IJOEAR

International Journal of Environmental & Agriculture Research

www.ijoear.com

ISSN
2454-1850

Volume-9, Issue-11, November 2023

Preface

We would like to present, with great pleasure, the inaugural volume-9, Issue-11, November 2023, of a scholarly journal, *International Journal of Environmental & Agriculture Research*. This journal is part of the AD Publications series *in the field of Environmental & Agriculture Research Development*, and is devoted to the gamut of Environmental & Agriculture issues, from theoretical aspects to application-dependent studies and the validation of emerging technologies.

This journal was envisioned and founded to represent the growing needs of Environmental & Agriculture as an emerging and increasingly vital field, now widely recognized as an integral part of scientific and technical investigations. Its mission is to become a voice of the Environmental & Agriculture community, addressing researchers and practitioners in below areas.

Environmental Research:

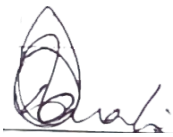
Environmental science and regulation, Ecotoxicology, Environmental health issues, Atmosphere and climate, Terrestric ecosystems, Aquatic ecosystems, Energy and environment, Marine research, Biodiversity, Pharmaceuticals in the environment, Genetically modified organisms, Biotechnology, Risk assessment, Environment society, Agricultural engineering, Animal science, Agronomy, including plant science, theoretical production ecology, horticulture, plant, breeding, plant fertilization, soil science and all field related to Environmental Research.

Agriculture Research:

Agriculture, Biological engineering, including genetic engineering, microbiology, Environmental impacts of agriculture, forestry, Food science, Husbandry, Irrigation and water management, Land use, Waste management and all fields related to Agriculture.

Each article in this issue provides an example of a concrete industrial application or a case study of the presented methodology to amplify the impact of the contribution. We are very thankful to everybody within that community who supported the idea of creating a new Research with *IJOEAR*. We are certain that this issue will be followed by many others, reporting new developments in the Environment and Agriculture Research Science field. This issue would not have been possible without the great support of the Reviewer, Editorial Board members and also with our Advisory Board Members, and we would like to express our sincere thanks to all of them. We would also like to express our gratitude to the editorial staff of AD Publications, who supported us at every stage of the project. It is our hope that this fine collection of articles will be a valuable resource for *IJOEAR* readers and will stimulate further research into the vibrant area of Environmental & Agriculture Research.

Mukesh Arora
(Managing Editor)



Dr. Bhagawan Bharali
(Chief Editor)

Fields of Interests

Agricultural Sciences	
Soil Science	Plant Science
Animal Science	Agricultural Economics
Agricultural Chemistry	Basic biology concepts
Sustainable Natural Resource Utilisation	Management of the Environment
Agricultural Management Practices	Agricultural Technology
Natural Resources	Basic Horticulture
Food System	Irrigation and water management
Crop Production	
Cereals or Basic Grains: Oats, Wheat, Barley, Rye, Triticale, Corn, Sorghum, Millet, Quinoa and Amaranth	Oilseeds: Canola, Rapeseed, Flax, Sunflowers, Corn and Hempseed
Pulse Crops: Peas (all types), field beans, faba beans, lentils, soybeans, peanuts and chickpeas.	Hay and Silage (Forage crop) Production
Vegetable crops or Olericulture: Crops utilized fresh or whole (wholefood crop, no or limited processing, i.e., fresh cut salad); (Lettuce, Cabbage, Carrots, Potatoes, Tomatoes, Herbs, etc.)	Tree Fruit crops: apples, oranges, stone fruit (i.e., peaches, plums, cherries)
Tree Nut crops: Hazlenuts. walnuts, almonds, cashews, pecans	Berry crops: strawberries, blueberries, raspberries
Sugar crops: sugarcane. sugar beets, sorghum	Potatoes varieties and production.
Livestock Production	
Animal husbandry	Ranch
Camel	Yak
Pigs	Sheep
Goats	Poultry
Bees	Dogs
Exotic species	Chicken Growth
Aquaculture	
Fish farm	Shrimp farm
Freshwater prawn farm	Integrated Multi-Trophic Aquaculture
Milk Production (Dairy)	
Dairy goat	Dairy cow
Dairy Sheep	Water Buffalo
Moose milk	Dairy product
Forest Products and Forest management	
Forestry/Silviculture	Agroforestry
Silvopasture	Christmas tree cultivation
Maple syrup	Forestry Growth
Mechanical	
General Farm Machinery	Tillage equipment
Harvesting equipment	Processing equipment
Hay & Silage/Forage equipment	Milking equipment
Hand tools & activities	Stock handling & control equipment
Agricultural buildings	Storage

Agricultural Input Products	
Crop Protection Chemicals	Feed supplements
Chemical based (inorganic) fertilizers	Organic fertilizers
Environmental Science	
Environmental science and regulation	Ecotoxicology
Environmental health issues	Atmosphere and climate
Terrestric ecosystems	Aquatic ecosystems
Energy and environment	Marine research
Biodiversity	Pharmaceuticals in the environment
Genetically modified organisms	Biotechnology
Risk assessment	Environment society
Theoretical production ecology	horticulture
Breeding	plant fertilization

Board Members

Dr. Goswami Tridib Kumar

Presently working as a Professor in IIT Kharagpur from year 2007, He Received PhD degree from IIT Kharagpur in the year of 1987.

Prof. Khalil Cherifi

Professor in Department of Biology at Faculty of Sciences, Agadir, Morocco.

Dr. Josiah Chidiebere Okonkwo

PhD Animal Science/ Biotech (DELSU), PGD Biotechnology (Hebrew University of Jerusalem Senior Lecturer, Department of Animal Science and Technology, Faculty of Agriculture, Nau, AWKA.

Prof. Özhan ŞİMŞEK

Agriculture Faculty, Department of Horticulture, Çukurova University, Adana, 01330 Turkey.

Dr. Anka Ozana Čavlović

Working as Professor in the department of Faculty of Forestry, University of Zagreb, Svetošimunska 25, Zagreb.

Dr. Rakesh Singh

Professor in Department of Agricultural Economics, Institute of Agricultural Sciences, Banaras Hindu University, Also Vice President of Indian Society of Agricultural Economics, Mumbai.

Dr. Sunil Wimalawansa

MD, PhD, MBA, DSc, is a former university professor, Professor of Medicine, Chief of Endocrinology, Metabolism & Nutrition, expert in endocrinology; osteoporosis and metabolic bone disease, vitamin D, and nutrition.

Dr. Ajeet singh Nain

Working as Professor in GBPUA&T, Pantnagar-263145, US Nagar, UK, India.

Dr. Salvinder Singh

Presently working as Associate Professor in the Department of Agricultural Biotechnology in Assam Agricultural University, Jorhat, Assam.

Dr. Salvinder received MacKnight Foundation Fellowship for pre-doc training at WSU, USA – January 2000- March 2002 and DBT overseas Associateship for Post-Doc at WSU, USA – April, 2012 to October, 2012.

Dr. V K Joshi

Professor V.K.Joshi is M.Sc., Ph.D. (Microbiology) from Punjab Agricultural University, Ludhiana and Guru Nanak Dev University, Amritsar, respectively with more than 35 years experience in Fruit Fermentation Technology, Indigenous fermented foods, patulin ,biocolour ,Quality Control and Waste Utilization. Presently, heading the dept. of Food Science and Technology in University of Horticulture and Forestry, Nauni-Solan (HP), India.

Dr. Mahendra Singh Pal

Presently working as Professor in the dept. of Agronomy in G. B. Pant University o Agriculture & Technology, Pantnagar-263145 (Uttarakhand).

Dr. Sanjoy Kumar Bordolui

M.Sc. (Ag.), PhD, FSTA, FSIESRP, Assistant Professor, Department of Seed Science and Technology, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia. W.B., India. He received CWSS Young Scientist Award-2016, conferred by Crop and Weed Science Society, received Best Young Faculty Award 2019 conferred by Novel Research Academy, received Innovative Research & Dedicated Teaching Professional Award 2020 conferred by Society of Innovative Educationalist & Scientific Research Professional, Chennai.

Dr.Chiti Agarwal

Dr. Chiti Agarwal works as a postdoctoral associate at the University of Maryland in College Park, Maryland, USA. Her research focuses on fungicide resistance to fungal diseases that affect small fruits such as strawberries. She graduated from North Dakota State University in Fargo, North Dakota, with a B.S. in biotechnology and an M.S. in plant sciences. Dr. Agarwal completed her doctorate in Plant Pathology while working as a research and teaching assistant. During her time as a graduate research assistant, she learned about plant breeding, molecular genetics, quantitative trait locus mapping, genome-wide association analysis, and marker-assisted selection. She wants to engage with researchers from many fields and have a beneficial impact on a larger audience.

DR. Owais Yousuf

Presently working as Assistant professor in the Department of Bioengineering, Integral University-Lucknow, Uttar Pradesh, India.

Dr. Vijay A. Patil

Working as Assistant Research Scientist in Main Rice Research Centre, Navsari Agricultural University, Navsari. Gujarat- 396 450 (India).

Dr. Amit Kumar Maurya

Working asJunior Research Assistantin the Department of Plant Pathology at Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, U.P. India.

Prof. Salil Kumar Tewari

Presently working as Professor in College of Agriculture and Joint Director, Agroforestry Research Centre (AFRC) / Program Coordinator in G.B. Pant University of Agric. & Tech., Pantnagar - 263 145, Uttarakhand (INDIA).

Dr. S. K. Jain

Presently working as Officer Incharge of All India Coordinated Sorghum Improvement Project, S. D. Agricultural University, Deesa, Gujarat.

Dr. Deshmukh Amol Jagannath

Presently working as Assistant Professor in Dept. of Plant Pathology, College of Agriculture polytechnic, NAU, Waghai.

Mr. Anil Kumar

Working as Junior Research Officer/Asstt. Prof. in the dept. of Food Science & Technology in Agriculture & Technology, Pantnagar.

Mr. Jiban Shrestha

Scientist (Plant Breeding & Genetics)

Presently working as Scientist (Plant Breeding and Genetics) at National Maize Research Programme (NMRP), Rampur, Chitwan under Nepal Agricultural Research Council (NARC), Singhdarbar Plaza, Kathmandu, Nepal.

Mr. Aklilu Bajigo Madalcho

Working at Jigjiga University, Ethiopia, as lecturer and researcher at the College of Dry land Agriculture, department of Natural Resources Management.

Mr. Isaac Newton ATIVOR

MPhil. in Entomology, from University of Ghana.

He has extensive knowledge in tree fruit orchard pest management to evaluate insecticides and other control strategies such as use of pheromone traps and biological control to manage insect pests of horticultural crops. He has knowledge in agronomy, plant pathology and other areas in Agriculture which I can use to support any research from production to marketing.

Mr. Bimal Bahadur Kunwar

He received his Master Degree in Botany from Central Department of Botany, T.U., Kirtipur, Nepal. Currently working as consultant to prepare CCA-DRR Plan for Hariyo Ban Program/CARE in Nepal/GONESA.

Table of Contents

Volume-9, Issue-11, November 2023

Haematology and Serum Biochemistry of West African Dwarf (Wad) Goats Fed Selected Tropical Browse Plants

Aboaja, C. R.[1]; Ukanwoko, A. I[2]; George, O. S[3*]

Department of Animal Science, Faculty of Agriculture, University of Port Harcourt, PMB 5323, Port Harcourt, Rivers State, Nigeria

*Corresponding Author

Received:- 10 November 2023/ Revised:- 16 November 2023/ Accepted:- 24 November 2023/ Published: 30-11-2023

Abstract— *The study explored the effect of feeding different tropical browse plants on the haematology and serum biochemistry of West African Dwarf (WAD) goats under different management system, namely: intensive and semi-intensive system. Bucks in T_2 had the highest Pack cell volume and Haemoglobin mean values of 28.17% and 9.37g/dl. Bucks in T_1 recorded highest mean value in Platelets and Lymphocyte as 238.33x10^3/ul and 58.83% respectively. Under intensive system, pack cell volume and Haemoglobin recorded high mean values of 28.08% and 9.33g/dl. Whereas highest value of Platelets 225.25(x10^3/ul) was reported under intensive system. PCV recorded high mean value of 34.33% and 29.33% in bucks of T_2 and T_3 under intensive and semi-intensive system respectively. Lymphocyte (L) recorded high mean value of 62.67% in bucks of T_1 under intensive system unlike semi-intensive system that recorded 60.00% in bucks of T_4 as its high mean value. Aspartate aminotransferase (AST) and Alanine aminotransferase (ALT) are statistically significant ($P<0.05$) even with lower mean values of T_1 (18.17u/l), T_2 (20.83u/l), T_3 (21.50u/l), T_4 (21.50u/l) and T_1 (4.45u/l), T_2 (5.89u/l), T_3 (5.77u/l), T_4 (6.67u/l) respectively. Total protein was noted with high mean value in all the treatments with corresponding values of 64.50g/l, 71.00g/l, 70.33g/l and 72.67g/l. AST, ALT, TP and Globulin recorded high mean values of 25.25u/l, 7.16u/l, 72.00g/l and 27.00g/dl respectively under semi-intensive system, while their low mean values were revealed under intensive system. AST recorded high mean value of 29.00(u/l) in bucks of T_3 under semi-intensive system followed by bucks in T_4 having mean value of 28.00(u/l). Consequently, ALB and GLO in bucks of T_4 and T_2 under semi-intensive system recorded high mean values of 49.00g/l and 29.00g/dl respectively. The study recommends that WAD goats managed intensively to supplementation of bitter leaf (Vernonia amygdalina) should be adopted since they showed more stability in the haematological and biochemical serum for maximum production.*

Keywords— Tropical browse plants, West African Dwarf (WAD) goats, Serum biochemistry, Aspartate aminotransferase (AST), Alanine aminotransferase (ALT).

I. INTRODUCTION

The West African Dwarf Goat (WAD) is the most important small ruminant breed in West African wetlands, accounting for approximately 38 percent of the region's 38 million goats. (Gall, 1996). This variety has good environmental adaptability and an innate ability to "resist the effects of trypanosome infections. and quot; (Steele, 1996). The feeding behavior of West African Dwarf Goats (WAD) is typically representative of traditional husbandry techniques and these goats forage for their daily nutritional needs. (Daramola *et al*., 2005). Traditional goat farming in Nigeria is mostly practiced in traditional ways, which leads to poor nutrition and encourages the search for alternative cheap feeds that are in less demand. (Amaefuru, 2002). Smallholders in rural Nigeria are highly dependent on goats due to their socio-economic importance and an integral part of the cultural existence and fabric of Nigeria (Ajala, 2004; Anaeto et al., 2009). Ruminants, including goats, play an important role in improving low consumption of animal proteins in Nigeria and other developing countries. Despite the importance of goats, their production continues to be hampered by the scarcity of fodder quantity and quality at certain times of the year. Nigeria continues to suffer from inadequate quality and quantity of ruminant feed supplies resulting in low ruminant productivity. The problem of lack of fodder can be solved by providing high-quality fodder, but in dry times, when the quality of fodder deteriorates, this is not practical. In addition, traditional forages such as grains and oilseeds available at that time of year are too expensive to feed ruminants. Therefore, there is an urgent need for researchers to find alternative and sustainable food

sources that do not compete with human food. This underlines the need to develop innovative solutions to meet the challenges posed by feed shortages.

Maintaining the nutritional status and physical well-being of goats is extremely important and requires careful monitoring and thorough blood analysis. (Ibhaze and Fajemisin, 2017). Hematological parameters are important indicators used in the monitoring and evaluation of animal welfare and nutritional status, which Babatunde et al. (1992). Analyzing the "hematological and biochemical parameters of WAD goats" can be a means of obtaining valuable information about their potential for productive performance. (Taiwo and Ogunsanmi, 2003). Therefore, analysis of blood samples is a quick and readily available method to evaluate the clinical and nutritional results of nutritional trials. (Babatunde et al., 1992). Ibhaze (2015) stated that there are several factors that cause variations in blood parameters in animals such as “nutrient levels, age, sex, breed and physiological state of the animal”. "Blood chemistry parameters such as glucose, total protein, blood urea nitrogen and cholesterol" have been used to assess the nutritional value of cattle (Gleen et al., 2006). Blood chemical profiles, which include parameters such as glucose, lipids and proteins, change in goats when feed or protein is reduced (Irkham et al., 2016). Aletor et al. (2012), "the effect of food on blood and serum chemistry must be extremely important because blood transports gases, nutrients and excretory products in the body". Bawala et al. (2008) emphasized that nutritional research should not be limited to "performance, carcass quality and protein intake" but should also consider effects on blood components. Conducting hematological and biochemical studies is crucial for accurate evaluation of various procedures, feeding habits and medical conditions of animals (Ahmed et al., 2009; Hassan et al., 2012; Okoruwa and Ikhimioya, 2014). However, data on the hematology and serum biochemistry of West African pygmy goats fed a selected tropical plant diet of Vernonica amygdalina, Spondias mombins, Alchornia cordifolia and Newbouldia are insufficient. As a result, this study is conducted to address this knowledge.

II. MATERIALS AND METHODS

2.1 Research Design:

The study involved the use of twenty-four WAD goats, which were kept in individual pens and randomly assigned to one of eight dietary treatment groups, with three animals per treatment for the Intensive system and one treatment each for T1, T2, T3, and T4 in the semi-intensive system, using a Factorial Design.

2.2 Study Area:

The study was carried out at the Goat unit of the University of Port Harcourt Teaching and Research Farm, Abuja campus, Choba, Rivers State. Rivers Stateis in the south-south of Nigeria. The school is “situated on latitude 4^{o} 53’ 14’’ North through 4^{o} 54’’42’’N and longitude 6^{o} 54’’00 East through 6^{0} 55’50’’East of the equator” (Ijeomah *et al*., 2013; Aiyeloja and Adedeji, 2015). It falls within “the humid rain forest of West Africa with a long duration of rainfall (March-November) and a very short dry season. Precipitation occurs in September with an average of 367mm of rain in 182 days and temperature of 25^{o}C-28^{o}C and a very high relative humidity (above 80%)”.

2.3 Population for the study:

A total of twenty-four male West African Dwarf weaner goats, aged between six and seven months, were procured from the open market for the purposes of this research. Their housing comprised of well-ventilated individual pens, featuring an open-sided system with corrugated aluminum roofing sheets, block walls, and a cemented floor. The latter was disinfected with Izal solution two weeks prior to the beginning of the research work. Quarantined for two weeks, the animals received vaccination against peste des petit Ruminant (PPR), were dipped in acaricide solution to control endo and ecto-parasites, dewormed using Abendazole suspension and weighed before the commencement of the research work.

2.4 Sample and Sample Techniques:

The plants that were available for browsing were harvested each evening, and subsequently cleared of any potential insects or caterpillars before being weighed. The animals were then provided with the freshly harvested plants the following morning, at approximately 8:00 am, after the pens and troughs had been properly cleaned. The daily feed intake was monitored by calculating the difference between the feed that had been served and the amount that was refused. *Ad libitum* access to fresh and clean water was also provided. The experimental animals were weighed at the outset of the experiment and on a weekly basis throughout the study period, utilizing a hanging measuring scale. The weight gain of the animals was calculated by subtracting their initial body weight from their final body weight at the conclusion of the study. The feed conversion ratio was then determined by dividing the feed intake by the body weight gain.

2.5 Nature/sources of Data

For the intensive system, the browse plants were cut fresh every evening cleaned of any possible insects/caterpillars and the weight obtained before offering them to the animals in the morning. Treatments T_2– T_4 was placed on 75% browse plants and 25% basal diet while T_1 was the control having zero inclusion of the browse plant.

T_1 = conventional feed (Control)

T_2 = *Panicum maximum + Vernonia amygdalina*

T_3 = *Panicum maximum + Newbouldia leavis*

T_4 = *Panicum maximum + Alchornea cordifolia*

For the semi-intensive system, treatment G_1 to $G_4$was placed on 75% browse plants and 25% basal diet while G_0 was the control having zero inclusion of the browse plant. The browse plants were placed in each of the paddocks where the experimental animals grazed.

G_1 = Conventional feed (Control)

G_2= *Panicum maximum + Vernonia amygdalina*

G_3 = *Panicum maximum + Newbouldia leavis*

G_4 = *Panicum maximum + Alchornea cordifolia*

2.6 Method of Data collection and Instrumentation:

At the end of the field work, all animals underwent jugular venipuncture using a disposable sterile 10-ml syringe and 20-gauge x 1.5-ml needle to extract two sets of blood samples. Each animal's 10ml blood sample was divided into two equal parts, with one part (3ml) being collected into properly labeled plastic tubes containing ethylene diamine tetra-acetic acid (EDTA) anticoagulant for haematological analysis. This analysis was conducted to determine Packed Cell Volume (PVC), Haemoglobin (HB), White Blood Cell (WBC), Red Blood Cell (RBC), Platelet (PLT), Neutrophil (N), Lymphocytes (L), Eosinophils (E), Monocyte (M), Basophils (B) in accordance with the methods described by Joshi et al., (2002).

The remaining 7ml of blood sample was collected into labeled plastic tubes without anticoagulant and used to analyze the serum biochemical profiles. The serum metabolites Aspartate aminotransferase (AST), Alanine aminotransferase (ALT), Alkaline phosphatase (ALP), Total protein (TP), Albumin (ALB), Globulin (GLO), Gamma-glutamyl Transpeptidase (GGT), Total cholesterol (TC), Triglycerides (TG), High density Lipoprotein (HDL), and Low density Lipoprotein (LDL) were determined by spectrophotometry following centrifugation. The values for all these parameters were analyzed using the routine laboratory procedures as described by Ogunsami et al., (2002).

2.7 Method of Data Analysis:

The entirety of the acquired data was subjected to a thorough statistical analysis of variance (ANOVA) with the aid of the Statistical Package for Social Science (SPSS). In cases where the means differed, they were separated through the utilization of the Duncan multiple range test of the aforementioned package.

III. RESULTS

3.1 Treatment effect on the Haematological indices of WAD goats fed some Tropical browses under Intensive and Semi-intensive system

The effects of treatment on hematological parameters of WAD goats fed some tropical leaves in intensive and semi-intensive systems are shown in Table 1. It is noted that Pack cell volume, hemoglobin, platelets, neutrophils, lymphocytes and monocytes were significantly (Pandlt; 0, 05).), which is affected by the treatment. The result showed that T2 had the highest Pack cell volume and average hemoglobin content of 28.17% and 9.37 g/dL, respectively, followed by T4 with an average Pack cell volume of 27.33% and 9.08 g/dL. while Bucks T1 recorded the highest average of 238.33 x 103/ul and 58.83% for platelets and lymphocytes. No significant (Pandgt;0.05) difference was observed between red blood cells, white blood cells and eosinophils.

TABLE 1
TREATMENT EFFECT ON THE HAEMATOLOGICAL INDICES OF WAD GOATS FED SOME TROPICAL BROWSES UNDER INTENSIVE AND SEMI-INTENSIVE SYSTEM

Blood parameters	Normal range	T1	T2	T3	T4	SEM
PCV (%)	21 – 35	21.50^{b}	28.17^{a}	24.17^{ab}	27.33^{a}	1.43
HB (g/dl)	7 – 15	7.17^{b}	9.37^{a}	7.98^{ab}	9.08^{ab}	0.65
RBC($x10^{6}$/ul)	3.5 - 13.5	3.27	4.32	3.78	3.27	0.53
WBC($x10^{6}$/ul)	6.8 - 20.1	4.85	4.83	5.33	6.1	0.53
PLT ($x10^{3}$/ul)	150 – 230	238.33^{a}	178.17^{b}	218.67^{a}	212.67^{a}	8.24
N (%)	17 – 52	36.50^{b}	43.33^{a}	36.83^{b}	35.67^{b}	1.62
L (%)	47 – 82	58.83^{a}	51.33^{b}	56.83^{ab}	56.33^{ab}	1.86
E (%)	1 – 7	1.33	1.5	1.83	2.5	0.54
M	0 – 10	3.33^{b}	3.83^{ab}	4.00^{ab}	5.50^{a}	0.63
B	0	0	0	0	0	0

^{abc}Means in the same row with different superscript differ significantly (P<0.05). Sources (Normal range): Tambuwal et al., 2002. Where PCV= Packed cell volume, HB=Haemoglobin, RBC= Red blood cell, WBC=White blood cell, PLT= Platelet, N= Neutrophil, L=Lymphocytes, E=Eosinophil, M=Monocytes

3.2 System effect on the Haematological parameter of WAD goats fed some Tropical browses under Intensive and Semi-intensive system

As recorded in Table 2, this was the result of systemic effects on hematological parameters in WAD goats fed tropical intensive and semi-intensive systems. In addition to packed cell volume, hemoglobin and platelets, which were significantly affected by the system (Pandgt; 0.05), other hematological parameters such as red blood cells, white blood cells, (N) neutrophils, (L) lymphocytes, (E) eosinophils. and (M) There were no significant differences in the systemic effects of monocytes (Pandlt; 0.05). Packed cell volume and hemoglobin recorded high average values of 28.08% and 9.33 g/dl in the intensive system, while low average values of 22.50% and 7.48 g/dl were recorded in the semi-intensive system. While in the semi-intensive system, the high average value of platelets was 225.25 (x103/ul), while in the intensive system, the low average value was 198.67 (x103/ul).

TABLE 2
SYSTEM EFFECT ON THE HAEMATOLOGICAL PARAMETER OF WAD GOATS FED SOME TROPICAL BROWSES UNDER INTENSIVE AND SEMI-INTENSIVE SYSTEM

Variables	Intensive	Semi-intensive	SEM
PCV (%)	28.08^{a}	22.50^{b}	1.01
HB (g/dl)	9.33^{a}	7.48^{b}	0.46
RBC ($x10^{6}$/ul)	4.33	3.45	0.38
WBC($x10^{6}$/ul)	5.16	5.4	0.38
PLT($x10^{3}$/ul)	198.67^{b}	225.25^{a}	5.83
N (%)	36.17	40	1.14
L (%)	57.17	54.5	1.32
E (%)	2.08	1.5	0.38
M (%)	4.33	4	0.44
B	0	0	0

^{abc} Means in the same row with different superscript differ significantly (P<0.05). Where PCV= Packed cell volume, HB=Haemoglobin, RBC= Red blood cell, WBC=White blood cell, PLT= Platelet, N= Neutrophil, L=Lymphocytes, E=Eosinophils, M=Monocytes

3.3 Treatment effect on the biochemical indices of WAD goats fed some Tropical browses under Intensive and Semi-intensive system.

The result of treatment of serum biochemical indicators of West African pygmy goats fed with tropical browsing in intensive and semi-intensive systems is shown in Table 3. The result revealed that aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase were significantly. affected by the treatment. (Pandlt; 0.05) (ALP), total protein (TP), albumin, globulin and gamma-glutamyl transpeptidase (GGT). Aspartate aminotransferase (AST) and alanine aminotransferase (ALT) are statistically significant (Pandlt; 0.05) even with lower mean values T1 (18.17 u/l), T2 (20.83 u/l), T3 (21.50 u/l), T4 (21.50 u/l) and T1 (4.45 u/l), T2 (5.89 u/l), T3 (5.77 u/l) and T4 (6.67 u/l l). The average total protein content was found high in all treatments with respective values of 64.50 g/l, 71.00 g/l, 70.33 g/l and 72.67 g/l. Alkaline phosphatase recorded the highest mean with T3 (18.00 u/L) followed by T4 (17.33 u/L) and T1 (15.50 u/L) but the lowest in dollars with T2 (14.00 exercise). There were no significant differences (Pandgt;0.05) in (TC) total cholesterol, (TG) triglycerides, (HDL) high density lipoprotein and (LDL) low density lipoprotein as shown in the table below.

TABLE 3
TREATMENT EFFECT ON THE BIOCHEMICAL INDICES OF WAD GOATS FED SOME TROPICAL BROWSES UNDER INTENSIVE AND SEMI-INTENSIVE SYSTEM

Blood parameters	Normal range	T_1	T_2	T_3	T_4	SEM
AST (u/l)	58-90	18.17^{b}	20.83^{a}	21.50^{a}	21.50^{a}	0.87
ALT (u/l)	30-Oct	4.45^{b}	5.89^{ab}	5.77^{ab}	6.67^{a}	0.65
ALP (u/l)	Dec-34	15.50^{ab}	14.00^{b}	18.00^{a}	17.33^{a}	1.04
TP (g/l)	30-65	64.50^{b}	71.00^{a}	70.33^{a}	72.67^{a}	1.45
Albumin (g/l)	20-42	41.33^{c}	45.17^{b}	42.50^{c}	47.83^{a}	0.79
Globulin (g/dl)		23.17^{b}	25.83^{ab}	27.83^{a}	24.83^{ab}	0.98
TC (m/mol)	1 – 5	2.8	3.34	2.8	3.1	0.49
TG (m/mol)	0.2-0.8	1.45	1.46	1.34	1.49	0.49
HDL (m/mol)	1.0-3.2	1.77	1.67	1.69	1.74	0.49
LDL (m/mol)	1.0-3.2	1.75	2.39	1.72	2.05	0.49
GGT		14.97^{c}	19.93^{a}	15.02^{c}	17.38^{b}	0.5

^{abc} means in the same row with different superscript differ significantly (P<0.05). Source (Normal range): RAR, 2009. Where AST= Aspartate aminotransferase, ALT= Alanine aminotranferase, ALP= Alkaline phosphatase, TP= Total protein, TC= Total cholesterol, TG= Triglycerides, HDL= High density lipoprotein, LDL= Low density lipoprotein, GGT= Gamma-glutamyl Transpeptidase

3.4 System effect on the Biochemical indices of WAD goats fed some tropical browses under intensive and semi-intensive system.

As shown in Table 4, system effect on the biochemical and haematological indices of WAD goats fed some tropical browse plants under intensive and semi-intensive systems the various parameters that recorded significant differences (P<0.05) include AST, ALT, TP and Globulin. The listed parameters all recorded high mean values of 25.25u/l, 7.16u/l, 72.00g/l and 27.00g/dl respectively under semi-intensive system, while their low mean values were revealed under intensive system. Other parameters not significantly (P>0.05) affected by system are ALP, Albumin, GGT, TC, TG, HDL and LDL.

TABLE 4
SYSTEM EFFECT ON THE BIOCHEMICAL INDICES OF WAD GOATS FED SOME TROPICAL BROWSES UNDER INTENSIVE AND SEMI-INTENSIVE SYSTEM

Variables	Intensive	Semi-intensive	SEM
AST (u/l)	15.75[b]	25.25[a]	0.61
ALT (u/l)	4.21[b]	7.16[a]	0.46
ALP (u/l)	15.42	17	0.73
TP (g/l)	67.25[b]	72.00[a]	1.03
Albumin (g/l)	43.42	45	0.56
Globulin (g/dl)	23.83[b]	27.00[a]	0.69
GGT	16.25	17.43	0.41
TC (m/mol)	2.97	3.05	0.35
TG (m/mol)	1.33	1.54	0.34
HDL (m/mol)	1.72	1.72	0.34
LDL (m/mol)	1.9	2.06	0.34

[ab] means in the same row with different superscript differ significantly (P<0.05). Where AST= Aspartate aminotransferase, ALT= Alanine amimotranferase, ALP= Alkaline phosphatase, TP= Total protein, TC= Total cholesterol, TG= Triglycerides, HDL= High density lipoprotein, LDL= Low density lipoprotein, GGT= Gamma-glutamyl Transpeptidase

IV. DISCUSSION

Packed cell volume (PCV) was used to measure toxicity and differences in composition were observed between breeds. As Ahamefule et al. (2005), PCV values were found to vary between 21-35%, which is within the 22-38% range considered physiological in goats by Krammer (2000). This finding suggests that the treatment diets were nutritious and non-toxic, contributing to adequate blood flow, as reported by Peter-Damian et al. (2016). Hemoglobin (Hb) values recorded in this study ranged from 7 to 15 g/dL, which is consistent with the findings of Daramola et al. (2005), but higher than the reported values of 5 to 6 g/dL... Belewu and Ogunsola (2010) in goats fed Jatropha curcas kernel cakes treated with mushrooms. The relatively high Hb concentration observed in the goats indicates that the nutritional treatment given in the study can promote the development of blood with a high oxygen carrying capacity. The study also showed that neutrophil and lymphocyte values corresponded to 47-82% and 17-52% respectively, as reported by Daramola et al. previously reported. (2005) and Tambuwal et al. (2002). These results indicate a skilled immune system in West African pygmy goats with sufficient numbers of immune cells to promote favorable health, as Daramola et al. (2005). These results further emphasize the ethnoveterinary properties of seed plants as emphasized by Fahey (2005). Ultimately, the study provides valuable information about the role of dietary therapy in promoting goat health and welfare, with implications for broader animal nutrition and welfare research. Since all WAD goats used in this experiment recorded hematological values that were similar to those of Daramola et al. (2005) and Tambuwal et al. (2002). This shows that WAD goats can do well in all management systems accepted by Imasuen (2014).

V. CONCLUSION

Assessment of liver function and damage is critical in the "diagnosis and treatment of liver disease". Aspartate aminotransferase (AST), alkaline phosphatase (ALP), and alanine aminotransferase (ALT) are important biomarkers commonly used to assess liver function. According to Yildirim et al (2011), these enzymes and#039; blood activity may indicate liver damage. An increase in their levels above normal can also be related to muscle damage. These enzymes and#039; normal values suggest that the processed diets did not damage the integrity of the liver and the animal as stated in the study by Aikpitanyi and Egweh (2020). In this study, serum protein was found in the range of 30-65 g/dL, which corresponds to serum protein values reported by Merck (2011) in clinically healthy dwarf goats. The serum albumin values observed in this study were similar to those of WAD goats by Yusuf et al. (2012) but higher than Okoruwani et al. reported intervals. (2014) and Opara et al. (2010) respectively. This finding suggests that the dietary protein content was sufficient to support the growth of the animal, as Olafadehan et al. (2020). Based on the AST and ALP values reported by Merck (2011), this study recorded reduced values in different management systems, indicating that WAD goats can perform well in all management systems used. Imasuen (2014) agreed with this. Based on the results, hairy leaf (Vernonia amygdalina) supplementation is recommended for intensively treated WAD goats because their hematological and biochemical serum showed a more stable maximum production. Therefore, further research should be conducted and directed to determine the standard threshold of blood parameters (hematological and

serum biochemical indices) and the level of added sorghum plant supplementation for goats reared under different systemic exposures.

REFERENCES

[1] Haematological profile in cyclic and non- cyclic and Endometritic Cross breed Cattle. International Journal of Agriculture and Biology 27: 83-91.

[2] Aikpitanyi, K.U.,and Egweh, N.O.(2020). Hematological and biochemical profile of broiler chickens fed diets containing ginger and black pepper additives. *Nigerian Journal of Animal Science.* 22 (2):114-125.

[3] Aiyeloja, A. A. and Adedeji, G.A (2015). Impact of weaver birds (Ploceus cucullatus Muller) nesting on the ornamental trees shade management in the university of port Harcourt, Nigeria. Researcher 7(4):49-54.

[4] Ajala MK.(2004). Household decision making in the production of small ruminants in Giwa Local Government Area of Kaduna State of Nigeria. In: Proceedings of the 29th Annual Conference of Nigeria Society of Animal Production, Sokoto, Nigeria, March 2004, pp. 399-402.

[5] Amaefule, K. U., (2002). Evaluation of pigeon pea seeds (Cajanus cajan) as protein source for pullets. Ph.D. Thesis. University of Nigeria. Nsukka.

[6] Amimo JO, Thumbi S, Inyangala BO, Junga JO, and Mosi RO.(2011).Socio-economic characteristics and perceptions of cattle keepers and constraints to cattle production in western Kenya, Livestock Research for Rural Development, 23 (6), 2-11.

[7] Anaeto, M., Tayo, G. O., Chioma, G. O., Ajao, A. O., & Peters, T. A. (2009). Health and nutrition practices among smallholder sheep and goat farmers in Ogun State Nigeria. Livestock Research for Rural Development, 21, 11

[8] Babatunde, G. M, Fajimi, A. O, Oyejde A. O (1992) Rubber seed oil versus palm oil in Broiler chicken diets. Effects on performance and nutrients digestibility, haematology and carcass characteristics. Animal feed sciences and technology 35: 133-146.

[9] 015). Methane Yield from Cattle, Sheep, and Goats Housing with Emphasis on Emission Factors: a review. *Slovak Journal of Animal Science,* 48 (3), 122–139. Retrieved from https://sjas.ojs.sk/sjas/article/view/195

[10] Daodu, M. O. and Babayemi, O. J. (2009). Utilization of Some Edge-Row Plants as Forage in Nigeria. Pakistan Journal of Nutrition, 8 (8): 1269-1274

[11] Daramola, J. O., Adeloye, A. A., Fatoba, T. A. and Soladoye, A. O. (2005) Haematological and Biochemical Parameters of West African Dwarf goats. Livestock Research for Rural Development, 17(8), p.3.

[12] Gall, C. (1996). Goat breeds of the world. CTA-Margraf, Weikersheim, Germany. 186pp.

[13] Green, M.P., Spate, L.D., Parks, T.E., Kimura, K., Murphy, C.N., Williams, J.E., Kerley, M.S., Green, J.A., Keisler, D.H. and Roberts, R.M. (2008). Nutritional skewing of conceptus sex in sheep: Effects of a maternal diet enriched in rumen-protected polysaturated fatty acids (PUFA). *Reproductive Biology and Endocrinology*, 6: 21-26.

[14] Hassan, M. M., Hoque, M. A., Islam, S. K. M. A., Khan, S. A., Hossain, M. B. and Banu, Q. (2012). Efficiency of anthelmintics against parasitic infections and their treatment effect on production and blood indices in Black Bengal goats in Bangladesh. Turkish Journal of Veterinary and Animal Sciences 30 (4): 400-408.

[15] Ibhaze, G. A (2015) Feeding quality of fermented maize-cob based diets as feed for West African dwarf. Applied Tropical Agricultural Science 20(1): 52-56.

[16] Ibhaze, G. A and Fajemisin, A. N (2017) Blood metabolites of intensively reared West African Dwarf goats fed pulverized Biofiber wastes based diets. Animal Research Journal 14(1): 2598-2603.

[17] Ijeomah, H.M., Chima, U.D, and Okagbare, O.H, (2013). Ecological survey of avifaunal resources in University of Port Harcourt, Nigeria. Ethiopian Journal of Enviromental Studies and Management, 6(6): 648-660.

[18] Imasuen, J.A (2014).Effect Of Different Management Environment On Hematological Performance In West African Dwarf (WAD) Goats. *Journal of Research in Forestry, Wildlife and Environment* 6(2): 46-50

[19] Irkham, W., Sarmin, K., Prabowo, P.P. (2016) Influence of feed intake on blood chemistry parameters in goats. A.I.P conference proceedings 1755(1).

[20] Kramer JW.(2000). Normal hematology of cattle, sheep and goat. In Schlam's veterinary hematology. Ed 5th, Philadephia, Williams and Wilkins.

[21] Merck (2011). Merck Sharp and Dohme Corp, a subsidiary of Merck and Co., Inc. White houseStation, NJ, USA.

[22] Okoruwa, M. I. and Ikhimioya, I. (2014). Haematological Indices and Serum Biochemical Profiles of Dwarf Goats Fed Elephant Grass and Varying Levels of Combined Plaintain with Mango Peels. *American Journal of Experimental Agriculture*, 4, 6.

[23] Okoruwa, M.I., Agbonlahor, I., Adomeh, E.E. and Dania, S. O. (2014). Performance characteristics and blood metabolites of growing goats fed diets of different proportions of yam peels and cowpea husk. *Journal of Agricultural Science and Applications,* 3(3): 62 – 66.

[24] Olafadehan O.A., Oluwafemi R.A., and Alagbe J.O.(2020). Performance, haemato-biochemical parameters of broiler chicks administered Rolfe (*Daniellia oliveri*) leaf extract as an antibiotic alternative. Drug Discovery.14(33):135-145.

[25] Olafadehan OA, and Adewumi MK. (2010).Livestock management and production system of agropastoralists in the derived savanna of South-west Nigeria, Tropical and Subtropical Agroecosystems, 12, 685–691.

[26] Opara, M.N., Udevi, N. and Okoli, I.C. (2010). Haematology parameters and blood chemistry of apparently healthy West African Dwarf goats in Owerri, South Easthern Nigeria. *New York Science Journal,* 3(8): 68 – 72 Organization of the United Nations

[27] Peter-Damian, C. J., Francis, O. A., Okechukwu, S.O., and Kingsley, I.(2016). Feed intake, body weight changes and haematology of West African dwarf goats fed dietary levels of *Moringa oleifera* leaf meal, Agricultura 13(1-2): 71-77

[28] Steele, M., 1996. Goats. CTA-Macmillan Publishing Ltd., London and Basingstoke, 152pp.

[29] Tambuwal, F.M., Agale, B.M. and Bangana, A., (2002). Haematological and biochemical values of apparently healthy Red Sokoto goats. In: Proceedings of the 27th Annual conference of the Nigerian Society for Animal Production (NSAP), 17–21 March 2002,Federal University of Technology, Akure, Nigeria. 50–53

[30] Yildirim, E.I.,Yalchinkaya, M.,Kanbur, M. Ç. and Oruc, E. (2011). Effects of yeast lucomannan on performance, some biochemical parameters and pathological changes in experimental aflatoxicosis in broiler chickens. *Révue de Médicine Vétérinaire*, 162:413–420.

[31] Yineger, H. and Yewhalaw, D. (2007). Traditional medicinal plant knowledge and use by local healers in Sekoru District, Jimma Zone, Southwestern Ethiopia. Journal of Ethnobiology and Ethnomedicine, 3, 24. https://doi.org/10.1186/1746- 4269-3-24

[32] Yusuf, A.O., Oyebanji, O.A., Yusuf, D.A., Ekunseitan, K.A., Adeleye, O.S., Sowande and Fasae. O.A. (2012). Blood profile of West African Dwarf goats fed *Panicum maximum* supplemented with *Newbouldia laevis* leaves. *Bulletin of Animal Health Production African*, 60: 493-502

Performance and Haematological Parameters of Growing Rabbits Fed with Noodle Waste as a Partial Replacement for Maize

Onyeukwu C.[1]; Ere-Richard, A.A.[2*]; Opara, J.Y.[3]

[1,2]Department of Animal Science, University of Port Harcourt, Rivers State, Nigeria
[3]African Regional Aquacultural Centre/Nigerian Institute for Oceanography and Marine Research, Buguma Station, P. M. B. 5122 Port Harcourt, Rivers State.
*Corresponding Author

Received:- 12 November 2023/ Revised:- 19 November 2023/ Accepted:- 25 November 2023/ Published: 30-11-2023

Abstract— *The aim of this study was to evaluate the effect of noodle waste on the performance as well as haematological parameters of growing rabbits. Twenty four growing rabbits of the dutch breed were used for this experiment. The rabbits were alloted four dietary treatments T1, T2, T3 and T4 containing 0%, 10%, 20% and 30% noodle waste respectively. The experiment lasted for a period of 8 weeks and the data obtained were statistically analysed. The result showed that the average weight gain and feed conversion ratio (FCR) of the rabbits were significantly affected (P<0.05) by the experimental diet. The average feed intake ranged from 0.29kg/animal in treatment 1 to 0.36kg/animal in treatment 4 while the average live weight ranged from 1.29kg/animal in treatment 1 to 1.32kg/animal in treatment 4. The result also showed significant difference (P<0.O5) in the Packed Cell Volume, White Blood Cells, Red Blood Cells, Haemoglobin, Neutrophils, Eosinophils, Lymphocytes and Monocytes. This study also showed that platelets values obtained from the result of this experiment showed no significant difference (P<0.05) across the various treatment groups. Noodle Waste can be incorporated up to 30% in the feed without having any deleterious effect but beneficial effect on performance and haematological parameters of the rabbits.*

Keywords— Performance; Haematology; Noodle Waste.

I. INTRODUCTION

It has been established that in many developing countries of the world, the reason for the decrease in consumption of animal proteins is the insufficient consumption of traditional livestock - cattle, sheep, goats, pigs and chickens. (1) approximately 854 million people, representing 12.6% of the world's population, are severely malnourished. To solve this, (2) argued that non-traditional meat sources suitable for smallholders need to be explored.

Rabbits have high reproductive potential and a unique ability to act as a flexible financial reserve. In particular, rabbit breeding in Nigeria offers the greatest potential to increase the quality and quantity of protein intake due to the short generation interval (4). Maize (*Zea mays*) is the main source of energy for feeding livestock in Nigeria, but it is also needed by humans and processing industries (5) The demand for maize in Nigeria has increased and this has led to a great hike in price of livestock feed; therefore, concrete efforts are needed to find alternative, inexpensive sources of nutritional ingredients with little or no competition with human consumption (5). In recent years, agro-industrial waste products have become popular feed components in poultry diets in Nigeria (6), (7). Examples of such products are kitchen waste, canning industry waste, potato pulp waste, citrus fruit waste, bakery waste, kola nut flour, cocoa bean flour, pigeon pea flour, Bambara groundnut flour, cashew flour, etc.

Since its introduction in the Nigerian kitchen, instant noodles have become popular, well accepted and found in the kitchen of almost every Nigerian home (8). This caused a big boom of the industry and a corresponding amount of waste in the industry. Instant noodles have several advantages over other non-conventional noodles. Instant noodles are intended for human consumption, therefore they are hygienically packaged and this eliminates the fear of contamination. Instant noodle waste has no known anti-nutritional factors (9) and also has more metabolizable energy than maize (10). The density composition of noodle waste (NW) has been reported to be comparable to that of maize (10). Noodle waste is a suitable source of energy, it

does not directly compete with humans as food source, it does not need further processing before being incorporated into the diet and its price is stable and favorable compared to maize.

In most developing countries, such as Nigeria, animal protein consumption has fallen below (11) the recommended 35g per animal per day. The apparent reason for the anomaly is the sharp rise in the prices of meat and other animal products such as milk and eggs, which have become unaffordable for the common man. This culminated in various malnutrition diseases such as kwashiorkor, beriberi, marasmus and many others in babies and children, not only in rural areas but also in big cities (12). For this, it is urgently necessary to promote the production of small and highly productive livestock, such as rabbits, whose turnover is fast. Very low production costs. However, the high cost of energy and protein foods such as maize and soybeans and the intense competition between humans and livestock for these foods is a concern. Therefore, replacing maize with agricultural by-products in poultry rations significantly reduces production costs (13). With increasing demand for maize and maize products (14), this has encouraged research into the use of alternative and cheaper feed resources, especially agro-industrial by-products and waste, to replace maize in livestock feed, reduce feed costs and thus reduce total cost of production (15). It can be argued that feed costs can be minimized by using cheaper, non-traditional feed ingredients such as noodle waste. The aim of this study is therefore to determine the performance characteristics and hematological parameters of rabbits fed different quantities of instant noodle waste flour as a partial substitute for maize.

II. MATERIALS AND METHODS

2.1 Experimental site and duration

The experiment was conducted at the Rabbits Unit of the University of Port Harcourt Teaching and Research Farm, Choba, Rivers State, Nigeria. The campus is situated at Choba, off east-west road, Port Harcourt and is at latitude 4.89437°N, longitude 6.91053°E and 16m altitude, having an average temperature of 28°Celsius (82.40°F). The experiment lasted for a period of eight (8) weeks.

2.2 Experimental design

Twenty four (24) Dutch rabbits were used for the experiment in a completely randomized design (CRD). The rabbits were assigned to four (4) dietary treatments and each treatment group was replicated three times with a total number of two (2) rabbits per replicate. The four (4) treatments were designated as T1, T2, T3 and T4.

2.3 Experimental Animals and Management

A concentrate diet was formulated to meet the nutrient requirement of the rabbit. Twenty four (24) grower rabbits used for the experiment were purchased from Michael Okpara University of Agriculture Teaching and Research Farm in Abia State.

The rabbits were allowed to acclimatize to the new environment for a period of one week, and thereafter, the live weight differences between treatment groups were obtained. Individual rabbits were given feed and fresh water ad-libitum. Noodle waste was used to substitute maize at graded levels. Measured quantity of each ingredient in the different diets was taken and properly mixed together. The diets formulated were isonitrogenous and isocaloric. The control (T1) had maize but no noodle waste, while T2, T3 and T4 had 10%. 20% and 30% of noodles waste as replacement for maize in T2, T3 and T4 respectively.

2.4 Data Collection:

2.4.1 Performance Parameters:

The animals' initial weight was measured and recorded, thereafter, they were weighed at weekly intervals using a Camry sensitive electronic scale to determine their weekly weight gain. The rabbits were weighed at the end of the experiment, and the average weight gain was calculated by subtracting the initial weight from the final weight. The daily feed intake was calculated by subtracting the leftover feed from the initially offered feed. The feed conversion ratio was determined by dividing the average daily feed intake per rabbit by the average daily weight increase per rabbit over the study period.

2.4.2 Haematological Parameters:

At the end of the experiment, blood samples were collected from two rabbits per treatment using (3ml) disposable syringe and were transferred directly into dry sample bottles containing Ethylene Diamine Tetracetic Acid (EDTA) anticoagulant for haematological parameters which included; Packed Cell Volume (PCV), Haemoglobin (HB), Red Blood Cell (RBC), White Blood Cell (WBC), Platelets, Eosinophils, Neutrophils, Monocytes and Lymphocytes values.

2.5 Statistical Analysis

Data generated were subjected to analysis of variance (ANOVA) using SAS (2000) Statistical Software. Significant ($p<0.05$) differences were separated using Duncan New Multiple Range Test.

III. RESULTS

The effect of the dietary treatments on the performance parameters of Rabbits is presented in Table 3. The result obtained showed that the average weight gain and feed conversion ratio (FCR) of the rabbits were significantly ($P<0.05$) affected by the experimental diet. T2 and T4 had the best ($p<0.05$) Average Weight Gain and Feed Conversion Ratio of 0.39/animal and 1.9 respectively. The result obtained also showed no significant difference ($P>0.05$) in the average feed intake and average live weight. The average feed intake ranged from 0.29kg/animal in T1 to 0.36kg/animal in T4 while the average live weight ranged from 1.29kg/animal in T1 to 1.32kg/animal in T4.

From the result of the haematological analysis in presented in Table 4, the packed cell volume (PCV), white blood cells, red blood cells, Haemoglobin, Neutrophils, Eosinophils, lymphocytes and monocytes were all significantly ($P<0.05$) influenced by the experimental diet. The packed cell volume, haemoglobin, red blood cells and monocytes were highest ($p<0.05$) in T2, having values of 39.00, 13.00, 5.90 and 8.00 respectively. The white blood cells and Lymphocytes were highest ($p<0.05$) in T4, having values of 9.00 and 56.33 respectively. Neutrophils were observed to be significantly ($P<0.05$) higher in T3 (45.33%), T2 (40.00%) and T4 (38.33%) over the control treatment. Eosinophils obtained were significantly ($P<0.05$) highest in T1 (4.6%) and lowest in T4 (2.33%). Platelets values obtained from the result of the experiment showed no significant difference ($P>0.05$) across the various treatment groups.

TABLE 1
COMPOSITION OF THE DIETARY TREATMENTS

Ingredients	T1 (0% NW)	T2 (10% NW)	T3 (20% NW)	T4 (30% NW)
Yellow maize	48.00	42.09	36.09	30.09
Indomie waste	0.00	6.00	12.00	18.00
Wheat bran	10.75	10.75	10.75	10.75
PKC	12.42	12.42	12.42	12.42
Soybean Meal	12.0	12.0	12.0	12.0
GNC	8.48	8.48	8.48	8.48
Bone meal	4.5	4.5	4.5	4.5
Salt	0.13	0.13	0.13	0.13
Methionine	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25
Vit/min premix	3.13	3.13	3.13	3.13
TOTAL	**100.00**	**100.00**	**100.00**	**100.00**

TABLE 2
PROXIMATE COMPOSITION OF THE EXPERIMENTAL DIETS

Feed Ingredients (%)	T1 (0% NW)	T2 (10% NW)	T3 (20% NW)	T4 (30% NW)	SEM
Crude protein	14.90^{d}	11.84^{c}	22.34^{b}	25.41^{a}	0.01
Dry matter	83.53^{d}	88.53^{a}	87.40^{c}	88.21^{b}	0.02
Crude fat	4.63^{a}	1.83^{c}	3.93^{b}	3.93^{b}	0.02
Ash	8.23^{a}	5.33^{b}	5.13^{c}	4.63^{d}	0.02
Crude fibre	7.10^{a}	2.14^{c}	7.00^{a}	4.65^{b}	0.02
NFE	48.68^{d}	67.41^{a}	54.02^{b}	49.61^{c}	0.07

TABLE 3
EFFECT OF NOODLE WASTE ON PERFORMANCE OF RABBITS

Performance parameters	T1 (0% NW)	T2 (10% NW)	T3 (20% NW)	T4 (30% NW)
Average feed Intake (Kg)	0.29 ± 0.04	0.34 ± 0.05	0.35 ± 0.06	0.36 ± 0.05
Average Weight gain (kg)	0.13^{b} ± 0.05	0.39^{a} ± 0.09	0.31^{ab} ± 0.09	0.22^{ab} ± 0.08
Average Live weight (kg)	1.29 ± 0.45	1.63 ± 0.34	1.30 ± 0.28	1.32 ± 0.31
Feed Conversion Ratio	3.21^{b} ± 0.07	2.42^{ab} ± 0.17	2.33^{ab} ± 0.16	1.9^{a} ± 0.12

means in a row with no superscript are not significantly different (P>0.05).

TABLE 4
EFFECT OF NOODLE WASTE ON HAEMATOLOGICAL PARAMETERS OF RABBITS

Haematological parameters	T1 (0% NW)	T2 (10% NW)	T3 (20% NW)	T4 (30% NW)
PCV (L/L)	29.00^{ab} ± 1.53	39.00^{a} ± 0.58	30.00^{ab} ± 2.65	28.67^{ab} ± 4.2
Haemoglobin (g/dL)	9.50^{ab} ± 0.76	13.00^{a} ± 0.17	10.07^{ab} ± 0.47	9.67^{ab} ± 0.88
Red blood cells (10^{6}/µL)	4.37^{ab} ± 0.18	5.90^{a} ± 0.12	4.37^{ab} ± 0.27	4.20^{ab} ± 0.21
White blood cells (10^{3}/µl)	6.87^{b} ± 0.88	7.03^{ab} ± 0.15	7.15^{ab} ± 0.12	9.00^{a} ± 0.67
Platelets (10^{3}/µl)	182.33 ± 4.33	179.67 ± 11.20	195.00 ± 7.69	203 ± 11.02
Neutrophils (10^{3}/µl)	35.00^{b} ± 2.89	40.00^{ab} ± 1.16	45.33^{a} ± 0.88	38.33^{ab} ± 0.88
Lymphocytes (10^{3}/µl)	51.33^{ab} ± 2.19	47.00^{b} ± 2.52	46.05^{b} ± 3.06	56.33^{a} ± 2.33
Eosinophils (10^{3}/µl)	4.6^{a} ± 0.88	3.60^{ab} ± 0.38	2.33^{b} ± 0.33	2.33^{b} ± 0.33
Monocytes (10^{3}/µl)	7.33^{a} ± 1.45	8.00^{ab} ± 0.10	6.67^{ab} ± 1.67	3.37^{b} ± 0.67

^{abc}, means on the same rows having different superscript differ significantly (P<0.05)

IV. DISCUSSION

The effect of dietary treatment on the performance parameters of broilers showed a significant difference in the average weight gain and feed conversion ratio (FCR) of rabbits. This result is consistent with the findings of (16), who reported a significant difference in performance parameters of albino rats fed noodle waste as part of their diet. This result is also consistent with (17) who noted a significant difference in the performance parameters of chickens fed the NW diet. The significant increase in average weight of rabbits in the treatment groups indicates a direct relationship between weight and dietary NW levels, which is consistent with the findings of (9). However, this result is in contrast to the findings of (18), which reported no significant difference in the feed conversion ratio of birds fed graded levels of instant noodle waste. The superior performance of rabbits fed diets containing 10, 20 and 30% noodle waste compared to the control diet may be due to the low crude fiber content and nutritional factors, as well as the palatability of the food, which increases feed intake and therefore body weight gain in animals (19). Also, the obtained result showed no significant difference in terms of average feed consumption and average live weight. This result is consistent with the findings of (18) who reported no significant difference between average feed consumption, average live weight and other performance parameters in birds given graded levels of noodle waste in their diet. However, the highest mean feed intake was observed in T4, while the lowest value was obtained in the control treatment. The higher feed intake observed in T4 is consistent with the findings of (19) and (9) who reported increased feed intake with increased noodle waste in animal diets. The result also showed that the feed utilization of rabbits was better in T4 as indicated by the calculated feed conversion ratio. The addition of noodle waste flour to the diet of rabbits had a significant effect on hemoglobin, red blood cell count, white blood cells, neutrophils, lymphocytes, eosinophils and monocytes in rabbits. This result is consistent with the findings of (20), who found a significant difference in the blood profile of birds fed graded levels of noodle waste in their diets.

(16) also reported a significant influence in hemoglobin and packed cell volume values in albino rats fed a noodle-based diet. The high hemoglobin values obtained in T2 show that the oxygen capacity of the rabbit blood with hemoglobin was relatively the best. It has also been found that an animal with reduced hemoglobin in its blood indicates poor nutrition, including iron, amino acid and vitamin deficiencies (21). The white blood cell count of this study showed a significant increase during treatment. The increase in white blood cell count as the amount of noodle meal in the diet increased is consistent with the findings of (20), who reported a significant increase in total white blood cell count in birds fed graded levels of noodle waste. White blood cells and their varying numbers play an important role in protecting the body against disease-causing bacteria, viruses and fungi, a lack of white blood cells can increase susceptibility to infection. A decrease in white blood cells reflects a decrease in the production of white blood cells to protect the body against infections (18). Packed cell volume is the volume of red blood cells per liter of blood. Its measurement gives the percentage of red blood cells in whole blood (19). The high PCV values recorded in T2 are significant due to the role of red blood cells and hemoglobin in the transfer of respiratory gases (16). This report is in contrast with the findings of (18), who reported no significant differences in hemoglobin, erythrocytes, white blood cells, and other hematological parameters in birds fed noodle waste classified as poultry diet. This study revealed that blood platelet values were not significantly influenced by the dietary treatment which is in agreement with (18).

V. CONCLUSION AND APPLICATIONS

The study revealed that:

1. The inclusion of 10-30% of Noodle waste in the diets of the rabbits did not have any deleterious effect on the haematological status of the rabbits but was rather beneficial to the overall performance of the rabbits.
2. The findings therefore suggest that noodle waste could partially replace maize to enhance their performance and haematological parameters.

REFERENCES

[1] Food and Agricultural Organization (2006). Bulletin \ (8th Edition). Rome.

[2] Biobaku, W.O. and Ekpeyong, T.E., (2001). Effects of feeding graded level of water lettuce and water hyacinth on the growth of rabbit. *Journal Application Rabbit Respondings.*, 14, 98– 100.

[3] Iheukwumere, F.C. and Okoli, I.C. (2002). Preliminary studies on raw Napoleona Imperialis as feed ingredient. 1: performance and blood chemistry of weaner rabbits. *Tropical Animal Production Investigation.* 6, 113 – 119.

[4] Effiong, O.O. and Wogar, G. S., (2007). Litter performance traits of rabbit under mixed feeding regime. *Proc. 32nd Annual conference of the Nigeria society for Animals production.* Calabar, March 18 – 21, 2007, pp. 155 – 158.

[5] Ukachukwu, S. N., (2005). Studies on the nutritive value of composite cassava pellets for poultry: chemical composition and Metabolizable energy. *Livestock Research for Development.* 17 (11).

[6] Eustace, (2005). Effect of Enzyme supplementation on palm kernel meal and brewers dried grain on the performance of broilers. *International. Journal of Poultry Science.* 4 (2): 76-80.

[7] Adeyina, A. O., Annongu, A. A. and Awe, O., (2008). Effects of cocoa bean shell on the performance, blood indices and organ characteristics of cockerels. *Agrosearch*. 10 (1). Pp: 11 – 19.

[8] Business news, (2006). "The Noodles War | The NEWS – Nigeria's authoritative weekly newsmagazine "Thenewsng.com.2008-07-21.

[9] Eniolorunda, O.O., Taiwo, B. B. A., Oyewumi, O.O. and Adeyemi, O.A., (2008). Performance of laying hens fed graded levels of indomie waste as replacement for maize in humid Tropical environment. *Research Journal of Animal Sciences.* 2 (5): 135-138.

[10] Laila, A, O., Bamgbose, M. D., Eruvbentine M., Bemji, A.O. and Osundare,T.O. (2010): Effects of Instant noodles waste based diets as a replacement for maize on Haemotological parameters of broiler chickens. *Proceeding of 15th Annual Conference of Animal Science Association of Nigeria.*(ASAN). 5-7.

[11] Food and Agricultural Organisation/World Health Organisation/United Nations University, (1985). Energy and protein requirements. Report of a Joint Expert Consultation. World Health Organization Technical Report Series. 724: 1 – 206.

[12] Onyimonyi, A. E. and ENE, J. C., (2003). Performance of growing rabbits fed Panicum maximum with graded levels of a concentrate diet. Pages 73 – 75. In: Olatunji, E. A., Ayanwale, B. A., Shiawoya, E. L. And Aremu, A. (Eds.). Sustainable Livestock Productivity and National Development the Holistic Approach. *Proceedings of the 8thAnnual Conference of Animal Science Association of Nigeria* (ASAN), September 16 – 18, 2003, Federal University of Technology, Minna, Niger State, Nigeria.

[13] Adejumo, D. O., Onifade, A. A., Olutunde, T. O. and Babatune, G. M. (2005). The effect of concentration, age and duration of feeding supplemental yeast (Levueisb®) in high fibre diet on the performance of broiler chicken. Pages 69 – 76. In: The Proceedings of the First Nigeria International Poultry Summit, held at The Temperance, Ota, Ogun State, Nigeria.

[14] Ukachukwu, S. N., (2005). Studies on the nutritive value of composite cassava pellets for poultry: chemical composition and Metabolizable energy. Livestock Research for Development. 17 (11).

[15] Fasuyi, A.and Olumuyiwa,T.A., (2012). Evaluating Nutritional Potential of Bio-fermented Rice Husk in Broilers Diets. American Journal of Food Technology. 7(12): 726-735.

[16] Zailani, H. A., Umaru, H. A. and Samuel, G., (2016). Effects of Instant Noodles Formulated Diet on Weanling Albino Rats. Direct Resource Journal of Agriculture and Food Science. 4 (7): 161-168.

[17] Omole, A.J., Obi O. O., Adejinmi, O.O. and Ajasin, F.O. and J. A. Fayenuwo, J.A., (2013). Performance Characteristics and Economy of Using Noodle Waste as Replacement in the Diets of Weaner Rabbits. *American Journal of Experimental Agriculture.* 3(4): 1044-1051.

[18] Animashahun R. A, Omoikhoje S. O, Alabi, O.O, Shoyombo, A.JandOlawoye S.O, (2018). Influence Of Graded Levels Of Instant Noodle Waste In The Diets On The Performance, Carcass Traits And Haematology Of Broiler Chickens. Agrosearch. 18(1): 40–52.

[19] Orogun, A.J., (2014). Growth Response and Haematological Characteristics of Broiler Chickens Fed Diets Containing Shea Butter (VitellariaParadoxa C.F Gaertn) Seed Cake As Starter Diet. Department of Biological Sciences, Ahmadu Bello University, Zaria, Nigeria.

[20] Alabi, O.M., Aderemi, F.A., Ladokun, A.O., (2012). Blood Profile of Birds fed Graded Levels of Noodles Waste Meal. *Elixir International Journal.* 4 (5): 32-35.

[21] Afolabi, O. and Oladimeji, H. (2003). Haematological studies of some avian species. *International Journal of Poultry Science.* 30 (2): 24.

AD Publications
Sector-3, MP Nagar, Rajasthan, India
www.adpublications.org, www.ijoear.com, info@ijoear.com