Organs Reaction to intake of *Mansonia altissima* in Laying Hens and Cocks

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Abstract

An experiment was carried out to study the effect of intake of *Mansonia altissima* in the feed of laying hens and cocks with respect to the testis, ovary, liver and spleen. A total of 45 birds consisting of 36 Isa-Brown layers and 9 cocks were completely randomized into three treatments A, B and C, which contained 0, 30 and 50g/kg, pulverized *M. altissima* bark meal, respectively. Each treatment was replicated thrice and each replicate contained 5 birds consisting of 4 females and 1 male. Results showed enlargement and hyperemia of the testis, severe congestion of the ovaries and venous congestion of the liver. However, the spleen appeared normal in both the control and treatment groups. Furthermore, the result showed that there were significant differences ($P < 0.05$) in the level of egg production between treatment groups with group C (50g/kg/feed) laying the highest number of eggs. It was therefore concluded that 50g/kg/feed of *M. altissima* can be used as an egg booster.

Keywords: *Mansonia altissima*, laying hens, cocks, egg production, organs.

Introduction

A knowledge of the reactions of the organs of the body of birds to the administration of specific feed additives will go a long way in improving the productivity of chicken. Various substances including chemical agents, antibiotics, plant extracts (including trees, shrubs and browses), hormones, and vitamins have been used to achieve this purpose. Algeier *et al.* (1967), reported that the timber tree *Mansonia altissima* contains mansonin and minute quantities of 30 other cardenolides all derived from strophanthidin and nigrescigenin, a timber tree which was many years later found to have growth effects on broilers and hens (Wekhe, 2000). Cromwell and Hays (1978) reported on the use of

chemical agents, copper sulphate, copper sulphide, and sodium sulphite, to enhance body weight gain in pigs. Griffin (1979) used a combination of nitrovin, penicillin, and zinc bacitracin to produce an increase in body weight of cage-reared broilers. Cromwell *et al.* (1980) reported positive growth effects by the dietary inclusion of copper and antibiotics in the feed of weaner pigs. Other agents that have been used to enhance the productivity of chicken and other animals include: Orabolin (Phimia, 1987); ampicillin, cloxacillin and terramycin (Taylor, 1988); anti-fungal-ampicillin, to increase the growth rate of female rabbits (Berepubo, 1993); propionic acid and calcium propionate to enhance growth rate in broilers and egg

production in layers (Oruwari, 1993); the use of different antibiotics to increase growth rate and efficiency in White Leghorn chicks (Pandey *et al.*, 1993); ethylestrenol and ampicillin to promote growth in broilers raised in the humid tropics (Wekhe *et al.*, 1994); inorganic sulphate and sulphite supplementation, to produce increase in weight of broiler chicks (Ologhobo *et al.*, 1998). With regard to the trees, shrubs and browses extracts, Wekhe and Njoku (2000) reported an increase in size of the gonads by the ingestion of pulverized *Alchornea cordifolia* by broilers. Wekhe (2000) reported an enlargement of the testis and atrophy of the ovaries in broilers fed *Mansonia altissima*. Uku (2002) reported that the response of testis to *Mansonia altissima* by adult indigenous birds fed a diet at 10g/kg feed and 20g/kg feed inclusion levels, respectively, was not consistent but caused decreased egg production, fertility and hatchability. The objectives of this study therefore, were to study the effect of *Mansonia altissima*, a West African timber tree which contains mansonin, a 2,3-di (0-methyl)-6-deoxyl-B-D-glucopyranoside of strophanthidin, a stimulant and aphrodisiac in man, on laying hens and cocks, with respect to the gonads (ovary and testis) and organs (liver and spleen).

Materials and Methods

Forty-five birds consisting of 36 Isa-Brown layers and 9 cocks were completely randomized into three treatment groups, A, B, C of 15 birds each. Each treatment group was replicated thrice, each contained 5 birds of both sexes (4 females and 1 male). Birds in group A were used as control, while those in treatments B and C were fed rations containing *M. altissima* bark powder at the rate of 30g and 50g per kilogram feed daily respectively, for eight weeks. The exact quantity of feed consumed daily by each replicate or group was determined by weighing the left-over feed and subtracting it from the initial weighted

quantity given. The study last for 10 weeks with two weeks serving as a stabilization period. The birds were reared in deep litter at the Teaching and Research Farm of Rivers State University of Science and Technology, Nkpolu – Port Harcourt. The *Mansonia altissima* barks were obtained from Nkpolu – Port Harcourt timber market. The quantity obtained was washed, sun-dried for two weeks, and ground into powder using motorized grinder at the Port Harcourt (Diobu, Mile 1) market. The pulverized *Mansonia altissima* was weighed with Mettler Electro Balance Model EA 163 electronic weighing scale into required dosages. The eggs laid per group were recorded daily. Organ specimens were collected at the end of the experiment by sacrificing the 45 birds and subjecting same to laboratory and histopathological examination. Histograms of organ tissues were also taken. The data collected were subjected to statistical analysis using the Analysis of Variance (ANOVA) according to Steel and Torrie (1980) and where differences existed, means were compared using Duncan Multiple Range Test (DMRT) according to Statistical Analysis Procedures of SAS (1999).

Results and Discussion

Post mortem examination performed on the birds sacrificed at the end of the experiment showed enlargement and hyperemia of the testis in group B. All other organs appeared normal in situ (Table 1). In group B, from the histogram, there was no change in the architecture of the testicular tissue but there was a congestion of the micro-vesiculature (Plate II). Similarly in group C, there was severe congestion of the capillaries (Plate IIb). The ovary showed mild congestion in group B (Plate I), and severe congestion in group C. The spleen appeared normal in all the groups. The liver showed portal triaditis and venous congestion in groups B and C, respectively (Plate III). Results showed that there were significant

Table 1: Proximate Composition of pulverized bark of *Mansonia altissima* (%)

1. Moisture Content (M.C)	7.3
2. Ash	8.1
3. Fat	5.3
4. Crude Protein (N x 6.25)	7.2
5. Total Available Carbohydrate	12.6
6. Crude Fibre	59.5

Source: Department of Food Science and Technology, Rivers State University of Science and Technology, Port Harcourt.

Ref: Association of Official Analytical Chemists (AOAC) 1990.

Plate 1 Histograph of the transverse section of the ovary showing congestion (hyperemia) of the ovary of a hen fed *M. altissima* at dosage level of 30g/kg feed (Group B). x 40.

Plate 2 Histograph of the transverse section of the normal ovary (Group A, control) x 40.

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Table 2. Postmortem of the organs of birds fed <i>M. altissima</i>								
Treatment	Proventriculus	Heart	Bursa of Fabricius	Liver	Spleen	Testis	Ovary	
A Male	Normal	Normal	Normal	Normal	Normal	Normal	Nil	
Female	Normal	Normal	Normal	Normal	Normal	Nil	Normal	
B Male	Normal	Normal	Normal	Normal	Normal	Enlarged; 3 x normal	Nil	
Female	Slightly enlarged	Normal	Slightly enlarged	Pale (bronze) and gritty		Nil	Normal	
C Male	Normal	Normal	Normal	Normal	Normal	Normal	Nil	
Female	Normal	Normal	Normal	Normal	Normal	Nil	Normal

Plate II a: Longitudinal section of the histograph of the testis (Group B), showing mild congestion of the capillaries. Arrows point towards the lumen of the capillary x 40.

Plate II b: Longitudinal section of the histograph of the testis showing severe congestion of the capillaries (Group C). Arrows point towards the lumen of the capillary x 40.

Plate III: Histograph of the longitudinal section of the liver of a cock fed *M. altissima* at dosage level of 50g/kg feed, showing portal triaditis and venous congestion, x 40.

Plate III b: Histograph of the transverse section of the liver of a normal cock (control, A), showing lack of presence of inflammatory cells, x 40.

Table 3a: Effect of feeding pulverized bark of *M. altissima* on egg production(no) (%).

Treatment	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Total	Means	STD
A (Control)	22	18	9	11	12	11.913	83	13.833	15.968
B 30g/Kg	(26.51)	(21.67)	(10.84)	(13.25)	(14.46)				
C 50g/kg	21	27	16	18	24	20	126	21	23.350
	(16.67)	(21.43)	(12.70)	(14.29)	(19.05)	(15.87)			
	24	32	30	32	31	28	177	29.50	32.462
	(13.56)	(18.08)	(16.95)	(18.08)	(17.51)	(15.82)			

STD: Standard difference

Table 3b: Effect of *M. altissima* on weekly egg production (Mean $\pm$ SEM).

Week	A(0g/kg feed) (kg)	B(30g/kg feed) Kg	C(50g/kg feed) kg
1.	7.33 $\pm$ 0.33	7.00 $\pm$ 0.57	8.00 $\pm$ 0.57
2.	6.00 $\pm$ 1.00	9.00 $\pm$ 0.57	10.67 $\pm$ 0.67
3.	3.00 $\pm$ 1.05	5.33 $\pm$ 1.33	10.00 $\pm$ 1.73
4.	3.67 $\pm$ 1.85	6.00 $\pm$ 1.09	10.67 $\pm$ 1.76
5.	4.00 $\pm$ 1.52	8.00 $\pm$ 1.15	10.33 $\pm$ 2.02
6.	3.67 $\pm$ 0.33	6.67 $\pm$ 2.02	9.33 $\pm$ 0.33
Overall Final Mean	5.00 $\pm$ 1.00 ^c	7.00 $\pm$ 1.00 ^b	10.00 $\pm$ 1.00 ^a

a, b, c: Means along the same row with different superscripts are significantly different ($P < 0.05$).

Plate 1: Histograph of the transverse section of the spleen of a normal cock (control, A) x 10.

Plate 2: Histograph of the transverse section of the spleen of a cock fed *M. altissima* at dosage level of 50g/kg feed, showing normal tissue x 10.

differences ($P < 0.05$) in the level of egg production between the treatment groups with group C (50g/kg feed) laying the highest number of eggs (Table 2). The histopathological examination showed that the spleen was normal. The function of the spleen as a reticulo-endothelial system (RES) tissue is that of destruction of the erythrocytes at the expiration of normal life span, and the detoxification of metabolites. The normal appearance of the spleen in this experiment suggests that the dosages of *M. altissima* administered are not yet recognized as toxic to the body even at the level of 50g/kg feed (group C). If the dosage administered were toxic to the body, there could have been either splenomegaly (enlargement of the spleen) or shrunken appearance in all the groups that received *M. altissima* as observed in viral infections. The venous congestion and portal triaditis of the liver observed suggests that *M. altissima* has an inflammatory effect on the liver parenchyma. The mild congestion of the capillaries of the testis and severe congestion

(group C), suggest an inflammation of the testis at the dietary inclusion level of 50g/kg feed. This is consistent with the findings of Uku (2002) that administration of *M. altissima* at dosage of 10g/kg and 20g/kg feed, respectively, had a negative effect on the testis of birds. It could be that at higher dosages that those applied in this experiment, the effect in the testicular tissue could have been more destructive. The congestion of the ovaries suggests an onset of inflammation of the ovaries. This corroborates the findings of Wekhe (2002) who reported atrophy of the ovaries of broilers fed pulverized bark of *M. altissima*. The effect on broilers was more pronounced because of their tender age. The *M. altissima* powder destroyed the immature tissues by overwhelming the immature immune system. The older birds (laying hens) used in this experiment were already having active ovaries and so the effect of *M. altissima* on them would not produce an immediate deleterious

effect as it would on broilers since the laying hens with a more functional immune system would be able to withstand the effect of the powder better. However, the congestion observed recalls that the inflammation of the ovarian tissue has not gone beyond the beneficial stage of inflammation since an increase in egg production was still observed in this experiment. Inflammation is on the whole, a beneficial phenomenon, (Smith *et al*, 1974).

Conclusion and Recommendation

If the pulverized bark of *M. altissima* is used as an egg booster (to increase egg production) at the dosages used in this experiment there will be no damage to the organs, namely, liver, spleen, ovary, and testis. Therefore inclusion level of 50g/kg feed is recommended for improved egg production.

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- (Received 16th Sept. 2005; Accepted 13th Oct. 2006)