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FOREWORD

Compliment of the season to all our contributors, well-wishers and world of Academia in general. I respectfully appreciate and welcome you all to the volume 3 issue 2 of Federal Polytechnic – Journal of Pure and Applied Sciences (FEPI-JOPAS) which is a peer reviewed multi-disciplinary accredited Journal of International repute. It is imperative to re-affirm that FEPI-JOPAS publishes full length research work, short communications, critical reviews and other review articles. In this issue, readers will find a series of manuscripts of top-rated significance in pure and applied sciences, engineering and built environment. This issue is the last of its kind for 2021 calendar year which features findings from basic and applied researches of high societal impacts from the seasoned authors. These articles have been reviewed and packaged for wider readership through the collective efforts of our managing editor, publishing editors, our valuable reviewers and editorial board members.

In this particular issue, you will find that Ilelaboye and Jesusina evaluated the quality of biscuits and chin-chin made from okara enriched plantain-sorghum flour blends. Ojo and Ebisin utlilized convolutional neural network for gender classification through facial analysis. Omotayo and Fafioye investigated antimalarial potential of ethyl acetate fraction of Phyllanthus niruri while Olubodun and Adetona examined landscaping as a strategy for combating air pollution in Lagos megacity. Buoye and Ojuawo provided imperative dataset on Covid-19 crisis management in Nigeria and Brazil. Obun-Andy and Banjo investigated effective communication as a tool for good governance in Nigeria. Yusuff and co-workers conducted a field survey on fish hatcheries in Yewa South and Yewa North Local Government of Ogun State. Akinlade and co-workers meticulously expatiated on the effect of aqueous blend of three herbs on haemato-biochemical indices of broiler chicken at starter phase. Ajeigbe, Sangosina, Ogunseitan, Lawal, & Yusuff analysed the Effects of Neem Leaves (Azadirachta Indica) and Cassava Peels on the Performance of West African Dware Goat. Abdussalam & Adewole in their paper carefully explained the Formulation of Natural Products Repellents for the Control of Cockroaches (Periplaneta americana). Elesin & Obafunmiso gave as Assessment of Public Toilets Facilities Provision and Management in Tertiary Institutions in Nigeria- An Overview of The Federal Polytechnic, Ilaro, Ogun State.

I would like to deeply appreciate and extend my profound gratitude to my co-editors, editorial board members, reviewers, members of FEPI-JOPAS, especially the Managing Editor, as well as all the contributing authors for making the production and publishing of this volume 3 issue 2 a reality. I will like to appreciate the authors in this issue for allowing their works to be subjected to our thorough and rigorous peer-review processes and for taking all the constructive criticism in good fate. The authors are solely responsible for the information, date and authenticity of data provided in their articles submitted for publication in the Federal Polytechnic Ilaro – Journal of Pure and Applied Sciences (FEPI-JOPAS). I am looking forward to receiving your manuscripts for the subsequent publications.

You can visit our website (https://fepi-jopas.federalpolyilaro.edu.ng) for more information, or contact us via e-mail us at fepi.jopas@federalpolyilaro.edu.ng.

Thank you and best regards.

Prof. Olayinka O. AJANI

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Effect of Aqueous Blend of Three Herbs on Haematobiochemical Indices of Broiler Chicken at Starter Phase

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Abstract

This research was centered on the effects of aqueous blend of three herbs on hematobiological indices of broiler chickens at the starter phase. Newly hatched Cobb 500 broiler chicks totaling 120 were allotted to 4 groups randomly. The groups namely Treatment 1 serves as the control without aqueous blend, other three treatments received 50 mL of; Scent leaf aqueous blend (SLAB), Ginger aqueous blend (GIAB) and Garlic aqueous blend (GAAB) to 1 litre of drinking water respectively. At 7 and 21 days of the experiment, blood samples were taken for heamatology and biochemical analysis. The observed values of RBC, WBC, Hb, and PCV (red blood cell, white blood cells, packed cell volume and hemoglobin) were significantly different from the control group at $p < 0.05$ with the fourth group having the highest value. It was observed on day 21 that the group fed garlic aqueous blend had levels of AST and ALT reduced than other groups. The low level of AST and ALT means that Garlic has hepatoprotective ability. Garlic aqueous blend group shows significantly high values ($p < 0.05$) of albumin, total serum protein, and globulin in contrast to other groups. Consequently, all values observed are within the reference range of broiler chicken. This results shows that the aqueous blends can be used at a safety dose 50 mL / liter of drinking water as an alternative to conventional growth promoters.

Keyword: Herbal blends, Broiler, Garlic, Ginger, Scent leaf

INTRODUCTION

The contributions of poultry production to the advancement of countries cannot be denied, because they provide animal protein that is cheap, at a shorter duration (5-8 weeks) and at a considerably reduced price to the customer when compared to other animal protein sources (Bosun, Kagya-Agyemang, Kwenin, and Zanu, 2012).

Aduku, (2004) reported that more than 50 billion chickens are raised annually for meat, this figure accounts for thirty percent of the protein consumed by humans as compared to other domestic animals.

The administration of antibiotic growth promoters (AGPs) in livestock sector spans over the last 50 years (Torun et al., 2018). However, public awareness is on the rise of human health challenges coupled with environmental risks caused by the excessive use of these AGPs (Torun et al., 2018) because of the presence of these antibiotics' residues in poultry meat and other poultry products beyond maximum permissible level (Muaz, Riaz, Akhtar, Park, and Ismail, 2018, Akinlade, Obi, and Lawanson, 2020).

Cao. Li, Lu and Zhao (2004) reported that synthetic feed additives contain trace level of vitamins, micro-minerals, anti-oxidants thus having great effect on the hormonal and immune system and increasing blood lipid concentration.
The outcome of serum and hematology analysis has been generally accepted as a means to evaluate the physiological and health status of livestock, changes in their values are indications of livestock response to varying physiological situations (Khan and Zafar, 2005).

The utilization of plants, their seed, bark, root and leaf aqueous extracts in animal production is becoming popular around the globe and has been scientifically and commercially accepted as a means of preventing and curing diseases, as well as enhancing the growth of poultry birds (Djkalia, Guichard, and Soumaila, 2011). Zhang, Yang, Wang, Jiang, and Gai, (2009) reported several medicinal plants that have proved useful in promoting efficiency in animal production, they include Moringa, Bitter leaf, Neem, Scent leaf, Gallic, Ginger, teak leaves among others. Scent leaf, Garlic and Ginger are available in large quantities and are scattered around

the tropics of Africa. They are easily accessible and can conveniently substitute synthetic growth promoters thereby reducing the price of chicken.

MATERIALS AND METHODS

Experimental Site

The experiment took place at the Poultry Unit of Agricultural Technology Department, The Federal Polytechnic, Ilaro. Ilaro is located in Yewa South Local Government area of Ogun State. It has coordinates of Latitudes 6°37′46″N and 6°55′42″N and Longitudes 2°47′24″E and 3°6′48″E.

Preparation of Experimental Aqueous Blends

Fresh Scent leaf, Ginger and Gallic were purchased from Sayedero market, Ilaro. They were rinsed to remove debris, sand and afterward drained. The Scent Leaf was weighed and blended (using a blender "Pyramid® PM-B999") with water at a ratio of 100 g to 1000 mL. The mixture was filtered using a muslin cloth to get scent leaf aqueous blend (SLAB) (Okhale, Bolaji and Bello-Onaghise, 2019). Garlic and Ginger were peeled separately, cut into small pieces. 100 g each of fresh Ginger and Gallic was blended with 1000 mL of water for 2-3 minutes (Kumari, Venkateshwarlu, Choukse, and Anandan, 2014). The mixture was sieved with a muslin cloth, the liquid part of the separation gave the herbal blends (Ginger aqueous blend 'GIAB' and Gallic aqueous blend 'GAAB') which were kept in the fridge and used for the experiment. Fresh extracts were prepared at five (5) days interval (Okhale, et al., 2019).

Experimental Animal and Management.

120 (Cobb 500) newly hatched broiler chicks were purchased from a commercial Hatchery in Ibadan. They were kept in the brooding pen for seven days for acclimatization. After which they were shared to Four (4) treatments in a completely randomized design (CRD) (Akinlade and Okusanya, 2020). The treatments were replicated three times with ten (10) birds per replicate. The birds were fed with a popular commercial broiler diet throughout the starter phase. All essential vaccines were administered.

Treatment 1 serves as the control, Treatment 2, 50 mL of SLAB, Teatment 3, 50 mL of GIAB and Treatment 4, 50 mL of GAAB to 1 litre of drinking water respectively. Feeding and watering was done ad-lib all through the starter period. Heat and ventilation was done according to proper management procedures (Akinlade and Okusanya, 2020).

Parameters measured

Hematological Studies

2 ml of blood was taken from six marked birds from each treatment at the beginning of the experiment and at the last day of the experiment (day 7 and 28 respectively). The blood was collected through the brachial vein in ethylene diaminetetra- acetic acid (EDTA) vials. The Hb, PCV, RBC, WBC analysis were carried out using procedure outlined by (Schalm Jain, and Carroll, 1975)

Serum Indices

2 ml of blood was taken from six marked birds from each treatment at the beginning of the experiment and at the last day of the experiment (day 7 and 28 respectively). The blood was collected through the brachial vein into sterilized test tubes and was centrifuged using a macro centrifuge to separate the serum which was used for biochemical analysis. Biuret method was used to evaluate Total serum protein, Albumin was done using BCG dye binding method, globulin, AST (aspartate aminotransferase), ALT (alanine aminotransferase) and serum creatinine was carried out using alkaline picrate method. The globulins were calculated by subtracting the values of albumin from total serum proteins.

Statistical Analysis.

All data were carefully inputted on Excel Microsoft 2015 and were analyzed with SPSS software (version 19.0, SPSS Inc) using analysis of variance (ANOVA) and the treatment means was separated using Duncan range test. Statistical significance was assumed at $P < 0.05$ (Oleforuh-Okoleh, Ndofor-Foleng, Olorunleke, and Uguru, 2015).

RESULTS AND DISCUSSION

Results

Tables 1 and 2 show the hematological values of the blood samples on day 7th and 28th day respectively. Table 1 shows no statistical difference ($p<0.05$) in the value of Hb, PCV, RBC, and WBC observed on the 7th day. In contrast, table 2 shows that Hb, PCV, RBC, and WBC values were statistically different on the 28th day.

Table 1: Haematological parameters of broilers before administration of experimental blends

Parameters	**Control**	**50 mL/Lit (SLAB)**	**50 mL/ Lit (GIAB)**	**50 mL/Lit (GAAB)**	±SEM
PCV	26.00^{d}	28.33^{c}	30.33^{b}	32.00^{a}	0.705
Hb	8.600^{c}	9.433^{b}	10.300^{a}	10.800^{a}	0.2662
RBC	2.200^{d}	2.367^{c}	2.533^{b}	2.700^{a}	0.0597
WBC	12.433^{b}	13.200^{ab}	14.767^{a}	14.433^{a}	0.3549
HET	29.33^{a}	28.33^{a}	28.00^{a}	29.67^{a}	0.458
LYM	69.33^{a}	70.00^{a}	70.33^{a}	69.67^{a}	0.534
EOS	0.33	0.67	0.67	0.00	0.515
BAS	0.33	0.67	0.33	0.67	0.522
MONO	0.67	0.33	0.67	0.00	0.515
MCV	118.200	119.733	119.733	118.533	1.4311
MCH	39.067^{b}	39.867^{ab}	40.667^{a}	40.000^{ab}	0.7198
MCHC	33.067^{b}	33.267^{b}	33.967^{a}	33.733^{a}	0.4166

Table 2: Effect of aqueous blends of the experimental herbs on Hematological parameters of Broilers

Parameters	Control	50 mL/Lit (SLAB)	50 mL/ Lit (GIAB)	50 mL/Lit (GAAB)	±SEM
PCV	26.50	24.50	25.00	24.75	0.839
Hb	9.100	8.350	9.550	8.400	0.2702
RBC	2.275	2.050	2.425	2.175	0.093
WBC	12.700	13.575	14.025	11.375	0.5074
HET	28.25	28.25	28.25	28.50	0.384
LYM	69.50	68.50	69.75	68.25	0.398
EOS	0.25	0.25	1.25	1.25	0.233
BAS	0.75	1.50	1.00	1.00	0.17
MONO	1.25	0.50	0.75	1.00	0.18
MCV	116.850	119.825	115.300	116.125	1.7795
MCH	40.100	41.025	39.350	39.450	0.6805
MCHC	34.350	34.200	34.125	33.975	0.2271

Means on with the same superscript on a row are not significantly different (P>0.05)

Means on with the same superscript on a row are not significantly different (P>0.05)

Tables 3 and 4 presents the serum analysis of the blood samples. Group fed garlic aqueous blend had decreased levels of ALT and AST than other groups in table 4. Values of albumin, total serum protein, and globulin of Garlic aqueous blend group are higher than other groups in Table 4.

Table 3: Serum parameters of broilers before administration of experimental blends

LABEL	Control	50 mL/Lit	50 mL/ Lit	50 mL/Lit	±SEM
T.PROT (g/dl)	5.5	7.6	5.3	5.5	0.544
ALB (g/dl)	4.3	5.8	3.8	4.3	0.433
GLOB (g/dl)	1.2	1.8	1.5	1.2	0.144
AST (U/L)	89	104	75	103	6.836
ALT(U/L)	19	22	23	21	0.854
CREAT (mg/dl)	2.6	2.2	0.8	1	0.443

Means on with thesame superscript on a row are not significantly different (P>0.05)

Table 4: Effect of aqueous blends of the experimental herbs on serum biochemistry of Broilers

LABEL	Control	50 mL/Lit (SLAB)	50 mL/ Lit	50 mL/Lit	±SEM
T.PROT (g/dl)	4.6^{b}	5.2^{b}	4.8^{b}	6.9^{a}	0.523
ALB(g/dl)	3.2	3.5	3.5	3.6	0.867
GLOB(g/dl)	1.4	1.7	1.2	3.4	0.503
AST(U/L)	101	126	115	100	5.930
ALT(U/L)	24^{a}	24^{a}	20^{b}	19^{b}	1.315
CREAT(mg/dl)	0.7b	0.9^{ab}	0.8^{ab}	0.5^{a}	0.854

Means on with the same superscript on a row are not significantly different (P>0.05)

DISCUSSION

The RBC (Red Blood Cell) aids the transportation of oxygen from the lungs to body tissues and removes carbon dioxide from the same for exhalation through the hemoglobin. Hematology indices are not only used to decide pathological and physiological statuses of an animal but are also a useful indicator of toxicity effects of a feed, supplemented herbs and its extract on animals (Oloruntola, Ayodele, Agbede, and Oloruntola, 2016).

The hematological indices in this study were found to be within normal ranges as illustrated by (Thrall, Weiser, Allison, and Campbell, 2012). Onyimonyi Chukwuma, and Igbokwe, (2012) also reported that incorporation of phytobiotic into the ration of broiler chickens did not affect their hematological integrity. In table 2, the study findings show an increase in RBC and WBC counts, and that of PCV and Hb of the groups fed herbal blends as compared to the control group. The result corroborates the findings of (Reis, *et al*., 2018) who reported that the inclusion of herbs and their extracts in the diet of chicken resulted in an increase in the erythrocyte counts and haemoglobin value as against the control group. A similar result was observed by (Krauze Abramowicz, and Ognik, 2020) in their study where they reported an improvement in the immune system and parameters such as RBCs and Hb of broiler chicken fed experimental diet as compared with the control group. Also in the experiment of (Gilani, Zehra, Galani, and Ashraf, 2018) there was observed significant increase in the values of the blood parameters of broiler chickens fed herbal growth promoters.

The observed increase in value of the blood parameters of the birds fed herbs indicates enhanced oxygen-carrying ability of the cells which will translate better well-being of the birds. This is in harmony with the findings of Oleforuh-Okoleh et al. (2015) who reported an increase in Hb, PCV, WBC, and RBC values of garlic

and ginger fed birds compared to the control birds. Consequently, the group fed 50 mL/Lit of GAAB had higher values for RBC, WBC, PCV and Hb this result correlates with the report of (Eid and Iraqi, 2014) that group fed on a diet of Garlic Powder (GP) 200 had the highest count of WBC, followed by group fed on GP 150. A similar observation was gotten from means of RBC which was highest in the group fed GP 200 diet and the lowest in the group fed on GP 0 diets.

The rank of ALT and AST are regarded as investigative tools used to determine toxicity in the liver (Króliczewska *et al*., 2017). The liver is a vital organ and plays important role in removal of toxins, metabolism, and elimination of exogenous plus endogenous substances (Paul *et al*., 2016). The group fed garlic aqueous blend had decreased levels of ALT and AST than other groups. The decreased values obtained for AST and ALT show the hepatoprotective ability of Garlic. This is in agreement with the findings of Dkhil Abdel-Bakia, Wunderlicha, Siesa, and Al-Quraishy, (2011) and Gedik *et al*., (2005) where they reported that garlic has protective functions because it decreases oxidative damage in the liver.

Values of albumin, total serum protein and globulin of the garlic aqueous blend group are significantly higher ($p>0.05$) than other groups. These results corroborate Hassan *et al*., (2009) and Jafari, Jalali and Kiani, (2012) who said there was an increase in total serum proteins and globulins in broiler chicken and Albino rats fed herbal supplements respectively. This observed increase in the garlic group may be due to its strong anti-inflammatory, hepato-renal and immunomodulatory properties. The presented data in this report are in harmony with those reported by Oleforuh-Okoleh et al. (2015) where there were increases in the total protein, albumin, and globulin of garlic or ginger fed birds ($p < 0.05$) when compared with the control group.

CONCLUSION

Based on this study, it can be concluded that the addition of 50 mL of SLAB, 50 mL of GIAB and 50mL of GAAB to 1 litre of drinking water shows no negative effect on the hematological and biochemical parameters of broiler birds as compared with the control group. The aqueous blends of the herbs significantly improve the health status of the birds although the group fed GAAB performs better.

Recommendation

The addition of aqueous blend of these phytogenic substances (Scent leaf, Ginger and Garlic at 50 mL to 1 litre of drinking water can serve as an effective growth promoter in broiler chicken.

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