HAEMATOLOGICAL RESPONSE OF RABBIT BUCKS TO QUANTITATIVE FEED RESTRICTION AND FEEDING TIME

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ABSTRACT

The experiment was carried out to evaluate the effects of feed restriction, feeding time and their interaction on haematological profile in rabbit bucks. Thirty six (36) rabbit bucks were used for the study. The rabbit bucks were fed 75.00, 67.50 and 60.00g commercial growers' pellets to represent 100, 90 and 80% daily ration respectively. The bucks were divided into two groups of eighteen (18) bucks each. The first group was fed in the morning while the second group was fed their daily ration in the evening. The bucks were randomly assigned to the three (3) different levels of feed restriction, and replicated three (3) times in both morning and evening group respectively. Bucks fed 100% daily ration served as control. The study adopted a 2 x 3 factorial arrangement in completely randomized design (CRD). At the end of the 4th week of the experiment, blood samples were collected from each replicate for determination of hematological indices. Data obtained were subjected to General linear model (GLM) procedure in a completely randomized design, using IBM Statistical Package for Social Science (SPSS) version 21. The result showed that feed restriction affected ($p<0.05$) PCV, WBC, neutrophils and lymphocytes of rabbit bucks in the study. Feeding time significantly influenced ($p<0.05$) PCV, MCV, neutrophils, lymphocytes and platelets. There was interaction between feed restriction and time of feeding on MCV, neutrophils, and lymphocytes and platelets. In conclusion, Feeding rabbit bucks 90% of their daily ration in the evening improves most haematological parameters without compromising the health of the animals.

Keywords: Feed restriction, feeding time, serum biochemistry, haematol

INTRODUCTION

Rabbits are small animals that can be produced optimally by using mixture of forage and formulated feeds, and according to Adewole *et al.* (2018), can survive on all forage diet. Emprical study by Chodova *et al.* (2016), has shown that feed restriction in growing rabbits influences the growth of rabbits by enhancing feed efficiency and reducing carcass fat (Adewole *et al.,* 2018). Chodova *et al.* (2016) in their study also noted that the effect of feed restriction explicitly hinge on timing of its beginning, its duration and its intensity. Chodova *et al*. (2016), stated that feeding regime is one of the major factors that influence meat quality of farm animals. An evaluations of the haematological profile according to Ihedioha *et al.* (2004), furnishes vital information on the nutrients contained in the diets fed to animals. As stated by Onwujiariri (2020), the liver biochemical parameters of a species serves as a marker in monitoring health status of the animal. This was therefore designed to evaluate the effect of quantitative feed restriction and feeding time on haematological and serum biochemical indices in rabbit bucks.

MATERIALS AND METHODS

Experimental Site

The study was carried out at the Rabbitry unit of Teaching and Research Farm of the Department of Animal Science, University of Uyo, Uyo, Akwa-Ibom State.

Experimental animals and management

Thirty six (36) clinically sound mongrel rabbit bucks were purchased and used for this study. The rabbit bucks were allowed for two weeks of acclimatization period during which they were fed with commercial growers' pellets and forages (Calopogonium) ad-libitum. Before the commencement of the experiment, the rabbits were treated against internal and external parasites.

Experimental Diets

The rabbit bucks were fed 75.00, 67.50 and 60.00g commercial growers' pellets to represent 100, 90 and 80% daily ration respectively. *Calopogonium mucunoides* was given to the bucks ad-libitum after wilting for 24 hours, since rabbits are basically foragers.

Table 1: Nutrient Composition of the Commercial Growers pellet fed to the bucks

Ingredients	Composition
Crude protein (%)	15.00
Carbohydrates	5.00
Crude fibre (%)	8.00
Calcium (%)	1.00
Available phosphorus (%)	0.35
Lysine (%)	0.60
Methionine (%)	0.35
Metabolizable Energy (Kcal/Kg)	2600

Experimental Design

The thirty six (36) rabbit bucks were divided into two groups of eighteen (18) bucks each. The first group were fed in the morning while the second group were fed their daily ration in the evening. The bucks were randomly assigned to the three (3) different levels of feed restriction, and replicated three (3) times in both morning and evening group respectively. Bucks fed 100% daily ration served as control in this study. The study adopted a 2 x 3 factorial arrangement in completely randomized design (CRD). The experimental period was 28 days (4 weeks).

Blood collection and Analysis

Haematological Profile

At the end of the 4th week of the experiment, blood samples were collected from each replicate for determination of hematological profile. A total of 2.0ml of blood was collected through the external ear veins of the bucks into labeled sterile universal bottle containing 1.0mg/ml ethyl diamine tetracetic acid (EDTA) as anticoagulant to determine the haematological component in the blood. Haematological parameters analyzed were packed cell volume (PCV), haemoglobin concentration (Hb), white blood cell counts (WBC), red blood cell counts (RBC), neutrophil, lymphocytes, mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC).

Statistical Analysis

The experimental data were subjected to General linear model (GLM) procedure in a completely randomized design, using IBM Statistical Package for Social Science (SPSS) version 21. Differences between treatment means were separated using Duncan multiple Range Test (Duncan

RESULTS AND DISCUSSION

The effect of restricted feeding on haematological profile of male rabbits is presented on Table 2. The result showed that feed restriction affected ($p<0.05$) PCV, WBC, neutrophils, lymphocytes and platelets of rabbit bucks in the study while other parameters such as RBC, haemoglobin (HB), MCV, MCH and MCHC were not significantly affected ($p>0.05$) by feed restriction. Etim *et al.* (2014), assessed the effects of nutrition on haematology of rabbits and stated that the physiology of farm animals is influenced by several factors, one of which is nutrition. Packed cell volume (PCV), was significantly higher in bucks fed 90% of their daily ration when compared with bucks fed 100 and 80% of their daily ration. According to Adeyemi (2014), PCV is the ratio of red blood cells to the whole blood volume expressed as a percentage. PCV values observed in this study were 35.30, 36.00 and 33.00% for bucks fed 100, 90 and 80% of their respective daily ration. These values are within the range of 30.00 – 50.00 g/dl recommended by Mitruka and Rawnsley (1977) and 9-19.4(g/dl) by Burke (1994). This result hence, imply that the bucks did not suffer from anaemia, dehydration nor polycythemia in the course of the study. Reduction in the haemoglobin may be accompanied by a fall in the RBC as stated by Akinmutimi *et al.* (2004). As reported by Adejumo (2004), haematological traits, especially, PCV and Hb were correlated with the nutritional status of the animal. Animals with low WBC are exposed to high risk of infection while those with high counts are capable of generating antibodies in the process of phagocytosis and have high degree of resistance to diseases (Soetan *et al.*, 2013).

Table 2: Effect of feed restriction and feeding time on haematological profile in rabbit bucks.

Factors	PCV (%)	RBC (10^{12}/L)	WBC (10^9/L)	HB (g/dl)	MCV (fl)	MCH (pg)	MCHC (g/dl)	NEUT (%)	LYM (%)	PLATELETS (10^9/L)
Feed Restriction										
100.00%	35.50^{ab}	5.30	7.00^{ab}	12.2	67.00	23.00	34.50	35.50^{b}	60.50^{a}	149.50^{c}
90.00%	36.50^{a}	5.45	8.60^{a}	12.45	67.50	23.00	34.50	38.00^{ab}	58.50^{ab}	188.50^{b}
80.00%	33.00^{b}	4.75	5.35^{b}	11.35	69.50	23.50	34.50	39.00^{a}	57.00^{b}	212.50^{a}
SEM	2.79	0.79	0.26	1.82	2.43	1.82	1.76	3.92	3.69	44.51
P-Value	0.028	0.818	0.048	0.619	0.113	0.884	1.000	0.028	0.032	0.000
Feeding Time										
Morning	33.67^{b}	4.83	7.53	11.60	69.67^{a}	23.67	34.67	35.33^{b}	60.33^{a}	192.33^{a}
Evening	36.33^{a}	5.50	6.43	12.40	66.33^{b}	22.67	34.33	39.67^{a}	57.00^{b}	174.67^{b}
SEM	0.67	0.33	0.21	0.94	0.67	2.21	0.34	4.34	0.54	5.88
P-Value	0.015	0.493	0.266	0.413	0.004	0.310	0.730	0.001	0.004	0.000
Interaction										
Feed Restriction X Feeding time	0.237	0.887	0.811	0.853	0.032*	0.695	0.619	0.002*	0.001*	0.000*

[a,b,c] Mean in the same column with different subscripts are statisticall significant ($p<0.05$); SEM – Standard error of mean; PCV – packed cell volume, RBC – red blood cells, WBC – White blood cells, HB – haemoglobin, MCV – Mean cell volume, MCH – Mean cell haemoglobin, MCHC – Mean cell haemoglobin concentration, NEUT –neutrophils, LYM – lymphocytes

Feeding time significantly influenced ($p<0.05$) PCV, MCV, neutrophils, lymphocytes and platelets while, RBC, WBC, HB, MCV, MCH, and MCHC were not affected. Rabbit bucks fed in the morning (33.67%) had lower PCV than those fed in the evening (36.67%). These values are however, within the normal range suggested by Mitruka and Rawnsley (1977), and showed that the bucks were not anaemic nor suffered polycythemia in the course of the study. The increase in PCV in bucks fed in the evening suggests improved protein intake and tissue synthesis because a decline in PCV has been associated with protein synthesis inhibition and suppressed immune system (Ebegbulem, 2018). The RBC, WBC and HB of bucks fed in the study were 4.83 and 5.50 x 10^{12}/L; 7.53 and 6.43 x 10^9/L; and 11.60 and 12.40g/dl respectively for bucks fed in the morning and evening respectively. According to Isaac *et al*. (2013), RBC is involved in the transport of oxygen and carbon dioxide in the body, implying that, a reduced red blood cell count implies a reduction in the level of oxygen that would be carried to the tissues as well as the level of carbon dioxide returned to the lungs and vice versa when RBC count increases. Neutrophils was lower in bucks fed in the morning while lymphocytes and platelet on the order hand, were higher in bucks fed in the morning. Adeyemi (2014), reported that increased numbers of lymphocytes are seen in most viral infections, some bacterial infections, and some cancers while decreased numbers of lymphocytes are seen in steroid exposure, some cancers, immunodeficiency and renal failure. Despite these variations, all values were within normal ranges recommended by Burke (1994) and Mitruka and Rawnsley (1977). An increase in WBC count and differentials suggest anaemia, infection and leukemia (Holland, 2013).

There was interaction between feed restriction and time of feeding on MCV, neutrophils, lymphocytes and platelets in the study. Bucks fed 80% of their daily ration showed higher MCV than those fed other levels of restriction and time. Neutrophils was increased significantly in bucks fed 80% daily ration in the evening. The values in this study were 39.00 and 39.67 for 80% restriction and feeding in the evening. Lymphocytes were 60.33 and 60.50% for bucks fed 100% ration in the morning. Blood platelet were significantly higher ($p<0.05$) in bucks fed 80% (212.50) daily ration in the morning (192.33).

CONCLUSION

Feeding rabbit bucks 90% (67.50g) of their daily ration in the evening improves most haematological and serum biochemical parameters without compromising the health of the animals.

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