BIOCHEMICAL INDICES OF BROILERS FED DIETS CONTAINING HORNED MELON (*Cucumis metuliferus*) AS PARTIAL REPLACEMENT FOR COMMERCIAL PREMIX

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ABSTRACT
The poultry industry serves as a backbone of global agriculture supplying a significant portion of dietary protein of a growing population and the success of this sector depends on the adoption of advanced nutritional strategies, especially with quality vitamin mineral premixes. This study evaluated the effects of horned melon meal as partial replacement for commercial vitamin mineral premix on biochemical parameters of broiler. Matured horned melon fruits were harvested and processed into horned melon meal (HMM). The vitamins minerals analysis of HMM was carried out according to AOAC (2000) procedure. The results showed that HMM had vitamins and minerals comparable to that of commercial premix. Four weeks old one hundred twenty birds were randomly allotted into four dietary treatments (0%, 25%, 37.5% and 50% respectively) in a complete randomized design with three replicates of ten birds each. The experiment lasted 4 weeks. 3 birds were randomly selected from each replicate for blood samples. 5mls blood was taken from each bird into plane bottles for serum biochemical analysis. The glucose, cholesterol, total protein, triglyceride, albumin, globulin, albumin globulin ratio and uric acid. Data collected from biochemical parameters was subjected to general linear model using MINITAB 18.The result showed no significant ($p>0.05$) difference across the treatment. The experiment concluded that inclusion of horned melon meal up to 50% partial replacement of commercial vitamin mineral premixes in broiler diets did not adversely affect serum metabolites.
Keywords: Chickens, Horned melon meal, Vitamins, Minerals, Serum Biochemistry

INTRODUCTION

Vitamin and minerals are essential for maintaining optimal avian health, supporting cell biological processes, such as growth, reproduction, immune responses and ultimately enhancing overall performances and wellbeing of animals (Ewing and Charlton, 2007).Deficiencies of these minerals and vitamins in the feed can have devastating consequences including mortality even lead to death (Öztürk *et al.*, 2024). Critical vitamins like choline, folic acid, pantothenic acid, pyridoxine, riboflavin, Vit-A, Vit-D3, Vit-E and limiting minerals like Calcium, phosphorus, copper, iodine, iron, manganese, sodium and zinc require meticulous monitoring in poultry nutrition, as gut flora of intensively raised chickens has limited capacity for vitamin synthesis (Mohamed *et al*., 2023). Deficiencies of these vitamins and minerals compromise their overall health and performance (Asaduzzaman *et al*., 2005).Therefore, call for the use of vitamins minerals premix. Poultry premixes are designed to fulfil the vitamins and minerals needs of birds, certain fruits are exceptionally rich in essential nutrients, including minerals, vitamins and beneficial phytochemicals, offering a natural complement to commercial premixes example include cucumbers and horned melon (Mosobalaje *et al*., 2024).

Horned melon belonging to the cucumber family is also known as kiwani. This nutrient-rich fruit boasts impressive levels of vitamin C, iron, and potassium, as well as essential minerals such as phosphorus, magnesium, zinc, calcium, copper and sodium (Usman *et al*., 2018). A matured 100 grams of wet horned melon has 44 kcal (calories) of energy. The other nutrients in the fruit are thiamine (0.025 mg), riboflavin (0.015 mg), niacin (0.565 mg), pantothenic acid (0.183 mg), vitamin B6 (0.063 mg), copper (0.020 mg), manganese (0.039 mg) and zinc (0.48 mg). Also, 100 grams of horned melon contains approximately 7.56 grams of carbohydrate, 1.26 grams of fat, 1.78 grams of protein, 88.97 grams of water, 3 micrograms of folate, 5.3 grams of vitamin C, 13 grams of calcium, 1.13 grams of iron, 40 grams of magnesium, 37 grams phosphorus, 123 grams of potassium, 2 grams of sodium (Achikanu *et al*., 2020). Despite these outstanding qualities of horned melon its effect on biochemical parameters is unknown, therefore there was need to research on biochemical indices of broilers fed diets containing horned melon as partial replacement for commercial premix,

MATERIAL AND METHODS

The experiment was carried out at the Poultry Research Unit of the Department of Animal Health and Production Oyo State College of Agriculture and Technology, Igboora (OYSCATECH) Matured horned melon fruits were harvested The harvested fruits were washed to remove dirt, sliced with knife and then oven dried at constant temperature of 55^0c for 2days and later milled to form Horned Melon Meal (HMM). The vitamin and minerals analysis were carried out according to AOAC (2000) procedure. Results obtained from vitamin mineral analysis

of horned melon meal were compared with values indicated on the label of the commercial premix with t-test analysis. Poultry Research Unit was washed, disinfected and allowed to dry, all materials necessary for a successful experiment were also washed (feeding and water trough). Four weeks one hundred and twenty birds were randomly allotted into four dietary treatments (0%, 25%, 37.5% and 50% respectively) in a complete randomized design with three replicates of ten birds each. The experiment lasted 4 weeks. All the vaccinations and medications necessary for production of broiler were strictly adhered to. At the end of the experiment, 3 birds were randomly selected from each replicate for blood samples collection. 5mls blood were taken through the wing from each bird into plane bottle for serum biochemical analysis. Data collected were subjected general linear model using MINITAB 18. The significant treatment means were separated using Tukey's test for both vitamin mineral and biochemical analysis. The gross composition of experimental diets is shown in Table1 below.

Table 1 Percentage composition of experimental diets

Ingredients	0% horned melon	25% horned melon	37.5% horned melon	50% horned melon
Premixes	0.30	0.225	0.19	0.15
Horned melon	0.00	0.08	0.11	0.16
Maize	53.00	53.00	53.00	53.00
Soyabean meal	23.00	23.00	23.00	23.00
Lysine	0.20	0.20	0.20	0.20
Methionine	0.20	0.20	0.20	0.20
Corn bran	13.50	13.50	13.50	13.50
Oyster shell	8.00	8.00	8.00	8.00
DCP	1.500	1.50	1.50	1.50
Salt	0.30	0.30	0.30	0.30
Total	100.00	100.00	100.00	100.00
Calculated analysis				
Energy	2608	2608	2608	2608
Protein	16.57	16.57	16.57	16.57

RESULT AND DISCUSSION

Table 2 shows vitamins and minerals analysis of commercial premix and HMM. The results showed that vitamins A, D, E, K, B1 B2, B12, Folic acid and Biotin in the commercial premix were significantly lower ($p<0.05$) than values recorded by horned melon meal. However, the pantothenic content of the commercial premix was higher ($p<0.05$) than values recorded for horned melon while values of vitamin B12 were similar ($p>0.05$) for the commercial premix and the horned melon. Results of the mineral contents showed that Manganese and Zinc contents of the commercial premix were significantly higher ($p<0.05$) than analysed values of the horned melon meal . The horned melon meal had the highest values ($p<0.05$) for Cobalt, Iron and Copper compared to those of commercial premix. The antioxidant content of the horned melon meal was significantly higher ($p<0.05$) than the antioxidant content of the commercial premix. Other important constituents of horned melon meal that were not indicated on the label of the commercial premix are Calcium , Phosphorus, Potassium and Sodium. The results of serum metabolites of broilers fed horned melon-based diets is presented in Table 3.
There were no significant ($p>0.05$) difference in all the biochemical parameters (glucose, total protein, albumin, globulin, albumin globulin ratio, triglyceride, cholesterol and uric acid). Serum biochemical analysis provides important information on animal's health status, basic medical diagnosis of disease in any species and it is useful for management purposes, especially important in avian species (Joy *et al*., 2020). In this study HMM had no

Table 2: Vitamin and minerals content of the commercial premix and horned melon

Nutrients	**Commercial premix (mg/kg)**	**Horned melon (mg/kg)**	**p-value**	**Nutrients**	**Commercial premix (mg/kg)**	**Horned melon (mg/kg)**	**p-value**
Vitamin A	1680.00^{b}	10940.00^{a}	0.00	Cobalt	100.00^{b}	51400.00^{a}	0.00
Vitamin D	35.00^{b}	16670.00^{a}	0.00	Manganese	38400.00^{a}	910.00^{b}	0.00
Vitamin k	960.00^{b}	17190.00a	0.00	Iron	1600.00^{b}	26202.00^{a}	0.02
Vitamin E	3600.00^{b}	13280.00a	0.00	Copper	3200.00^{b}	5190.00a	0.00
Vitamin B1	720.00^{b}	10510.00a	0.00	Antioxidant	50.00^{b}	20300.00^{a}	0.01
Vitamin B2	2000.00^{b}	9410.00a	0.01	Choline cholide	150.00	ND	
Biotin	20.00^{b}	4550.00^{a}	0.00	Phosphorus	NI	375.83	
Pathothemic Acid	2400.00^{a}	1500.00^{b}	0,02	Pottasium	NI	3756.96	
Vitamin B6	720.00	610.00	0.68	Calcium	NI	589.92	
Vitamin B12	3.50^{b}	511.00^{a}	0.00	Sodium	NI	517.24	
Folic Acid	280.00^{b}	10830^{a}	0.00				
Vitamin c	Nil	28101.00					

Source: Mosobalaje *et a*l., (2024)

ab means differently subscripted along the same row are significantly different from one another ($p<0.05$). ND = Not Determined; NI = Not Indicated.

negative effects on biochemical parameters of broiler, this establishes the safety of HMM. This result is not aligned with the finding of Joy *et al*. (2020) who reported decrease in uric acid of cockerels when treated with methanol extract from HNM for 21 days. The glucose increases with an increase level in HMM this suggests that horned melon could marginally provide energy source in the diets, Albumins play vitals roles in osmotic pressure carriers, regulation of osmotic pressure and the degree of hydration during adverse environmental condition (Nowakoswka, 2011).The hyperproteinaemia and hyperalbuminaemia observed in group fed HMM may be enhanced by amino acid composition in HMM which may be responsible for production of blood protein, however, the protein present in HMM might not be easily absorbed or utilized by the body thereby having no notable effect on blood albumin.

Table 3 Biochemical parameters of birds fed horned melon based diets

Parameters	T1 (0%HMMM)	T2 (25% HMM)	T3 (37.5% HMM)	T4 (50% HMM)	SEM	p-value
Glucose (mg/dl)	204.35	210.52	212.07	225.16	4.09	0.46
Total protein(g/dl)	3.91	4.32	3.89	4.31	0.91	0.12
Albumin (g/dl)	2.99	2.95	3.29	3.07	0.88	0.28
Globulin (g/dl)	0.92	1.37	0.50	1.24	1.13	0.41
ALB:GLOB ratio	3.25	2.15	6.78	2.44	2.22	0.43
Triglyceride (mg/dl)	80.50	67.00	78.50	77.00	3.49	0.64
Cholesterol (mg/dl)	92.00	88.00	110.80	102.40	6.95	0.76
Uric Acid	6.85	7.48	6.85	9.35	0.50	0.32

SEM = standard error of mean

CONCLUSION:

The experiment concluded that inclusion of horned melon meal up to 50% partial replacement of commercial vitamin-mineral premixes in broiler diets did not adversely affect serum metabolites.

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