SENSORY EVALUATION OF MEAT OBTAINED FROM BROILER CHICKEN FED DIET SUPPLEMENTED WITH MINT (*MENTHA PIPERITA)* AND SCENT (*OCIMUM GRATISSIUM*) LEAF MEALS

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ABSTRACT

In the livestock industry, the restrictions on the non-therapeutic use antibiotics have prompted the investigation of natural growth promoters (NGPs) to enhance animal performance without adverse effects. Scent leaf (Ocimum gratissimum) and mint leaf (Mentha piperta) have garnered attention as potential NGPs .However, the synergistic effects of these leaves and their impact on broiler production remain insufficiently explored. One hundred and sixty 4-week old Arbor Acres broilers were randomly allotted to four treatments and four replicates of ten birds per replicate in a completely randomized design. Four experimental diets were formulated. Diet 1, which was designated as control with no leaf meal supplementation, diet 2 has 2.5g/kg Mentha piperita leaf meal (MPLM)+ 2.5g/kg Ocimum gratissimum leaf meal (OGLM), diet 3 has 5.0g/kg MPLM+ 5.0g/kg OGLM while diet 4 has 7.5g/kg MPLM + 7.5g/kg OGLM . The experiment lasted for 28days. Sensory assessment of broiler breast meat was conducted using a quantitative descriptive analytical scale with semi-trained panelists, and data were analyzed using analysis of variance (ANOVA) and means separated with Duncan Multiple Range Test. The results showed significant differences in colour, flavour, texture, and overall acceptability among treatment groups, particularly favoring broilers fed diets with higher levels of MPLM and OGLM. Despite this, no significant differences were in tenderness and juiciness. These findings suggest that incorporating MPLM and OGLM into broiler diets positively affects sensory attributes. In conclusion, MPLM and OGLM as natural growth promoters in broiler diet of 7.5g/kg MPLM + 7.5g/kg OGLM exhibiting promising outcomes in terms of sensory evaluation.

Keywords: Natural Growth Promoters, Scent Leaf, Mint Leaf, Broiler Chicken, Sensory Attributes

INTRODUCTION

The livestock and poultry industry faces a pressing challenge with the restriction of antibiotics in many countries, driven by concerns over alterations in natural gut microbiota and the emergence of drug resistance in both animals and humans (Broz and Paulus, 2015). In response to this challenge, there has been a growing interest in exploring natural growth promoters (NGPs) as alternatives to antibiotics in broiler chicken diets. The NGPs, including prebiotics, probiotics, symbiotics, enzymes, and plant extracts, offer a promising avenue for maintaining optimal performance in poultry without adverse effects (Dhama *et al.,* 2011).

Among the diverse array of NGPs, plant extracts have garnered particular attention due to their multifaceted beneficial properties in animal nutrition. These bioactive plant constituents have been found to stimulate appetite and feed intake, enhance endogenous digestive enzyme secretion, act as flavouring and colouring agents, and bolster immune responses, while also exhibiting antibacterial, antiviral, and antioxidant actions (Al-Mashhadani, 2015). In light of these attributes, scent leaf (*Ocimum gratissimum*) and mint leaf (*Mentha piperita*) have emerged as promising candidates for incorporation into broiler diets as natural growth promoters.

Scent leaf, a perennial herb widely cultivated in tropical Africa, has gained global recognition for its versatile nutritional, anesthetic, and medicinal uses. Studies have identified a rich array of bioactive compounds in scent leaf, including alkaloids, tannins, flavonoids, terpenoids, and saponins, with a tolerable cyanogenic glycoside content (Ijeh *et al.,* 2004; Mensah *et al.,* 2008). Similarly, mint leaf, a small perennial shrub commonly found in forest undergrowth, is renowned for its high aromatic compound content and diverse pharmacological activities, including anti-tumor, anti-oxidative, anti-mutagenic, and anti-inflammatory properties (Sinha *et al*., 2012; Priya *et al.,* 2014).

Despite the nutritional properties of scent leaf and mint leaf as NGPs in broiler nutrition, there is a paucity of information regarding their potential synergetic effects when incorporated into broiler diets.Therefore, there is a compelling need to investigate the combined impact of *Ocimum gratissimum* and *Mentha piperita* leaf meal supplementation on broiler production, particularly focusing on sensory evaluation. Sensory evaluation serves as a crucial tool for assessing the quality and acceptability of poultry products, providing valuable insights into consumer preferences and satisfaction.In light of the gaps in current knowledge, this study seeks to determine the effect of *Ocimum gratissimum* and *Mentha piperita* leaf meal supplementation in broiler diets on sensory attributes of broiler chicken meat. By elucidating the sensory qualities of meat derived from birds fed these botanical additives, this research aims to contribute to a deeper understanding of their potential as natural growth promoters in poultry production, ultimately informing sustainable and high-quality poultry feeding practices.

MATERIALS AND METHODS

The study was conducted at the Poultry Unit of the Federal College of Agriculture, Moor Plantation, Apata, Ibadan, located in the humid zone of southwestern Nigeria (Oyo State). The geographical coordinates of the site are longitude 03^0 51E and latitude 07^0 23 N and altitude 650 lies in the humid zoneof the rainforest belt 0703.25 of Southwest Nigeria with mean annual rainfall of 122mm and mean temperature of 20^0 C.

Source and Processing of Test Materials

Fresh leaves of *Ocimum gratissimum* and *Mentha piperita* were harvested from the National Crops Research Institute (NCRI), Apata, Ibadan. The leaves were then dried under shade for three days and subsequently crushed by grinding to obtain leaf meal, which was included as part of the experimental diet.

Chemical Analysis

Samples of *Ocimum gratissimum* and *Mentha piperita* leaf meal were subjected to proximate composition analysis following the methods outlined by the Association of Official Analytical Chemists (AOAC, 2005). The analysis was performed at the Biochemical Laboratory of the Institute of Agriculture and Research Training (IARandT).

Experimental Design and Management of Birds

A total of one hundred and sixty (160) four-week-old broiler chickens were randomly selected from chicks raised on the Federal College of Agriculture Poultry farm. The birds were allocated to four dietary treatments in a completely randomized design (CRD), with each treatment consisting of four replicates of ten birds each. Throughout the experimental period, birds were provided ad libitum access to feed and water.

Experimental Diets

Four treatment diets were formulated and labeled as follows:

Treatment 1 (T1): Basal diet without leaf meal supplementation (Control)

Treatment 2 (T2): Basal diet containing 2.5g/kg *Mentha piperita* leaf meal (MPLM) + 2.5g/kg *Ocimum gratissimum* leaf meal (OGLM)

Treatment 3 (T3): Basal diet containing 5.0g/kg MPLM + 5.0g/kg OGLM

Treatment 4 (T4): Basal diet containing 7.5g/kg MPLM + 7.5g/kg OGLM

Data collection and sensory evaluation

Sensory evaluation of meat samples was conducted using a structured questionnaire based on a 9-point Hedonic scale, assessing attributes including flavour, tenderness, juiciness, texture, colour, and overall acceptability. Meat samples weighing 300g from the left side breast muscle were washed, packed, and tagged in transparent polythene bags. The samples were boiled in water for 30 minutes, allowed to cool, and then served to a total of 15 semi-trained panellists for sensory assessment. Data collected were analyzed using analysis of variance (ANOVA) and significant means were separated using Duncan Multiple Range Test. All statistical analyses were performed using SAS software (2002).

Table 1: Gross Composition of Basal Diet of broiler chicken (finisher)

Feed Ingredients	Basal Diet (kg)
Maize	62.5
Soybean Meal	30.5
Fish meal (72%)	1.5
Wheat offal	2
Dicalcium phosphate	1.5
Limestone	1
Lysine	0.25
Methionine	0.25
Premix	0.25
Common salt	0.25
Total	**100**
Calculated Composition	
Metabolizable Energy (kcal/KG)	3035
Crude Protein (%)	19.83
Crude Fat (%)	4.1
Fibre (%)	3.67
Calcium (%)	1.05
Available Phosphorus (%)	0.53
Lysine (%)	1.38
Methionine (%)	0.57

RESULTS AND DISCUSSION

The proximate compositions (Table 2) of *Mentha piperta* and *Ocimum gratissimum* leaves show their potentials as phytonutrient supplements that can promote growth in poultry production. Sensory evaluation of broiler breast meat supplemented with *Ocimum gratissimum* and *Mentha piperta* leaf meal revealed significant differences ($p<0.05$) in sensory attributes across treatment groups, as shown in Table 2. Notably, all sensory parameters exhibited significant variations among treatment means except for tenderness and juiciness. Regarding colour, the mean score of the control treatment (T1) was significantly higher ($p<0.05$) compared to the other treatment groups, indicating a potential influence of leaf meal supplementation on meat colouration (Sinha *et al.,* 2012). Conversely, the flavour mean score of treatment 4, fed a diet supplemented with 7.5g/kg *Mentha piperta* leaf meal (MPLM) and 7.5g/kg *Ocimum gratissimum* leaf meal (OGLM), was significantly higher ($p<0.05$) than the control, suggesting a positive impact on meat flavour (Priya *et al.,* 2014). This result is in line with the findings of Savithri *et al*., 2002 that mint leaves serves as flavouring agent. The taste and overall consumer acceptability score higher in all supplemented diet and least score in control .Although taste scores in treatments 2, 3, and 4 were significantly similar to the control, the organoleptic evaluation revealed higher sensory attributes in birds fed diets supplemented with higher levels of *Ocimum gratissimum* and *Mentha piperta* leaf meal compared to the control group. This aligns with studies emphasizing the positive impact of plant extracts on taste and organoleptic properties (Al-Mashhadani, 2015).Sensory evaluation is crucial in determining consumer acceptability, particularly in the context of food products derived from poultry. The higher organoleptic attributes observed in birds supplemented with *Ocimum gratissimum* and *Mentha piperta* leaf meal highlight the potential of these botanical additives in enhancing meat quality and consumer satisfaction.In conclusion, the results of this study demonstrate the positive impact of dietary supplementation with *Ocimum gratissimum* and *Mentha piperta* leaf meal on the sensory attributes of broiler breast meat.

Table 2: Proximate composition of *Ocimum gratissimum* and *Mentha piperta* leaves

Parameters (%)	*Ocimum gratissimum*	leaf *Mentha pipert leaf*
Crude Protein	14.62 ± 1.31	3.12 ± 0.06
Total Ash	10.54 ± 0.81	5.75 ± 0.12
Crude Fat	2.52 ± 0.03	2.17± 0.04
Crude fibre	7.51 ±0.12	6.60 ± 0.15
Carbohydrate	62.62 ±3.23	46.32 ± 2.10
Dry matter	90.73 ±5.50	92.5 ± 5.45

Table 2: Sensory evaluation of broiler chicken fed diet containing *Ocimum gratissimum* and *Mentha piperta*

Parameters	T1	T2	T3	T4	±SEM
Colour	6.55^{a}	6.11^{b}	5.86^{c}	5.83^{c}	0.11
Flavour	4.00^{b}	4.11^{ab}	4.71^{ab}	5.56^{a}	0.24
Taste	3.91^{b}	6.17^{a}	5.57^{a}	6.22^{a}	0.22
Texture	5.64^{b}	7.00^{a}	6.57^{ab}	6.44^{ab}	0.21
Tenderness	6.27	6.83	6.43	6.78	0.23
Juiciness	5.55	6.00	6.14	6.67	0.30
Overall Acceptability	5.00^{b}	6.33^{a}	6.29^{a}	6.67^{a}	0.21

^{abc} means along the same row with different superscripts are significantly different at $P < 0.05$
SEM: Standard Error of Means
T1: Basal diet without leaf meal supplementation (Control) T2: Basal diet containing 2.5g/kg *Mentha piperita* leaf meal (MPLM) + 2.5g/kg *Ocimum gratissimum* leaf meal (OGLM)
T3: Basal diet containing 5.0g/kg MPLM + 5.0g/kg OGLM, T4: Basal diet containing 7.5g/kg MPLM + 7.5g/kg OGLM

CONCLUSION

In conclusion, the supplementation of broiler chicken diets with *Ocimum gratissimum* and *Mentha piperta* leaf meal resulted in significant improvement in sensory attributes of the breast meat. While there were notable variations in colour, flavour, texture, and overall acceptability among the treatment groups, birds fed diets enriched with higher levels of leaf meal exhibited superior sensory characteristics compared to the control group. Notably, the combination of 7.5g/kg *Mentha piperta* leaf meal and 7.5g/kg *Ocimum gratissimum* leaf meal demonstrated particularly favorable effects on meat flavour. These findings underscore the potential of botanical additives in enhancing the sensory quality of poultry products and suggest avenues for further exploration in optimizing supplementation levels to maximize consumer satisfaction and market acceptance.

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