Ghana Journal of Science, Technology and Development
Volume 2, No. 1. April 2015
Journal homepage: http://gjstd.org/index.php/GJSTD
ISSN: 2343-6727

HAEMATOLOGICAL CHARACTERISTICS OF LOCAL RABBITS FED *SIDA ACUTA* AND *SYNEDRELLA NODIFLORA*

Jerebi, D. A. and Naandam, J.
Department of Animal Science, Faculty of Agriculture, University for Development Studies,
P. O. Box TL 1882, Tamale, Ghana. Corresponding email: jaknaan@yahoo.com

Abstract

A 49-day feeding trial was conducted to investigate the effect of feeding Synedrella nodiflora and Sidaacuta on the haematological parameters of rabbits. A total of nine rabbits were assigned to three experimental diets in a completely randomised design. The experimental diets were Trt1 (100% Synedrella nodiflora), Trt2 (100% Sidaacuta) and Trt3 (50% Synedrella nodiflora and 50% Sidaacuta). Blood samples were taken before the start and after the finish of the feeding trial. Blood parameters considered included haemoglobin (Hb), packed cell volume (PCV), red blood cells (RBC), white blood cells (WBC), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), mean corpuscular haemoglobin concentration (MCHC) and white blood cell differential counts (neutrophils, lymphocytes, eosinophils, monocytes and basophiles). Whereas there were significant differences (P<0.05) between treatments for PCV, Hb, RBC, WBC, and WBC differential counts like neutrophils, lymphocytes and monocytes, no significant differences (P>0.05) were observed between treatments for MCV, MCH, MCHC, eosinophils and basophiles. Feeding Synedrella nodiflora and Sidaacuta did not produce any noticeable negative effect on the haematological parameters of rabbits since these observations all fell within the normal range reported for rabbits.

Keywords: *Blood indicators, feeding, rabbits, Sidaspp., Synedrella spp*

.

INTRODUCTION

The rabbit has immense potentials and good attributes which include high growth rate, high efficiency in converting forage to meat, short gestation period, and high prolificacy, relatively low cost of production, high nutritional quality of rabbit meat which includes low fat, sodium, and cholesterol levels. It also has a high protein level of about 20.8% and its consumption is bereft of cultural and religious biases (Biobaku and Oguntona, 1997). Animal Genetic Resources (AnGR) are of great importance to every nation since they serve as an important source of income, employment and food (Joshua, 2009). The prolific nature of rabbits coupled with its short gestation period and generation interval, makes it the choice of animal for multiplication and a short way of increasing an animal protein intake (Akinmutimi *et al*., 2006). Rabbits can be raised for their skin (pelts) which is used for the manufacture of handbags, jackets and handicrafts (Kwarteng and Towler, 1994). In addition they are easy to rear since they can be fed left over from the kitchen and some common forages around.

Haematological components of blood are valuable in monitoring feed toxicity especially with feed constituents that affect the formation of blood (Oyawoye and Ogunkunle, 1998).Haematological values are widely used to determine systematic relationship and physiological or pathological adaptations including the evaluation of general health

condition and diagnosis and prognosis of various types of animal diseases (Shah *et al*., 2007). The knowledge of the haematological reference values in the rabbits, like many other livestock, cannot be overemphasized since the value could help in associating certain inherent resistant to infection (Svoboda *et al*., 2005).

Given the fact that some common forages around that can be used to feed rabbits may contain anti-nutritional factors which could adversely affect blood parameters, it was necessary to investigate whether *Sida acuta* and *Synedrella nodiflora* could be useful as forage for feeding rabbits since they are abundant in many part of northern Ghana.

MATERIALS AND METHODS

Study Area

The study was carried out at the Nyankpala Campus of the University for Development Studies Clinic, Tamale, Ghana. Nyankpala is about 18 km west of Tamale in the Tolon District in the Northern region of Ghana. It is located on latitude 9° 25′ 41″ N and longitude 0° 58′ 42″ W at an altitude of 183 m above sea level (SARI, 2007). The area is in the Guinea Savannah Zone characterized by a unimodal rainfall pattern. Rains begin in April, rising to a peak in August -September and ending in October or November. Rainfall averages 1060 mm per annum (NAES, 1994). Temperatures range from as low as 15˚C in January when the weather is under the influence of the North Easterly (Harmattan) winds and as high as 42˚C around the end of the dry season in March (SARI, 2007).

Procurement of Rabbits

Nine local rabbits of about twelve weeks old were used in the study. The mean weights of the animals were 933g, 933g, and 933g for T_1, T_2 and T_3, respectively. These were indigenous rabbits and were obtained from Nyankpala town.

Experimental Procedure

Samples of blood were collected from each rabbit using the ear-vein procedure (Radostits *et al*., 1994). Each blood sample was put into test tubes containing ethylene diaminetetraacetic acid (EDTA).Parameters measured/calculated by standard haematological procedures were Haemoglobin (Hb), Packed cell Volume (PCV), Red Blood Cell (RBC), Mean Corpuscular Volume (MCV), Mean Corpuscular Haemoglobin (MCH), Mean Corpuscular Heamoglobin Concentration (MCHC), White Blood Cells (WBC) total counts and differential count (Basophils, Neutrophils, Lymphocytes and Monocytes).The following indices: mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration(MCHC) and mean corpuscular volume (MCV) were calculated according to Seiverd (1964).

Experimental Design

Completely randomized Design (CRD) was used in this experiment. The experiment consisted of nine (9) experimental units (rabbits), three (3) treatments consisting of 100% *Sida acuta*, 100% *Synedrella nodiflora* and 50% each of both plants, and with each treatment having three replications. The average weight of the animals on each treatment was similar at the start of the experiment as shown earlier under procurement of experimental animals. Animals were fed twice daily at 6:00 am and 4:00 pm. Water was offered *ad libitum* throughout the experimental period. The animals were housed singly on a wired floor wooden cage with each cage measuring 640 cm×640 cm×640 cm.

Data Analysis

All data were analyzed using One-way Analysis of variance in Completely Randomized Design using Genstat Discovery Edition 4. Means were separated at 5% using LSD.

RESULTS AND DISCUSSION

Packed Cell Volume (PCV), Haemoglobin (Hb), Red Blood Cells (Rbc) and White Blood Cells (WBC)

From Table 1, PCV Hb, and RBC were significantly different ($P<0.001$) between treatments. A similar trend was observed for WBC ($P<0.01$). Values for MCV, MCH and MCHC were however not significantly different ($P>0.05$), implying that the quality of the forages could be counted on not to cause anaemia because, abnormal morphology of these

particular parameters suggests some anaemic condition (Campbell, 1988).

Table 1: Haematological parameters of rabbits fed treatment diets.

Parameters	Trt1	Trt2	Trt3	S.e.d	P. value
PCV %	31.30[a]	30.30[a]	28.0[b]	3.58	<0.001
Hb g/dl	10.45[a]	10.10[a]	9.33[b]	1.206	<0.001
RBC 10^6/µl	4.08[a]	3.93[b]	3.63[b]	0.461	<0.001
WBC 10^9/l	6.03[a]	6.78[a]	5.90[b]	0.735	<0.003
MCV fl	76.63	77.08	77.07	0.556	0.369
MCH Pg	25.53	25.63	25.66	0.227	0.260
MCHC %	33.30	33.25	33.31	0.088	0.215

S.e.d-standard errors of difference, P-probability, Means with different superscripts in the same row are significantly different (P<0.001 and P<0.01)

For treatments 1 and 2 which were sole feeds of *Synedrella Nodiflora* and *Sida acuta* respectively, similar responses were obtained for all blood parameters considered except for RBCs where those of T1 were significantly different (P<0.001) from that of T2 suggesting that *Synedrella nodiflora* probably has a greater capacity to improve RBC status in rabbits as a sole feed compared to *Sida acuta*. Blood parameters for treatment 3 on the one hand were lower and differed significantly from those of T1 and T2 on the other hand for PCV, Hb and WBC ($P \leq 0.01$). This was not the case for RBC {(i.e. T3 did not differ from T2 (P>0.05)}. The interaction between the two forages may be implicated in the lowered blood indices, however the decline in values though significant, were not abnormalsince all observed values for all parameters including WBC differentials (Table 2) fell within standard haematology values for rabbits reported by a number of researchers (MediRabbit.com, 2014; University of Minnesota, 2014).

WBC Total Count and Differential Counts

The significant difference (P<0.01) observed in the WBC between T3 on the one side and T2 and T3 on the other side translated into significant differences of P<0.001, P<0.01 and P<0.05 in some WBC differentials namely, neutrophils, lymphocytes and monocytes respectively but not eosinophils and basophils (Table 2). No pattern was observed in these differences.

Table 2: WBC total counts and differential counts of rabbits fed treatments diets.

Parameter (WBC %)	Trt1	Trt2	Trt3	S.e.d	P. value
Neutrophils	29.50[a]	29.7[a]	32.0[b]	4.63	<0.001
Lymphocytes	67.70[a]	68.0[b]	66.30[c]	4.79	<0.005
Eosinophils	2.00	1.33	1.00	1.29	0.059
Monocytes	0.50[a]	0.83[b]	0.67[c]	0.66	<0.05
Basophils	0.33	0.16	0.00	0.27	0.490

S.e.d-standard errors of difference, P-probability, Means with different superscripts in the same row are significantly different (P<0.001 and P<0.01)

In spite of the good quality of the experimental diets alluded to above, this assertion needs to be made with caution since it was noted that there could be a negative interactive effect of the two forages, as observed from the lowered significant difference ($p<0.001$) in hb.

The lowered hb levels in t3 suggested that anaemic conditions though not reached, were probably looming. Low hb may be caused by vitamin deficiency or loss of blood from the gastrointestinal tract as a result of ulcers or colon cancer (davis, 2014). Disorders in the body trigger off different wbc differential counts which could be a plausible explanation for the differences observed in the wbc differential counts in this study.it may be that a much longer feeding regime than the 49 days in this study can trigger off the anaemic condition suspected and thus requires further investigation with dietary treatment 3 which was 50% *synedrella nodiflora*and 50% *sida acuta.*

CONCLUSION

Feeding *Synedrella nodiflora* and *Sida acuta* as sole feeds and also as mixed feed did not affect the haematological parameters of rabbits for the given period of the study. *Synedrella nodiflora*as a sole feed has the capacity to improve the Hb and RBC status of rabbits compared to *Sida acuta.*

RECOMMENDATION

Further research should be conducted with treatment 3 for a much longer period than was the case in this study.

ACKNOWLEDGEMENTS

The authors are most grateful to Mr Addy of the laboratory section of the University Clinic who conducted the blood indices counts. Our gratitude also goes out to the support staff of the Ruminant Unit who assisted in the feeding and data collection.

REFERENCES

Akinmutimi, A.H., Odoemelam, U.V., and Obasiekong, S.F. 2006. Effect of replacing maize with ripe plantain and yam peels in the diet of weaner rabbits .*Journal Animal Veterinary. Advances*. 5:737-740.

Biobaku, W.O. and Oguntona, E.B. 1997**.** The effects of feeding multi nutrient mini blocks and pelleted diet on the growth of rabbits. Nig. J. Anim. Prod., 24(2): 147-149.Campbell, T.W. 1988. Avian hematology and cytology. Iowa State Univ. Press, Ames, Iowa 50-90.

Davis C. P. 2014. What does low haemoglobin mean? In: M. C. Stoppler (eds), emedicinehealth experts for everyday emergencies p 4. Accessed on 1st July, 2014.Available at www.emedicinehealth.com/hemoglobin_levels/page4_em.htm

Joshua, W. S. M. 2009. Phenotypic and Morphological Characterization of the Indigenous Guinea Fowl Resources of Northern Ghana. A Thesis Submitted to the University of Ghana, Legon in partial fulfilment of the requirement for the award of the degree Master of Philosophy in Animal Science.

Kwarteng, J. A. and Towler, M. J. 1994. *West African Agriculture.* A Textbook for Schools and Colleges Published by Macmillan Press Ltd. 245 pp.

MediRabbit.com. 2014. Complete blood count and biochemistry references values in rabbits.http://www.medirabbit.com/EN/Hematology/blood_chemistry.htm(retrieved 1st July, 2014)

NAES, (1994).Annual report.*Nyankpala Agricultural Extension Service.* CSIR, Nyankpala.

Oyawoye, E. O and Ogunkunle, M. 1998. Physiology and biochemical effects of raw Jackbeans on broilers.*Proc. Silvery auvery WASAP.Innauguralconference*., 27:21-26.

Radostits, O. M., Blood, D. C and Gay, C. C. 1994. Veterinary medicine. *A textbook of the diseases of cattle, sheep, pigs, goats and horses,* 8th edition. Baillere Tindall, London, pp 66.

SARI. 2007. *Savannah Agriculture Research Institute*, Agro-Metrological Station, Nyankpala Station, Tamale, Ghana.

Shah, M. K., Khan, A., Rizvi, F., Saddique, M and Sadeeq ur Rehman, 2007. Effect of Cypermethrin on Clinico-haematological parameters in rabbits. *Pakistan Veterinary Journal, 27:171-175.*

Svoboda, M. k., Eichlerova, V. Horak and Hradecky, 2005. *Development of haematological indices in Melanoma-bearing Libechovminipigs.*Acta Vet Borno, 74:603-611.

Seiverd, C.E., 1964. Haematology for Medical Technologists. Lea andFebiger, Philadelphia, p. 946.

University of Minnesota. 2014. Reference Values for Laboratory Animals: Normal Hematology Values. Research Animal Resources, University of Minnesota. Available at http://www.ahc.umn.edu/rar/index.html (retrieved 1st July, 2014)