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Carcass Characteristics and Consumers Acceptability of Broiler chickens Meat: Exploring The Power of *Morinda lucida* and *Vernonia amygdalina* Leaf

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ABSTRACT

Brimstone (*Morinda lucida*) leaf meal (MLLM) and Bitter leaf (*Vernonia amygdalina*) meal (VALM) were evaluated for their effect on the productive performance and nutrient digestibility of broiler chickens. Five experimental diets were formulated such that the control had no MLLM/VALM, treatments B and C contained MLLM at 0.5 and 1% respectively also D and E contained VALM at 0.5 and 1% respectively. A total of 150 day-old Arbor Acre broiler chicks were randomly allocated to the treatments comprising 30 birds of 10 birds per replicates. At day 49, twelve birds per treatment were randomly selected for slaughter in order to measure carcass cut-up parts (thigh, breast, neck, wing, back, drumstick and abdominal fat), and selected organs were weighed and expressed relative to live weight. The quality of the meat was also evaluated by analyzing for crude protein, ether extract and dry matter. The meat samples were also subjected to consumers' preference. Data collected were subjected to one-way analysis of variance and treatment means separated using Duncan Multiple Range Test at $p<0.05$. Result indicated no significant difference ($p<0.05$) in all carcass characteristics parameters measured except for eviscerated and wing weights. The eviscerated weight was significant ($p<0.05$), however, there is a non-significant difference between control (1400.30g) and 0.5 *Morinda lucida* (1423.80g) while the 0.5% *Vernonia amygdalina* treatment yielding the lowest values (1106.97g). birds supplemented with the 0.5% *Morinda lucida* group recorded the lowest value (10.13%) while other treatments maintained similar proportions (10.95-11.40%). proventiculus relative weight has its highest ($p<0.05$) value in 1.0% *Vernonia amygdalina* treatment (0.91%) compared to other groups (0.58-0.75%). The consumer's preference to the breast meat were not significantly affected ($p>0.05$) with the use of *Morinda lucida* and *Vernonia amygdalina*. In conclusion, while MLLM shows promise, especially at the 1% inclusion rate, VALM appears less beneficial at the levels tested.

Key words: phytogenics; meat-type chicken; medicinal plants; plant-based bioactive compounds

DESCRIPTION OF PROBLEM

The global recognition of medicinal plants as valuable sources of alternative therapeutic treatments with minimal adverse effects has gained significant attention among researchers (1). These plants contain bioactive compounds that can be utilized directly for treatment or as precursors in pharmaceutical synthesis, making them essential components of healthcare systems worldwide, particularly in developing regions where access to conventional medicine may be limited.

Medicinal plants naturally synthesize and accumulate diverse secondary metabolites including alkaloids, flavonoids, tannins, saponins, and essential oils, which contribute to their therapeutic properties. The incorporation of plant-based bioactive compounds from *Morinda lucida* (Brimstone) and *Vernonia amygdalina* (Bitter leaf) into broiler nutrition represents a promising strategy for enhancing poultry production outcomes.

Previous investigations have demonstrated the potential of *Vernonia amygdalina* to improve body weight gain, feed conversion efficiency, and carcass yield in broiler chickens, indicating its effectiveness as a natural feed supplement (2). Likewise, *Morinda lucida* has shown beneficial

effects on carcass and organ, as well as the blood profile, thereby promoting overall bird health (3). This study investigates the influence of *Morinda lucida* and *Vernonia amygdalina* leaf supplementation on broiler chickens diet, specifically examining their effects on carcass characteristics, and consumer acceptability of broiler chickens meat.

MATERIALS AND METHODS

Location of the Study/ Experiment

The study was conducted at the Teaching and Research Farm (Broiler Unit), Ladoke Akintola University of Technology, Ogbomoso. The geographical information of Ogbomoso is as retrieved in (4) and reported by (5)

Procurement of Test Ingredient and Processing

Brimstone leaf (*Morinda lucida*) and Bitter leaf (*Vernonia amygdalina*) were harvested from Ladoke Akintola University of Technology, Ogbomoso, Teaching and Research Farm plots. It was plucked from the stem of the trees, rinsed with water, air-dried for two weeks and the dried leaves were ground in an Electric mill to a powder.

Experimental birds, diets and management

One hundred and fifty (150) day-old broiler chicks (Arbor Acre) from a reputable hatchery in Nigeria were used for the study. The birds were randomly allotted to five dietary treatments of 3 replicates each. The birds were subjected to standard poultry routine practices and offered feed and drinkable water *ad libitum* on daily basis throughout the experiment which lasted for seven (7) weeks. During this period broiler starter and finisher diets were offered at 0-3 and 4-7 weeks respectively. Five broiler starter and finisher diets were formulated such that Diet A is the control, diet B / C were supplemented with 0.05% and 1% *Morinda lucida* and D / E were supplemented with 0.05% and 1% *Vernonia amygdalina* powder respectively, at starter and finisher phases as presented in Table 1.

Table 1: Gross composition of starter and finisher diets (DM %)

Ingredients (%)	(Starter) 0-3 weeks	(Finisher) 4-7 weeks
Maize	52.10	57.00
Soya bean meal	27.00	23.00
Groundnut cake	8.00	4.00
Wheat offal	5.00	8.60
Fish meal (72%)	3.00	2.50
Di-calcium Phosphate	3.00	3.00
Oyster shell	1.00	1.00
Lysine	0.20	0.20
Methionine	0.25	0.25
Broiler Premix*	0 .25	0.25
Salt	0.20	0.20
Total	**100**	**100**
Analysed composition (%)		
Crude Protein	23.05	19.91
Ether Extract	5.05	4.66
Crude Fibre	4.31	5.09
Ash	7.10	6.90
Dry Matter	93.11	93.55
NFE**	60.49	63.44
Metabolizable Energy (kcal/Kg)***	3413.34	3369.98

** Nitrogen Free Extract, *** Calculated from ingredient analysis table

Data collection

At day 49, 4 birds per replicate representing the average body weight of each replicate were slaughtered, properly bled by hanging them by their shanks and scalded in water at temperature of 60°C. After de-feathering, they were eviscerated and dressed to get the dressed carcass weight. The weights of the cut-up parts (thigh, breast, neck, wing, back and drumstick), organs (heart, kidney, lungs, liver, spleen and gizzard), intestines and the abdominal fat were recorded and expressed as a percentage of live weight.

From the carcasses, samples of the breast muscles were rinsed individually with distilled water, packed in labeled transparent double layer polythene bag and boiled in a water bath at 70^{o}C for 20 minutes. Samples were allowed to cool to room temperature. They were coded with random numbers, arranged on white enamel plates and presented to each of the ten member Semi-trained panelists for sensory evaluation. Each panelist was required to masticate one sample per treatment and grade them subjectively with regards to their colour, juiciness, flavour, tenderness and overall acceptability using a nine-point hedonic scale with 1 referring to extremely dislike to 9 as extremely like. Members of the panel were told not to chew gum or drink water for at least 3 hours before the commencement of the test. They were also asked to rinse their mouths with water after each sample has been tasted and to allow an interval of not less than 2 minutes in-between samples, this is to allow proper palate cleansing between each sample tasting. Samples of the uncooked meat (breast muscle) were also used to determine the crude protein, ether extract and moisture contents according to (6).

Statistical Analysis

The data collected were subjected to a one-way analysis of variance (ANOVA) using the procedure of (7). Significant mean differences were determined using Duncan's Multiple Range Test of the same package at a 5% probability level.

RESULTS AND DISCUSSION

Results

The inclusion of *Morinda lucida* and *Vernonia amygdalina* Leaf Meals in broiler chickens diets demonstrated no significant difference ($p<0.05$) in all carcass characteristics parameters measured except for eviscerated and wing weights (Table 2). The live weight remained statistically thesame ($P>0.05$) across the treatment groups (1700-2000g), with the control and 0.5% *Morinda lucida* groups achieving the highest numerical values (2000g). The eviscerated significant ($p<0.05$) weight showed no significant difference between control (1400.30g) and 0.5 *Morinda lucida* (1423.80g) while the 0.5% *Vernonia amygdalina* treatment yielded the lowest values (1106.97g). Despite the insignificant difference ($P>0.05$) recorded for liveweight and dressed weight, indicating that the proportional yield of edible carcass is maintaned. Wing percentage showed significant differences ($P<0.05$), with the 0.5% *Morinda lucida* group recorded the lowest value (10.13%) while other treatments maintained similar proportions (10.95-11.40%).

The relative organ weight analysis revealed that all parameters measured were not significantly affected except for the proventiculus weight which recorded its highest ($p<0.05$) value in 1.0% *Vernonia amygdalina* treatment (0.91%) compared to other groups (0.58-0.75%). Notably, the gizzard weights showed numerical increases in the *Vernonia amygdalina* groups, particularly at 0.5% inclusion (4.88% vs. 4.13% in control) and the small intestine also demonstrated numerically higher relative weights in *Vernonia amygdalina* treatments (8.34-8.51%) compared to *Morinda lucida* and control groups (5.84-6.97%).

The organoleptic evaluation revealed that herbal (*Morinda lucida* and *Vernonia amygdalina*) leaf meal supplementation did not ($p>0.05$) affect consumer acceptability parameters (Table 3). Overall acceptability scores ranged from 6.7 to 7.3 on the hedonic scale, with the 0.5% *Morinda lucida* treatment achieving the highest non significant ($p>0.05$) score (7.3).

Discussion

The significant values observed in the eviscerated weight of broiler chickens fed diets supplemented with *Morinda lucida* and *Vernonia amygdalina* of which the birds fed 0.5% *Morinda lucida* (ML) had a comparable highest value with those fed control diet is consisteent with the report of (14) who fed broiler chickens diets supplemented with *Pulicaria jaubertii* (PJ) powder and reported improved carcass characteristics (preslaughter weight, hot carcass weight, and cold carcass weight). This suggests that the use of *Morinda lucida* powder as a feed additive could improve carcass characteristics, and the improvement could be attributed to the bioactive compound in it. This is consistent with the results of (11 and 12) who found that different levels of aromatic medicinal plant powder effectively improved the carcass characteristics of broiler chickens.

Table 2: Carcass and organ yield of broiler chickens fed diets supplemented with *Morinda lucida* and *Vernonia amygdalina* Leaf Meals

Parameters %	A Control	B 0.5% (M.L)	C 1.0% (M.L)	D 0.5% (V.A)	E 1.0% (V.A)	SEM
Carcass						
Live weight(g)	2000.00	2000.00	1900.00	1700.00	1700.00	81.64
Eviscerated(g)	1400.30^{a}	1423.80^{a}	1323.33^{ab}	1106.97^{b}	1173.93^{ab}	73.9
Dressed	86.00	88.02	86.17	84.91	87.10	1.4
Neck	5.71	5.94	5.53	5.40	6.45	0.4
Breast	29.51	30.31	30.06	27.14	28.53	1.2
Wing	10.95^{a}	10.13^{b}	11.09^{a}	10.95^{a}	11.40^{a}	0.2
Thigh	14.89	15.33	14.82	15.26	14.99	0.4
Drumstick	12.82	13.53	12.82	14.15	13.04	0.5
Back %	17.57	16.26	17.04	17.22	16.13	0.69
Organ						
Kidney	0.76	0.73	0.68	0.82	0.57	0.09
Lungs	0.64	0.83	0.73	0.78	0.65	0.03
Heart	0.53	0.54	0.62	0.58	0.60	0.1
Spleen	0.12	0.16	0.20	0.18	0.18	0.02
Gizzard	4.13	3.54	3.98	4.88	3.84	1.2
Emp. Gizzard	2.44	2.52	2.25	3.09	2.69	0.2
Liver	3.04	3.06	3.27	3.74	3.11	0.2
Proventiculus	0.66^{b}	0.60^{b}	0.75^{b}	0.58^{b}	0.91^{a}	0.07
Pancreas	0.21	0.40	0.33	0.46	0.13	0.11
Bursa	0.10	0.11	0.12	0.12	0.14	1.07
Small intestine	6.97	5.84	6.57	8.51	8.34	0.97
Large intestine	0.19	0.24	0.23	0.26	0.19	0.2
Ceacum	0.96	0.80	1.05	1.00	0.93	0.1

ab: Means with different superscript on the same row differ significantly (P<0.05). SEM: standard error of mean.

Table 3: Consumer acceptability of broiler chickens fed diets supplemented with *Morinda lucida* and *Vernonia amygdalina* Leaf Mealsconsumer Acceptability

Parameters %	A Control	B 0.5% (M.L)	C 1.0% (M.L)	D 0.5% (V.A)	E 1.0% (V.A)	SEM
Color	6.6	5.9	5.9	6.6	6.9	0.62
Flavor	4.3	4.4	4.0	5.2	5.3	1.67
Tenderness	6.3	5.9	5.6	6.9	6.9	0.40
Juiciness	6.2	6.5	5.9	5.6	6.6	0.56
Texture	6.7	6.4	6.0	6.8	6.1	0.62
Overall Acceptability	6.9	7.3	6.8	7.2	6.7	0.48

The non-significant difference observed in most of the carcass and organ parameters measured is consistent with the report that aromatic medicinal plant powders (cinnamon twigs and star anise fruit) did not negatively affect carcass traits (10, 3, 8 and 9) who reported that yarrow, cumin, poley, peppermint, *Morinda lucida* and *Anacardium occidentale* leafs did not affect the relative organ weight in broiler chickens. The non-significant sifference observed in the consumers acceptance of the meat is in contrast with the report of (13), who reported a significant influence on the consumers acceptability of broiler chickens meat with the use of papain in their diet.

CONCLUSION AND APPLICATION

In conclusion, the use of *Morinda lucida* and *Vernonia amygdalina* did not elucidate significant influence on the carcass, organ and consumers preference, except for the eviscerated, wing, and proventiculus. Thereby underscore the importance of optimizing inclusion rates when using the herbal supplements in broiler chickens diets.

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