INFLUENCE OF THORN APPLE AND TURMERIC POWDER BLEND ON MEAT QUALITY OF BROILER CHICKEN

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ABSTRACT
A total of two hundred (200) unsexed day-old Abor acres chicks were used to determine the effect of turmeric and thorn apple on organoleptic and meat quality of broiler chicken. The birds were randomly allotted to five (5) dietary treatments at 40 birds of 4 replicates (10 birds per replicate) each. T1 serves as the control, T2, T3, T4 and T5 contained 2, 4, 6 and 8g of blended thorn apple and turmeric powder per kilogram diet, respectively. The birds were fed for six (6) weeks after which 2 birds per replicate were randomly selected and sacrificed. Meat samples were obtained from the samples and used for organoleptic and quality analysis. Data collected on meat quality of the broiler chickens showed that highest ($P<0.05$) cooking loss (43.47%) was recorded from broiler bird fed diet containing 2g/kg of thorn apple and turmeric blend while broiler fed diet containing 8g/kg had the least (36.82%) value. Highest value ($P<0.05$) of refrigeration loss (5.40%) was recorded from broiler bird fed diet containing 4g/kg of thorn apple and turmeric blend while broiler fed control diet (0g/kg) had the least (0.00). The highest value (3.00) was recorded at 8g blend for aroma while the least value (1.00) was recorded at 4g. Appearance had highest value (3.50) recorded at 6g while the least value (2.00) was recorded from 4g. It was concluded base on the result obtained that utilization of turmeric and thorn apple blend at 2g/kg had positive effect on meat quality of broiler chicken and can be utilized by poultry farmers.

Keywords: Broiler chicken, Turmeric, Thorn Apple, Meat quality.

DESCRIPTION OF PROBLEM

Poultry meat is a vital source of high-quality protein, minerals, and vitamins that help to keep the human diet balanced (1). In order to improve the performance of poultry birds, commercially accessible antibiotics have been utilized in their feeds for past decades to provide therapeutic and prophylactic treatments against exogenous and endogenous infections. These antibiotics aid in the reduction of morbidity and mortality in chicken, but they also have the potential to harm public health by promoting the development of drug resistance microflora (2). Thus, the use of plants-based phyto-additives in livestock production has gradually gained interest against the use of synthetic antibiotics as measure to avert the adverse residual effects on antibiotic resistance in animals and consumers of animal products (3). Herbal plants have the potential to be used in ethnomedicine, most of which are very safe for farm animals and human being (4).

Phytobiotics are used for promoting growth and improving meat and egg quality in poultry production. More so, that synthetic antibiotic growth promoters (AGPs) have been gradually eliminated from animal production owing to the increased risk of occurrence of antimicrobial resistance, the use of phytobiotics as an alternative to AGPs has been extended to farm animals for improving their intestinal status and subsequently promoting growth (3). Turmeric and thorn apple has medicinal properties. They contains different type of phytochemical compounds which include saponins, tannins, steroids, alkaloids, flavonoids, phenols and glycosides (5) and (6). These additives when used appropriately, can contribute to improved broiler growth and health, making them valuable components of modern poultry nutrition strategies. Hence, the study evaluated the effect of using Thorn Apple and Turmeric as feed additives in broiler production.

Materials and Methods

Experimental site

The experiment was carried out at the Poultry Unit of Teaching and Research Farm, Ladoke

Akintola University of Technology Ogbomoso, Oyo State Nigeria.

Procurement and Processing of Test Ingredients

Thorn apple fruit was fetched within Teaching and Research Farm, Ladoke Akintola University of Technology, Ogbomoso, Oyo State while Turmeric rhizome was purchased from a local market in Ogbomoso. They were clean and later sliced into flakes to increase the surface area to aid drying. Thereafter each of the test ingredients were air dried until the weight remains constant. The test ingredients were reduced into lentil-size part with the aid of mortar and pestle and milled into fine powdery form with the use of electric blender following method described by (7). Thereafter it was sieved and stored in air-tight container until use.

Experimental birds and management

Two hundred (200) unsexed day-old Abor acre chicks were purchased from a reputable hatchery and used for experiment. The birds were randomly allotted into five (5) dietary treatments of 40 birds per treatment and 4 replicate of 10 birds per replicate in a completely randomized design. Five experimental diets were formulated such that blend per 1kg feed in T_1 while T_2, T_3, T_4 and contained 2g/kg, 4g/kg, 6g/kg and 8g/kg of blend thorn apple and turmeric.

Data Collection

Determination of Water Absorptive Power of Meat

At the expiration of six weeks feeding trial, two sample birds per replicate were randomly selected, sacrificed and 20g each of two breast meat samples per replicate were cut and placed in clean test tubes; 10mls of distilled water was poured in and left for an hour. After the time elapsed, each sample were removed and reweighed. The increase in the weight of the sample indicated the volume of water absorbed.

WAP (g) = Final weight (g) – Initial weight (g)

Determination Meat Refrigeration Loss

Another 20g each of two breast meat samples per replicate were cut and labelled before refrigeration at 4ºC and weighed again after 24hours of refrigeration to determine the chilling loss as follows:

Refrigerated loss (g) = Weight before refrigeration (g) – weight after refrigeration (g)

Determination of Meat Cook Loss

A sample of 200g each of two breast meat samples per replicate were cut and weighed, wrapped in an individual airtight polythene bag, then cooked for 30 minutes at 70^0C in a water bath. After cooking, all meat samples had any remaining moisture removed, and they were allowed to cool to room temperature. The meat samples were reweighed accordingly and difference in weight was obtained as cooking weight loss.

Cook loss (g) = Weight before cooking (g) – weight after cooking (g)

Meat Sensory Evaluation

Two hundred gram (200g) each of two breast meat samples per replicate were cut and weighed. They were washed in clean water, packed in a transparent polythene bag and tagged for identification accordingly. After that, they were cooked for 45 minutes in a water bath at 70 degrees Celsius, cooled to room temperature, and then were served to the 20 trained panelists for the purpose of sensory evaluation. The trained panelists were given at room temperature, bite-sized portions of boiled meat samples. Every panelist had to masticate one sample for each treatment. Ranking their preference: color, aroma, taste and overall acceptability and then awarded scores using a 9-point Hedonic scale Dislike extremely, Dislike very much, Dislike moderately, Dislike slightly, Intermediate, Like slightly, Like moderately, Like very much and Like extremely

Data analysis

All data collected were analysed using ANOVA as contained in SAS (8). Significant means were separated using Duncan Multiple Range Test of same software package.

RESULTS AND DISCUSSION

Table 1 the result of meat quality of meat sample from broiler chicken fed varying level of thorn apple and turmeric blend. Significant ($P<0.05$) difference was recorded among treatment in all the parameters. Highest ($P<0.05$) water absorptive power (3.95%) was recorded from broiler bird fed diet containing 2g/kg of thorn

apple and turmeric blend while broiler fed diet containing 8g/kg had the least (0.98%) value. Highest (P<0.05) cook loss (43.47%) was recorded with broiler bird fed diet containing (2g/kg) of thorn apple and turmeric blend while broiler fed diet containing 8g/kg had the least (36.82%). Highest (P<0.05) refrigeration loss (5.40%) was recorded with broiler bird fed diet containing 4g/kg of thorn apple and turmeric blend while broilers fed control diet had the least (0.00%). Results obtained agrees with the report of (9), that phytobiotics are rich in flavonoids and essential oils that can help improve muscle fiber structure and moisture retention. The result was also in line with report of (10) who stated that inclusion of turmeric and ginger has significant influence on the meat of broiler birds. It was observed that the value of cook loss and refrigeration loss increases because of the increasing value of water absorptive power of meat as the inclusion level of the blend increased.

Table 1: Effect of thorn apple and turmeric blend at different inclusion level on the meat quality of broiler chicken.

Parameters (%)	**T1[0g/kg]**	**T2[2g/kg]**	**T3[4g/kg]**	**T4[6g/kg]**	**T5[8g/kg]**	**SEM**
WAP	1.72^{b}	3.95^{a}	2.92^{ab}	2.70^{ab}	0.98^{b}	0.32
Cook loss	38.40^{ab}	43.47^{a}	39.15^{ab}	39.52^{ab}	36.82^{b}	0.89
Refrigeration loss	0.00^{b}	1.10^{b}	5.40^{a}	0.00^{b}	2.85^{ab}	0.64

^{ab}means on same row with different superscript were significant (p<0.05) different, WAP; Water absorptive power.

Organoleptic properties of broiler chicken fed graded levels of blend thorn apple and turmeric powder was significantly (p<0.05) different in term of aroma. Tenderness and Oily/Greasy (Table 2). The highest value of aroma was recorded from T5 (3.00) while the least value was recorded at T3 (1.00). Meat from birds fed diets containing 6g/kg of blend thorn apple and turmeric () was most appealing in appearance (3.50) while the least value (2.00) was recorded at T3 (diet contained 4g/kg of blend thorn apple and turmeric), though no definite trend was ascertained. Texture, had the highest value at T2 (3.00) while the least value was recorded at T1 (1.00). Tenderness, had the highest value at T3 (3.00) while the least value was recorded at T4 (2.00). Oily/Greasy, had highest value at T3 (3.50) while the least value was recorded at T5 (2.00). Herbs can improve the visual appeal of meat by enhancing pigmentation, which can be related to the antioxidant properties of certain herbs (11). The poor appearance in T3 could be linked to suboptimal feed processing or the excessive concentration of the herbal mixture. According to Martin and Green (9), herbs rich in flavonoids and essential oils can improve meat texture and juiciness by enhancing muscle fiber structure and moisture retention. (12) reported that the inclusion of herbal extracts in poultry diets can influence meat tenderness by affecting collagen fiber breakdown. The improved tenderness in T5 could be due to the high levels of bioactive compounds present in both herbs, which promote enzymatic activity that softens muscle tissues. Also, there was preference for the meat that contain the thorn apple and turmeric additives because of the active ingredients that is present in the Phytobiotics which has been proven to give good aroma, appearance, texture and this agrees with the report of (10).

Table 2: Effect of graded levels of thorn apple and turmeric blend on organoleptic properties of broiler birds

Parameters	T1(0g/kg)	T2(2g/kg)	T3(4g/kg)	T4(6g/kg)	T5(8g/kg)	SEM
Aroma	2.00^{abc}	1.50^{bc}	1.00^{c}	2.50^{ab}	3.00^{a}	0.20
Appearance	2.50^{ab}	2.50^{ab}	2.00^{b}	3.50^{a}	3.00^{ab}	0.19
Texture	1.00^{c}	3.00^{a}	2.00^{b}	2.00^{b}	2.50^{b}	0.18
Juiciness	2.00	3.00	2.00	3.00	2.50	0.17
Tenderness	2.50^{b}	2.00^{c}	3.00^{a}	2.00^{c}	2.50^{b}	0.09
Oily/Greasy	3.50^{a}	2.50^{bc}	3.50^{a}	3.00^{ab}	2.00^{c}	0.15

^{abc} Means there were significant different (p<0.05) across the treatment, S.E.M: Standard Error of Means

CONCLUSION AND APPLICATION

It can be concluded that inclusion of turmeric and thorn apple blend has positive effect on meat quality of broiler chicken at all levels with no definite trend with respect to all parameters measured. However, when appearance is considered, 6g/kg played the leading role.

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