Jenkins, 1993; Hilliyer, 1994; Medi rabbits, 2007; Nuhu, 2010).

IV. CONCLUSION

Values obtained for haematology and serum biochemical indices were within normal physiological ranges documented for healthy rabbits. Feeding, dietary protein level as low as 13% had no effect on haematology and serum biochemical indices of weaned rabbits

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