

PHYTOCHEMICAL COMPONENTS AND SENSORY EVALUATION OF BROILERS FED *Cymbopogon citratus* LEAF MEAL (lm) AS AN ALTERNATIVE TO MYCOTOXIN BINDER

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ABSTRACT

The study was conducted to evaluate the sensory effect of phytochemical components of *Cymbopogon citratus* (Cc) leaf meal on meat quality. 120 Arbor-acre broiler chicks were tested for meat quality in a 56 day feeding program of 30 birds per treatment and 10 birds per replicate. Four experimental diets were formulated, Diet A (control) Diet B1 (control with 0.01% Cc leaf meal) Diet B2 (control with 0.1% of leaf meal) and Diet B3 (control with 0.2% Cc leaf meal) respectively. The phytochemical component of the leaf meal comprises alkaloids, glycosides, tannin, phenolic, saponins and flavonoids which are attributed to bitter, crystalline texture and lemon flavour. There were no significant ($p > 0.05$) differences in colour, texture, taste and odour of broiler meat. The overall acceptability showed significant ($p < 0.05$) difference with diet B3 having the highest value which might be attributed to the flavonoid component in the leaf meal. Conclusively the bitter, crystalline texture and lemon flavour did not have any adverse effect on the meat quality of broiler chicken fed Cc at 0.2% inclusion level.

Keywords: *Cymbopogon citratus*, phytochemical components, mycotoxin binder, sensory evaluation, meat quality.

INTRODUCTION

There has been a steady increase in the demand for poultry products in Nigeria due to increase in population, urbanization, export drive and improved standard of living (Abdullah, *et al.*, 2011; Steinfeld, 2003). This calls for a serious attention with regard to the quality of chicken meat available to the Nigeria population especially with its consistent high quality essential nutrients low saturated fat content, availability, affordability and worldwide patronage. Meat quality has

always been important to the consumer and it is essential for the food industries as demand for quality meat increases endeavour to produce and supply quality meat of high value, tasty, safe, of good flavour and healthy for consumers to ensure continued consumption. (Akinleye, *et al.*, 2017)

Experimental Site

The experiment was carried out at the poultry and livestock unit of Babcock University Teaching and Research farm Ilera Remo Ogun State. *Cymbopogon citratus* were harvested from Babcock University Ilishan Remo Ogun State. The plants were identified and properly authenticated at the department of Botany University of Ibadan Nigeria.

Experimental animal and Design

One hundred and twenty (120) day-old Arbor-acre broilers were purchased from Ajanla farms. These were randomly allocated to four (4) dietary treatments of A, B1, B2, B3, in a completely randomize design in triplicate with 10 birds per replicate. Birds were raised on deep litter system, feeding troughs were provided at the ratio of 10 chicks per trough and the birds were fed *ad libitum* through 8 weeks.

Leaf Meal (LM) Preparation

Mature fresh leaves of *Cymbopogon citratus* were harvested. Harvesting was done between the hours of 016 and 017hours when the plants must have completed their light stage of photosynthetic process for the day. The quantity of leaves needed were air dried at an average room temperature of 27⁰C for seven days and further oven dried to constant weight at 40⁰C for ten hours and then milled with a hammer mill sieve of 0.02 mm diameter (Makanjuola, 1984), to obtain a fine powdery dust stored at 4⁰C in the fridge until ready for use.

Table 1: Gross Composition (%) Of Broiler Starter Experimental Diet

| Ingredients | Diet A 151 ppb aflatoxin plus 0.01% of Mb | B 151ppb aflatoxin plus 0.01% of Ap | C 151ppb aflatoxin plus 0.1% of Ap | D 151ppb aflatoxin plus 0.2% of Ap |
|--------------------------------------|--|--|---|---|
| Maize | 55.00 | 55.00 | 55.00 | 55.00 |
| GNC | 20.00 | 20.00 | 20.00 | 20.00 |
| SBM | 14.30 | 14.30 | 14.30 | 14.30 |
| Fish meal (72%cp) | 3.00 | 3.00 | 3.00 | 3.00 |
| Wheat offal | 2.00 | 2.00 | 2.00 | 2.00 |
| Limestone | 1.00 | 1.00 | 1.00 | 1.00 |
| DCP | 2.00 | 2.00 | 2.00 | 2.00 |
| PKC | 2.00 | 2.00 | 2.00 | 2.00 |
| Common Salt | 0.25 | 0.25 | 0.25 | 0.25 |
| Methionine | 0.10 | 0.10 | 0.10 | 0.10 |
| Lysine | 0.10 | 0.10 | 0.10 | 0.10 |
| Premix | 0.25 | 0.25 | 0.25 | 0.25 |
| Total | 100 | 100 | 100 | 100 |
| Crude protein | 23.08 | 23.08 | 23.08 | 23.08 |
| Metabolizable energy (kcal/kg) | 2960 | 2960 | 2960 | 2960 |
| Ether extract | 4.41 | 4.41 | 4.41 | 4.41 |
| Crude Fibre | 3.85 | 3.85 | 3.85 | 3.85 |

GNC = Groundnuts cake
 PKC = Palm kernel cake
 DCP = Dicalcium phosphate

Table 2: Gross Composition (%) of Broiler Finisher Experimental diet

| Ingredients | Diet A 400ppb aflatoxin plus 0.01% of Mb | B₁ 400ppb aflatoxin plus 0.01% of Cc | B₂ 400ppb aflatoxin plus 0.1% of Cc | B₃ 400ppb aflatoxin plus 0.2% of Cc |
|--------------------------------|---|--|---|---|
| Maize | 59.00 | 59.00 | 59.00 | 59.00 |
| GNC | 17.00 | 17.00 | 17.00 | 17.00 |
| SBM | 8.00 | 8.00 | 8.00 | 8.00 |
| Fishmeal (72% cp) | 1.00 | 1.00 | 1.00 | 1.00 |
| Wheat offal | 5.30 | 5.30 | 5.30 | 5.30 |
| Limestone | 1.50 | 1.50 | 1.50 | 1.50 |
| DCP | 2.00 | 2.00 | 2.00 | 2.00 |
| PKC | 5.50 | 5.50 | 5.50 | 5.50 |
| Common Salt | 0.25 | 0.25 | 0.25 | 0.25 |
| Methionine | 0.10 | 0.10 | 0.10 | 0.10 |
| Lysine | 0.10 | 0.10 | 0.10 | 0.10 |
| Premix | 0.25 | 0.25 | 0.25 | 0.25 |
| Total | 100 | 100 | 100 | 100 |
| Crude protein | 19.52 | 19.52 | 19.52 | 19.52 |
| Metabolizable energy (kcal/kg) | 2998 | 2998 | 2998 | 2998 |
| Ether extract | 4.42 | 4.42 | 4.42 | 4.42 |
| Crude Fibre | 3.72 | 3.72 | 3.72 | 3.72 |

GNC = Groundnuts cake

PKC = Palm kernel cake

DCP = Dicalcium phosphate

Collection of Data

Data were collected to assess the phytochemical components of *Cymbopogon citratus* namely alkaloides, tannin, saponin, phenols, glycosides and meat quality components such as taste, odour, texture and acceptability.

Statistical Analysis

Data obtained were subjected to analysis of variance (ANOVA) using (SAS, 2003) and significant ($P < 0.05$) means were compared using Duncan's Multiple Range Test (DMRT).

RESULT AND DISCUSSION

Phytochemical components of *Cymbopogon citratus*

The leaf meal of *Cymbopogon citratus* was evaluated for nutritional and anti-nutritional compositions the results revealed that the plant leave contained appreciable amount of phytochemicals (alkanoides, glycosides, tannin, flavonoids and saponnins) these composition obtained may be responsible for the nutritional and therapeutic uses. The content of flavonoids suggests possible anti oxidative effects of the plant, leaves flavonoids are phenolic compounds that serve as flavouring ingredients (Uraku, *et al.*, 2016). Alkaloids in the leaf meal are beneficial chemicals repelling parasite effects.

Table 3: phytochemical composition of *Cymbopogon citratus*

| <u>Phytochemical component of <i>Cymbopogon citratus</i></u> | |
|--|------------|
| Alkanoids | 1.38±0.02 |
| Glucosides | 0.10±0.02 |
| Phenolics | 3.58±0.02 |
| Saponins | 1.25±0.14 |
| Flavonoids | 4.76±0.02 |
| Tannin | 15.60±0.03 |

Anayo, *et al.* (2016)

Sensory Evaluation of Broiler Chicken Fed *Cymbopogon citratus* Leaf Meal.

The sensory evaluation was done to test the general acceptability of broiler chicken meat produced through the treatment diets of the above study. Sensory evaluation was done using nine panelist. Bite portion of broiler meat samples weighing 10g were served at room temperature. Results from the panelist were obtained using hedonic scale of ranking as shown in Table 4. The values obtained for colour showed that the highest value, 8.0, was obtained from birds raised on B3 (0.2%) (*Cymbopogon citratus lm*) compared with the control diet (A). The results of texture, odour and taste were not significant ($p>0.05$) which showed that meat of broilers fed with (20g/kg) of *Cymbopogon citratus* were not affected. Although diet A had the highest value (7.6) for

taste this might be as a result of lemon flavonoids in the feed, these variations were not statistically ($p>0.05$) significant. All the meat samples seemed to affirm the reliability and acceptability of B0.2% treated feed sample.

From the results, the hedonic scale ranking where all the parameters chosen by the panelist were greater than 7.5, suggests that sensory evaluation method may be adequate to ascertain the true nature of the parameters under consideration. It is also worthy to note that the taste of the meat did not reflect bitterness as most of the phytochemical component of the leave meal possess bitter taste the flavour of the meat was high on the on B3 this might be as a result of phenolic compound in the leaf meal which serve as flavouring agent in the meat (Shelef, 1983).

In summary the sensory evaluation of broiler chickens fed *Cymbopogon citratus* leaf meal showed no significant ($P>0.05$) difference in colour, texture, odour and taste across the diets.

Table 4: Sensory Evaluation of Broiler Chicken Fed *Cymbopogon citratus* Leaf Meal

| Parameters | A Control | B 1 Control plus 0.01% <i>Cymbopogon citratus</i> LM | B 2 Control plus 0.1% <i>Cymbopogon citratus</i> LM | B 3 Control plus 0.2% <i>Cymbopogon citratus</i> LM | SEM |
|-----------------------|-------------------|--|---|---|------|
| Colour | 7.7 | 7.3 | 7.8 | 8.0 | 0.34 |
| Texture | 7.6 | 7.1 | 6.2 | 7.9 | 0.42 |
| Odour | 7.4 | 6.8 | 7.5 | 8.1 | 0.42 |
| Taste | 7.6 | 7.2 | 7.3 | 7.4 | 0.41 |
| Overall Acceptability | 7.6 ^{ab} | 7.0 ^{ab} | 7.0 ^{ab} | 8.0 ^a | 0.37 |

a,b,c: Means on the same row with the same superscript are not significantly different ($P>0.05$).

SEM=Standard Error of Mean

This was determined by using hedonic scale 1-9 (1=dislike extremely, 2=dislike very much, 3=dislike moderately, 4=dislike slightly, 5=neither like nor dislike, 6=slightly like, 7=like moderately, 8=like very much, 9=like extremely)

CONCLUSION

It can be concluded that *Cymbopogon citratus* leaf meal does not have any adverse effect on meat quality of broiler chicken instead the meat quality improved in taste, texture, odour, acceptability and colour. The phytochemical component in the leave meal does not have any

adverse effect on the meat quality it can be affirmed that *Cymbopogon citratus* leave meal at 0.2% can be added to broiler feed to improve meat quality.

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