

Short Communication

Preliminary investigation of the effect of *Rhizophora racemosa* (mangrove) feed additive on broiler performance

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An experiment was conducted to determine the effect of consumption of *Rhizophora racemosa* (Mangrove) incorporated feed on feed intake, body weight gain, and some visceral organs of broiler chicks. Sixty day-old Hubbard broiler chicks were randomly allocated into four treatment groups, A, B, C and D of 15 birds per group and 5 birds per replicate. The dosages of the groups were 0 (control), 10, 20 and 30 g per kilogram of feed, respectively. Results obtained showed that there were no significant differences ($P > 0.05$) among the treatment means with respect to feed consumption/efficiency, and body weight gain. However, a lineal body weight gain was observed. There was obvious hypertrophy of the bursa of Fabricius of groups B, C, and D, indicative of defensive reaction to *R. racemosa* (foreign body) and increase of antibody production. The observed atrophy of the ovaries and the converse hypertrophy of the testes are analogous to decreased ovarian and increased testicular functions, respectively.

Key words: Mangrove, feed intake, weight gain, visceral organs, broilers.

INTRODUCTION

Rhizophora racemosa is a vast and abundant salt-water forest tree, native to and extending from Senegal in West Africa to Angola in Central Africa. It is also found along the east coast of tropical America and the neighbouring islands. Feed additives are non-nutrients of diverse sources including synthetic, biological, medicinal or mineral sources. They may be anabolic, antibiotics, hormones, plants or shrubs or other chemical agents incorporated in feeds to increase production. For example, the use of antibiotics (Maynard et al., 1979; Griffin, 1979; Taylor, 1988; Wekhe and Taylor, 1992; Wekhe and Olowo, 1994), hormones and anabolic (Phimia, 1987; Berepubo and Wekhe, 1993) and amino acids by Syed et al., 1983; Okonkwo and Alhassan, 1977; Wekhe, 2000) to increase weight gain has been severally reported. The use of the shrub *Leucaena leucocephala* as a growth promoter in young chicks (D'Mello et al., 1978), the tree *Mansonia altissima* to increase egg production (Ogbamgba and

Wekhe, 2005) and *M. altissima* as a growth promoter (Ogbamgba and Wekhe, 2006) have also been reported.

It is the abundance and the seemingly forgotten possibility of the economic use of this abundant foliage, *R. racemosa*, which prompted its trial as an additive in broiler feed. Its implication as a feed additive is that it should be included in very small and insignificant economic quantities capable of impacting desirable or suppressing undesirable properties (Richard, 2001) to add significant economic value. It is the objective of this work to explore the possibility of using the foliage of *R. racemosa*, a mangrove forest tree, as a feed additive to enhance the performance of broilers in the tropics.

MATERIALS AND METHODS

Sixty (60) day-old Hubbard broiler chicks were randomly allocated to four treatment groups A, B, C, and D of 15 birds per group. The groups were further replicated randomly into three sections of 5 birds each. The birds had an initial average weight of 40 g each at day old. Pen A was the control while B, C, and D were administer-

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Table 1. *Rhizophora racemosa* (mangrove) feed additive on broiler performance.

Treatments	Overall feed intake (g/bird)	Daily feed intake (g/bird)	Feed to gain ratio (g/bird)	Feed efficiency (g/bird)	Overall wt. (g/bird)	Overall wt. gain (g/bird)	Average daily wt. gain (g/bird)
A	752.5± 199.7	106.40±28.38	3.38± 0.48	0.37±0.09	692.0± 199.4	192.5± 39.8	27.50 ± 5.69
B	804.1± 213.8	114.87±30.54	3.78±1.11	0.46±0.13	844.2± 218.2	207.1±39.2	29.59 ± 5.60
C	824.2± 211.5	117.74±30.21	3.17± 0.59	0.50±0.18	855.5± 216.4	227.1± 39.3	32.45 ± 5.61
D	805.1± 209.7	115.01±29.96	3.26± 0.65	0.48±0.16	846.6± 215.0	215.4± 34.2	30.77 ± 4.89
TOTAL	796.5 ± 99.3	113.51±14.17	3.40± 0.36	0.45±0.07	809.6± 101.7	210.5 ± 183	30.08 ± 2.61

Within column, the means do not differ significantly ($P > 0.05$).

tered the powdered dried mangrove leaf (*R. racemosa*) on dosages of 10, 20 and 30 g per kilogram of feed respectively. At the end of each week the birds in the replicates were weighed collectively, using Avary Diamond weighing scale. Whole fresh leaves of the mangrove tree *R. racemosa* were harvested at the Eagle Island, Port Harcourt, Nigeria, oven dried at 28 – 34°C for 1 - 2 h, milled (pulverized), and weighed out according to their treatment levels with the aid of top load balance (Ohaus Scout II). A proximate analysis of the mangrove leave *R. racemosa* was done to determine the crude protein, ash and fat contents. The powder was dispensed (administered) to the birds in their feed from day 1 to day 56 (eighth week), the end of the experiment. The birds were brooded using electric bulb of 200 watts to provide heat. The feed consumption was monitored daily by the difference between the served and the left-over quantities. The data on feed consumption and weight gain of the birds were taken on a weekly basis, and was analyzed by the Analysis of Variance (ANOVA), and the means separated by Duncan Multiple Range Test (DMRT), Gill (1979).

RESULTS

The proximate composition (g/kg) of the dried mangrove leaves (*R. racemosa*) were: crude protein 9.6, ash 34.69, and fat 2.5%. The average weight gain of 1817.1 g was highest for treatment C which received 20 g/kg feed, followed by treatment D 1723.3 g which received 30 g/kg feed, then treatment B 1656.7 g which received 10 g/kg feed, and lowest for treatment A 1540 g, the control. Birds in treatment C level had the highest weight gain followed closely by those in D level but there were no significant differences ($P > 0.05$) in their weight gain. Similarly there were no significant differences ($P > 0.05$) in feed consumption among the treatment groups (Table 1).

Post mortem examination of some organs of birds slaughtered showed that the testes of birds in group B (10 g/kg feed) were slightly larger than those of group C (20 g/kg feed) and group D (30 g/kg feed). The ovary of group A (control) was slightly bigger (more developed) than those of groups B, C, and D, while the bursa of Fabricus of group B (10 g/kg feed) was slightly bigger than the other treatment groups. The other visceral organs namely spleen, gizzard, kidney, and heart, did not show any visible differences. A total of 13 birds died during the period of the experiment. Four (4) birds died in treatment group B, three (3) in treatment group C, and six (6) in treatment group D. Post mortem examination

showed that one of the birds in group C died of coccidiosis.

DISCUSSION

Observations in this study showed no significant differences ($P > 0.05$) among the treatment groups in their mean final body weights. This means that the additive (powdered *R. racemosa*) did not make any significant impact on the body weight of the birds as was expected. This fact should not condemn the effectiveness of the additive since a marginal (lineal) weight gain was noticed at the end of the experiment that is, a difference of 277.1 g between birds in treatment C which received *R. racemosa* at the rate of 20 g/kg feed, and birds in the control group A, which received no *R. racemosa*. Also the marginal weight gain could be due to the low level of *R. racemosa* additive used. This implies that higher dosages should be tried. The proximate analysis is convincing that the mangrove foliage, *R. racemosa*, could be utilized as a mineral source for broilers (ash 34.69%) and perhaps as forage for lean pork production because of its fat content (2.5%) and protein (9.6%).

The mortality rate recorded was highest in treatment D (30 g/kg feed), followed by treatment B (10 g/kg feed), and lowest in treatment C (20 g/kg feed). For the reason of inconsistency in mortality relative to groups, there is no lead to hold *R. racemosa* as causative, more so as one of the deaths in group C was diagnosed as due to coccidiosis. Since the mortality rate was lowest in birds in group C which recorded the highest weight gain, there is justification in regarding the inclusion level of *R. racemosa* at 20 g/kg feed as safe. The death of the bird in group C, at the seventh week of the experiment diagnosed as due to coccidiosis could be the result of failure of the bird to respond to the coccidiostat which was prophylactically administered to the birds in the third week of the experiment.

The testes of birds in treatment B which received the additive at the rate of 10 g/kg feed were bigger than those of C and D which received the additive at the rate of 20 g/kg feed and 30 g/kg feed, respectively. This means that at the inclusion level of 10 g/kg feed the effect

of *R. racemosa* was optimum for the development or sustenance of the testes. This suggests that *R. racemosa* could be used to enhance the performance of breeder cocks in the broiler industry. While this is suggested, there is the need to assay the hormone levels of testosterone at these dosages. Conversely, the ovaries of the control groups were bigger than those of all the other treatment groups. This means that the ovaries were negatively affected while the testes were positively affected by *R. racemosa*. Again, hormonal assay for estrogen is necessary, just like that for testosterone. When this is done using male and female chickens, the effect of *R. racemosa* in laying birds and cocks will be elucidated.

The increase in size of the bursa of Fabricus in groups B, C and D, suggests an immunological reaction of the birds to the presence of a foreign body. The bursa of Fabricus is a lymphoepithelial organ peculiar to birds. The hypertrophy of the bursa of Fabricus was due to an increased production of antibody against *R. racemosa* which the body regarded as foreign. This finding corroborates the work of Wekhe (2002) who reported an increase in size of the bursa of Fabricus of broilers fed pulverized root bark of *Alchornea cordifolia*, and that of Glick et al. (1967) who reported that the bursa of Fabricus conferred immunological competence to fowls. The other visceral organs, namely, liver, spleen, gizzard, kidney, and heart, did not show any visible pathological differences either in size, texture, or appearance. Consequently *R. racemosa* is not toxic to broiler birds at these levels.

Conclusion

Broiler birds could be fed pulverized leaves of the mangrove tree *R. racemosa* for weight gain though only lineal increases may be observed. The growth enhancing effects of this mangrove tree may be better appreciated if broiler birds are fed fresh leaves or if higher dosages of the pulverized dried leaves are used. It is inconclusive at this point to prescribe *R. racemosa* for weight gain in broilers or to enhance the performance of breeding cocks until further experiments elucidate the enhancing properties more clearly.

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