



COMPARATIVE EFFECTS OF HERBAL FEED ADDITIVES ON HEAMATO LOGICAL AND SERUM BIOCHEMICAL PARAMETERS OF BROILER CHICKENS

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Abstract

The experiment was conducted to evaluate the effect of some herbal plant extracts used as alternative growth promoters on hematology and serum biochemical parameters of broiler chickens. Four different phytogetic plants were collected i.e. *Moringa oleifera*, *Senna occidentalis*, *Cassia tora* and *Vynonia amagdylina* leaf aqueous extract as feed additives. A measured (50mls/litre of water) quantity of the filtrate according to the experimental treatment was added to water and served to the birds while keprocyll powder was given as positive control. One hundred and twenty broiler chicks were randomly allotted to five treatments. Each of the treatment was replicated four times (six birds per replicate) in a completely randomized design (CRD). At the end of the eight weeks experiment, hematological and serum biochemical evaluation were carried out. Results of hematology showed that there were significant differences in packed cell volume (PCV) (19.00-29.50), white blood cells (208.20-267.05), and red blood cell (1.76-2.51). Serum creatine (36.59-47.21), glucose (10.34-12.46) and total protein (26.93-32.68) were affected by the treatments. It was concluded that phytogetic leaf extracts can be fed to broilers as a feed additive without deleterious effects on hematology and serum biochemical parameters.

Keywords: Additives, hematology, serum biochemical, phytogetic plants, broiler chickens

Introduction

Herbs and plant extracts utilized in animal feed are referred to as phytogetic or herbal feed additives, which are derivative compounds of plant origin. The inclusion of these phytogetic additives in animal feed can enhance productivity through the enhancement of digestibility, nutrient assimilation and elimination of pathogens resident within the animal gut (Dantas *et al.*, 2008; Maidala *et al.*, 2017). Plants with medicinal properties have been used against various ailments affecting man and animals since time immemorial, these promoters are now recognized in broiler industry as additives to shorten the period for attaining the market weight by stimulating growth, improving feed efficiency and survivability of broilers (Hossain, Khairunnesa, and Das, 2015). Millions of naira is spent annually in Nigeria on feed additives which may have negative effect on the animals and human beings (Stolker and Brinkman, 2005). This study was therefore designed to investigate the effect of *Moringa oleifera*, *Senna occidentalis*, *Cassia tora* and *Vynonia amagdylina* leaf aqueous extract as feed additives on hematology and serum biochemical parameters of broiler chickens.

Materials and Methods

Experimental location and climate

The experiment was carried out in Katagum local government area of Bauchi State Nigeria. It is located between latitudes 11° 42' and 11° 40' and longitude 10° 31' and 10° 11' east (Anon, 2009).

Processing of phytogetic leaf extract

The fresh leaves of *Moringa oleifera*, *Senna occidentalis*, *Cassia tora* and *Vynonia amagdylina* were collected after which they were thoroughly rinsed and dried. They were then sparsely spread on jute bags at room temperatures between 28°C and 30°C for 6 – 7 days until they became crispy. The leaves were regularly turned to avoid uneven drying and decay to ensure that the greenish color of the leaves was maintained. The dried crispy leaves were crushed using a hammer milled and then sieved through a 2mm sieve before storage in airtight containers to avoid the absorption of moisture. They were later used in



preparation of the aqueous extract. A measured quantity (50g) each of the phytogetic plants of the ground leaves was infused in 1litre of hot water and allowed to stay overnight (12hours). The solution was filtered in the morning using a clean white piece of cloth and a measured (50mls/litre of water) quantity of the filtrate according to the experimental treatment was added to water and served to the birds keprocyll powder was given as positive control. One hundred and twenty (120) day old chicks were used for this experiment. The chicks were divided into five treatments replicated four times (six birds per replicate) in a completely randomized design (CRD).

Experimental diets

Broiler starter and finisher diets were formulated. The percentage composition of the experimental diets is shown in Table 1 and 2 for starter and finisher respectively

Blood collection

Four birds were selected from each treatment, one from each replicate for blood analysis. The blood was collected at the end of the experiment using wing vein with a syringe and needle. The blood was put in tubes containing EDTA to prevent coagulation and another tube without EDTA for serum biochemical parameters.

Data analysis

The data collected from all parameters were subjected to analysis of variance. ANOVA. Least significance difference was used to separate the means.

Results and Discussion

The hematological parameter of broiler chickens fed diets containing different types of medicinal plants is presented in Table 3. Results showed that packed cell volume (19.00-29.50) were affected ($P<0.05$) by different phytogetic plants. Depressed packed cell volume was identified among birds fed *Cassia tora* this may be attributed to high content of heamogluttinnins in the plant. Packed cell volume is involved in the transport of oxygen. Increased packed cell volume shows a better transportation in the body of animals. The white blood cells were affected by different medicinal plants, the control diets and other plants had better values than those fed *Cassia tora* ($P<0.05$), The major functions of the white blood cell and its differentials are to fight infections, defend the body by phagocytosis against invasion by foreign organisms and to produce antibodies in immune response. Therefore, animals with low white blood cells are exposed to high risk of disease infection, while those with high white blood cell counts are capable of generating antibodies in the process of phagocytosis and have high degree of resistance to diseases (Soetan *et al.*, 2013). According to Isaac *et al.* (2013) red blood cell is involved in the transport of oxygen and carbon dioxide in the body. Thus a reduced red blood cell count implies a reduction in the level of oxygen that would be carried to the tissues as well as the level of carbon dioxide returned to the lungs. Mean corpuscular volume was higher among birds fed *Senna occidentalis* ($P<0.05$). Mean corpuscular hemoglobin (pg) was better among birds fed *Senna occidentalis* and *cassia tora* ($P<0.05$) while Mean corpuscular hemoglobin concentration (%) was better among birds fed bitter leaf and *cassia tora* ($P<0.05$). Serum biochemical parameter of broilers fed different type of medicinal plants are presented in Table 4. Results showed that urea (0.52-1.01) was not affected by different phytogetic plants ($P>0.05$). Broiler chickens utilized medicinal plants as they utilize the synthetic additives. It was observed that total protein and albumin among the control group and other groups were significantly higher than those fed *Senna occidentalis* ($P<0.05$). The level of carbohydrate metabolism was determined by the blood glucose content. Blood glucose of chickens fed different phytogetic plants was significantly ($P<0.05$) lower than those fed control. This suggests that the plants can be used in the control of blood glucose. Depressed creatine and cholesterol were identified ($P<0.05$) in birds fed different phytogetic plants with birds fed bitter leaf having the least values. The conjugate bilirubin, was affected by different medicinal plants with the control diets and other plants having better values feed *Senna occidentalis* ($P<0.05$).

Conclusion and Recommendations

Considering the results of this study, it was concluded that phytogetic leaf extracts can be fed to broilers as feed additives without deleterious effects on hematology and serum biochemical parameters. Therefore



the four medicinal plants can be used as additives in broiler production without compromising the health of the birds in the tropics.

Percentage composition of experimental diets fed to broiler starter

Ingredients	Control	<i>Moringa oleifera</i>	<i>Senna occidentalis</i>	<i>Cassia tora</i>	<i>Bitter leaf</i>
	1	2	3	4	5
Maize	42.35	42.35	42.35	42.35	42.35
Soybean	41.75	41.75	41.75	41.75	41.75
Wheat offal	10.00	10.00	10.00	10.00	10.00
Fishmeal	2.00	2.00	2.00	2.00	2.00
Bone meal	3.00	3.00	3.00	3.00	3.00
Sodium chloride	0.25	0.25	0.25	0.25	0.25
Lysine	0.20	0.20	0.20	0.20	0.20
Methionine	0.20	0.20	0.20	0.20	0.20
Vitamin mineral premix*	0.25	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00	100.00
Calculated analysis					
Crude protein	23.00	23.00	23.00	23.00	23.00
Metabolizable energy	2810	2810	2810	2810	2810
Crude fibre	6.25	6.25	6.25	6.25	6.25

Table 2: Percentage composition of experimental diets fed to broiler starter

Ingredients	Control	<i>Moringa oleifera</i>	<i>Senna occidentalis</i>	<i>Cassia tora</i>	<i>Bitter leaf</i>
	1	2	3	4	5
Maize	53.81	53.81	53.81	53.81	53.81
Soybean	22.29	22.29	22.29	22.29	22.29
Wheat offal	15.00	15.00	15.00	15.00	15.00
Fishmeal	5.00	5.00	5.00	5.00	5.00
Bone meal	3.00	3.00	3.00	3.00	3.00
Sodium chloride	0.25	0.25	0.25	0.25	0.25
Lysine	0.20	0.20	0.20	0.20	0.20
Methionine	0.20	0.20	0.20	0.20	0.20
Vitamin mineral premix*	0.25	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00	100.00
Calculated analysis					
Crude protein	20.00	20.00	20.00	20.00	20.00
Metabolizable energy	2860	2860	2860	2860	2860

Table 3: Hematology of broilers fed different medicinal plants

Parameters	Control	<i>Moringa oleifera</i>	<i>Senna occidentalis</i>	<i>Cassia tora</i>	<i>Bitter leaf</i>	SE
	1	2	3	4	5	
Hemoglobin (g/dl)	9.00	9.80	8.45	8.35	9.10	1.45NS
Packed cell volume (%)	27.00 ^a	29.50 ^a	25.50 ^a	19.00 ^b	27.50 ^a	4.25 *



White blood cell (% x 10 ⁶ ul)	242.75 ^a	267.05 ^a	259.65 ^a	208.20 ^b	245.25 ^a	43.24*
Red blood cells (x 10 ⁶ ul)	2.43 ^a	2.72 ^a	1.76 ^b	1.85 ^b	2.51 ^a	1.20*
Mean corpuscula volume (um ³)	111.11 ^b	108.46 ^b	144.87 ^a	102.70 ^b	109.56 ^b	8.24*
Mean corpuscula hemoglobin (pg)	37.04 ^a	36.03 ^b	48.01 ^a	45.14 ^a	36.25 ^b	6.21*
Mean corpuscula hemoglobin concentration (%)	33.33 ^b	33.22 ^b	33.14 ^b	43.95 ^a	47.89 ^a	9.26*

Means bearing different superscripts in the same rows are significantly different (P<0.05).

Table 4: Serum biochemical parameters of broilers fed different medicinal plants

Parameters	Control	Moringa leaves	Senna occidentalis	Cassia tora	Bitter leaf	SEM
	1	2	3	4	5	
Urea (MMOL/L)	1.01	0.52	0.67	0.60	0.62	0.45NS
Creatine (UMOL/L)	47.21 ^a	36.24 ^b	40.08 ^a	38.96 ^a	36.59 ^b	8.63*
Glucose (MMOL/L)	12.46 ^a	11.51 ^b	10.35 ^b	10.35 ^b	10.34 ^b	2.43*
Cholesterol (MMOL/L)	4.56 ^a	3.16 ^b	3.24 ^b	3.37 ^b	3.10 ^b	1.63*
Total bilirubin (MMOL/L)	6.12 ^a	5.79 ^a	6.86 ^a	6.23 ^a	5.46 ^b	1.23*
Conjugate bilirubin (MMOL/L)	2.79 ^b	2.68 ^b	4.11 ^a	2.49 ^b	2.44 ^b	0.52*
Total protein (G/L)	31.51 ^a	32.68 ^a	26.93 ^b	34.11 ^a	30.75 ^a	5.21*
Albumin (G/L)	15.25 ^a	15.82 ^a	12.95 ^b	17.06 ^a	15.99 ^a	2.01*

SEM=Standard error of means, NS= Not significant, *= (P<0.05), Means bearing different superscripts in the same rows are significantly different (P<0.05).

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