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INFLUENCE OF PHYTOGENIC ADDITIVE FROM ASPILIA AFRICANA EXTRACT ON CARCASS TRAITS AND ORGAN BIOMETRICS IN BROILERS

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Abstract
This study investigated the influence of water-based phytogenic additive produced from *Aspilia africana* leaf extract on the carcass and internal organ biometrics of broiler chickens. A total of 160 day-old Ross 308 broiler chicks in five groups of 32 each and 4 replicates of 8 birds per group were randomly allocated to five treatment groups in a completely randomized design experiment and raised under a deep litter system.. The birds received different concentrations of the additive in their drinking water: 0 ml (control), 5 ml, 10 ml, 15 ml, and 20 ml per litre. Clean water was provided after the additive-treated water was consumed daily, and both feed and water were offered *ad libitum*. At the end of the experiment, one bird closest to the average weight per treatment was selected from each replicate for carcass and internal organ evaluation. Parameters measured included live weight, dressed weight, carcass weight, and internal organ weights. Data collected were statistically analyzed using ANOVA, and Tukey's test was used for mean separation where differences were significant. The findings revealed that supplementation with *Aspilia africana extract* at 10 ml and 15 ml per litre of water significantly ($p < 0.05$) enhanced live weight, dressing percentage, and carcass yield and some internal organ weights compared to the control group. These results suggest that additive produced from *Aspilia africana* leaf extract can be a natural and effective alternative to synthetic growth promoters in broiler production, improving carcass characteristics and internal organ weights sustainably.

Keywords: Additive, *Aspilia africana*, broilers, drinking-water (5 words)

Description of Problem

Phytogenic materials are widespread globally and their beneficial effects on poultry production are well documented**,** due to antimicrobial, antioxidant, antifungal, and anticoccidial properties. Several herbs have been tested as leaf meals to enhance feed utilization, growth, and meat quality in broilers. Many leaf meals also provide essential minerals due to their high ash content (1).*Aspilia africana*, a common weed in southeastern Nigeria, has shown promise as a phytogenic additive. Its leaves contain 14 – 26% crude protein and bioactive compounds (2, 3, and 4). However, its common use in form of leaf meals and extracts induces high fibre content in feeds, bitter taste, poor keeping quality, short shelf life and importantly below optimum performance relative to their beneficial bioactive substances. These challenges have been significantly ameliorated with the production of additive from *Aspilia africana* leaf extracts. The additive contains very useful bioactive substances and tolerable levels of anti-nutrients like oxalate, phytate and trypsin inhibitors (5). Obasi (5) demonstrated the effectiveness of *Aspilia africana* additive at 2 ml per litre of drinking water in broiler chickens. However, the optimal dose has not yet been determined. To establish the right dose of the additive, detailed data on carcass yield and internal organ development are required. This study aimed to determine the effect of different doses of additive produced from *Aspilia africana* leaf extract in broiler chicken drinking water on carcass and internal organ weights.

MATERIALS AND METHOD

Experimental location: The study was conducted at the Poultry Unit, School of Agriculture and Agricultural Technology (SAAT), Federal University of Technology, Owerri, and the Department of Zoology and Environmental Sciences Laboratory, Michael Okpara University of Agriculture, Umudike.

Preparation of additive from *Aspilia africana* leaf: Preparation of additive from *Aspilia africana* leaf was by the microwave-assisted ethanol extraction method described by (5)**.**

Feed ingredients and experimental diet: Maize, soyabean meal, palm kernel cake, fish meal, bone meal, vitamin/mineral premixes, oyster shell, common salt, methionine and lysine were used to produce experimental pre-starter, starter and finisher broiler chicken diets as recommended by (6).

Experimental design and management of experimental chicks: One hundred and sixty (160), day-old Ross 308 broiler chicks were divided into 5 groups of 32 birds each and 4 replicates of 8 chicks per group. Each group was randomly assigned to one of the 5 levels (doses) of additive on a daily basis in a completely randomized design (CRD) such that chicks on T1 (control) received 0.00 ml, T2, received 5.00 ml, T3 received 10.00 ml ; T4 received 15.00 ml and those in T5 received 20.00 ml of additive per litre of drinking water. Ordinary drinking water was administered after the additive treated water was exhausted daily. Feed and water offered *ad libitum*. Prior to the arrival of the birds, pens were disinfected, prepared and preheated. Standard management, health and other biosafety measured were applied. The experiment lasted 42 days.

Data collection: Initial and weekly body weights were recorded per replicate and subsequently compiled per treatment. On day 42, one chick per replicate whose weight was closest to the mean was selected, fasted overnight, weighed, and slaughtered by jugular severing. Carcass components were weighed and expressed as percentages of carcass. Internal organ weights were taken and expressed as percentages of live weight (7).

Statistical Analysis of Data: Means of data obtained were analyzed using ANOVA in Minitab17 (8) **Minitab Inc., State College, PA, USA, 2013**). Differences were considered significant at $p < 0.05$ and separated using Tukey's Range Test.

RESULTS AND DISCUSSION

The results in Table 1 revealed that broiler chickens administered additive from *Aspilia africana* leaf extract showed significant ($p < 0.05$) improvement in live weight across treatments T2–T5compared to the control (T1). The highest live weight was recorded inT4 (1887.50 g), indicating better nutrient utilization and growth promotion.Although dressing percentage showed no significant differences ($p > 0.05$), values in T3 and T4 (77.75%) were higher than T1 (74.75%), implying no adverse impact of the additive on yield. These align with the findings of (3 and 5).Carcass weight significantly ($p < 0.05$) increased in T3 (1437.50 g), T4 (1445.00 g), and T5 (1425.75 g) relative to T1 (1287.50 g), Breast weight, a key meat cut, significantly ($p < 0.05$) increased in T5 (32.47 %) compared to T1 (27.39 %), with T3 (30.81 %) and T4 (31.33 %) showing moderate gains. Wings weight also increased significantly ($p < 0.05$) in T4 (12.92 %) versus T1 (12.23 %). Thigh and drumstick weights were significantly higher ($p < 0.05$) in T2–T5 than in T1, with T4 yielding the highest values 15.11 % and 14.63 %, respectively). Back weight was significantly ($p < 0.05$) higher in T4 (19.37 %) compared to T1 (18.24 %). This confirms the additive's effect on muscle development (3 and 4). No significant ($p > 0.05$) differences were observed in head, neck, and shank weights, indicating the additive did not affect non-meat components, as noted by (5).

The effect of additive from *Aspilia africana* leaf extract on internal organ weights of broiler chickens (Table 2) showed significant increases ($p < 0.05$) in heart weight for T2–T5 compared to T1 (control), with T3 highest at 0.59 % live weight, indicating enhanced heart development. Lung weight also increased significantly ($p < 0.05$) in additive-treated groups, peaking at T2 (5.00 ml) with 0.75 % live weight, consistent with (3). Gizzard weight was similar ($p > 0.05$) but trended upward, highest at T4 (1.73 % live weight). Crop and proventriculus weights were similar ($p > 0.05$) but slightly higher in treated birds, with crop peaking at T4 (0.73 %) and proventriculus at T2 (0.72 %). (9) similarly reported unchanged liver and gizzard weights at

2 ml additive, indicating support for normal organ function. Small and large intestine weights were largely unchanged ($p > 0.05$), with slight decreases at higher doses. Liver weight increased significantly ($p < 0.05$) in T4 compared to all except T1, suggesting hepatoprotective potential. Spleen weight declined significantly with higher doses, except at 20 ml/L, indicating possible immunomodulatory effects. Duodenum length increased in T3 and T4, reaching 219.50 cm in T3. Large intestine length peaked at 12.00 cm in T5 but was statistically similar ($p > 0.05$) among groups. Changes in relative internal organ weights may reflect physiological responses to dietary or waterborne toxins (10, 11).

Table 1: Effect of additive produced from *Aspillia africana* leaf extract on the carcass weights of broiler chickens.

Parameters	Doses of additive (mls/litre of drinking water)					SEM
	T1 (0.00)	T2 (5.00)	T3(10.00)	T4(15.00)	T5(20.00)	
Live weight (g)	1737.50^{b}	1862.50^{a}	1875.00^{a}	1887.50^{a}	1862.50^{a}	16.58
Dressing percentage (%)	74.75	75.50	77.75	77.75	77.25	0.53
Carcass (g)	1287.50^{b}	1417.50^{a}	1437.50^{a}	1445.00^{a}	1425.75^{a}	17.56
Primal cuts (% carcass weight)						
Breast	27.39^{c}	29.34^{bc}	30.81^{ab}	31.33^{ab}	32.47^{a}	0.54
Wings	12.23^{c}	12.33^{bc}	12.84^{ab}	12.92^{a}	12.63^{abc}	0.09
Thighs	13.89^{b}	14.59^{a}	14.90^{a}	15.11^{a}	15.04^{a}	0.13
Drumsticks	12.96^{b}	14.12^{a}	14.53^{a}	14.63^{a}	14.22^{a}	0.17
Back	18.24^{c}	18.73^{bc}	19.06^{ab}	19.37^{a}	18.85^{ab}	0.11
Other cuts (% live weight)						
Head	2.46	2.46	2.47	2.42	2.36	0.02
Neck	5.48	5.46	5.50	5.48	5.45	0.02
Shank	4.05	4.47	4.48	4.50	4.46	0.08

^{abc} means with different superscript in a row are significantly different ($p<0.05$)

Table 2: Effect of additive produced from *Aspillia africana* leaf extract on the internal organs biometrics of broiler chickens

Parameters (% live weight)	Doses of additive (ml per a litre of drinking water					SEM
	T1(0.00)	T2(5.00)	T3(10.00)	T4(15.00)	T5(20.00)	
Heart	0.49^{b}	0.58^{a}	0.59^{a}	0.58^{a}	0.57^{a}	0.01
Lung	0.63^{b}	0.75^{a}	0.70^{ab}	0.69^{ab}	0.62^{b}	0.02
Gizzard	1.55	1.58	1.62	1.73	1.70	0.04
Crop	0.63	0.67	0.71	0.73	0.72	0.02
Proventriculus	0.62	0.72	0.68	0.61	0.67	0.02
Small intestine	4.79	4.54	4.38	4.53	4.07	0.13
Large intestine	0.15	0.16	0.16	0.16	0.13	0.01
Liver	2.89^{ab}	2.80^{b}	2.85^{b}	3.00^{a}	2.86^{b}	0.02
Spleen weight	0.20^{a}	0.12^{b}	0.13^{b}	0.13^{b}	0.16^{ab}	0.01
Large intestine length (cm)	10.25	10.00	9.50	10.50	12.00	0.39
Duodenum length (cm)	214.50	202.00	219.50	216.50	195.75	3.75

^{abc} means with different superscript in a row are significantly different($p<0.05$)

CONCLUSION AND APPLICATION

Administering additive produced from *Aspilia africana leaf* extract at 5.00, 10.00, 15.00, and 20.00 ml/litre of drinking water generally improved carcass yield and internal organ weights compared to the control (0.00 ml). The highest carcass yield, some primal cuts and internal organ weights occurred at 15.00 ml/litre of drinking water. Hence, the additive should be used at 15 ml/litre of drinking water for broiler chickens.

REFERENCES

1. Alagbe, J. O., Shittu, D. M. & Eunice, A. O. (2020). Prospects of leaf extracts on the performance and blood profile of monogastric; A Review. *International Journal of Integrated Education*, 3(7): 122-127.
2. Oko, O. O. K. & Agiang, E. A. (2011). Phytochemical activities of *Aspilia africana* leaf using different extractants. *Indian Journal of Animal Sciences*, 81(8): 814 – 818
3. Uchewa, E. N., Amaduruonye, W., Onunkwo, D. N., &Njoku, H. A. (2018). Performance of broiler chicken fed bush marigold (*Aspilia africana*) leaf extract. *Nigerian Journal of Animal Science, 20*(3), 223–228.
4. Osiagor, W. U., & Nwankwo, C. (2023). Effects of bush marigold (*Aspilia africana*) leaf extract on the performance and blood biochemistry parameters of broiler chickens. *Journal of Agricultural Science and Environment, 23*(1), 114–125.
5. Obasi, I. U. (2024). Response of broiler chickens to additives produced from *Aspilia africana* and *Chromolaena odorata* leaf extracts (PhD Thesis). Federal University of Technology, Owerri.
6. SON (2019). *Nigerian Industrial Standard (NIS 259:2019): Standard for poultry feeds (ICS 65.120).* Standards Organisation of Nigeria, 9 –16.
7. Ukorebi, B. A. & Akpet, S. O. (2019). Performance, carcass and organ weight characteristics of broiler chickens fed diets containing graded levels of *Gongronema latifolia*. *Nigerian Journal of Animal Science, 21*(3), 294–302.
8. Minitab Inc. (2013). *Minitab 17 Statistical Software* [Computer software]. State College, PA: Minitab Inc.
9. Obasi, I. U., Azodo, L. N., Ogbuewu, I. P., Okoli, I. C., & Etuk, E. B. (2024). Gastrointestinal tract and internal organ weights of broiler chickens offered additives produced from *Aspilia africana* leaf extracts. In *Proceedings of the 49th Conference of the Nigerian Society for Animal Production*. University of Ibadan, Nigeria. March 24–27, 2024.
10. Iwuji, T. C., Iheanacho, G. C., Ogamba, M. C., &Odunfa, O. A. (2022). Relationship between live weight, internal organs, and body part weights of broiler chickens. *Malaysian Animal Husbandry Journal (MAHJ), 2*(2), 64–66. http://doi.org/10.26480/mahj.02.2022.64.66
11. Biswas, A., Mohan, N., Raza, M., Mir, N. A., &Mandal, A. (2019). Production performance, immune response and blood biochemical parameters in broiler chickens fed diet incorporated with prebiotics. *Journal of Animal Physiology and Animal Nutrition*, *103*(2), 493–500. https://doi.org/10.1111/jpn.13042