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Research Paper

Sensory Evaluation and Fatty Acid Composition of Broiler Chickens Fed Diets Containing with *Prosopis africana* Essential Oil

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Abstract

Exploring the use of phytogenic components in plants is one of the ways to ensure safety in food and sustainable livestock production. This experiment was designed to investigate the sensory evaluation and fatty acid composition of broiler chickens fed diets containing *Prosopis africana* essential oil. A total of 540 – one-day-old broiler chicks (Arbo Acres) were randomly distributed into 6 treatments, each containing six replicates of 15 birds. Experimental diets were adequate in all nutrients (NRC, 1994). Birds in treatment one were fed a basal diet without *Prosopis africana* oil, a basal diet with antibiotic growth promoter (oxytetracycline at 2.5 g/kilogram) was fed to treatment two while treatment three, four, five, and six were fed a basal diet supplemented with 200 mg, 400 mg, 600 mg and 800 mg per kilogram respectively. A completely randomized design was used and the experiment lasted for 56 days. Feed and freshwater were offered *ad libitum* and other management practices were rigorously followed. Result revealed that the composition of total monosaturated fatty acid and total polyunsaturated fatty acid was significantly (*P*<0.05) influenced by the treatments. Total saturated fatty acid (TSFA) levels decrease as the level of *Prosopis africana* oil increases across the treatments (P<0.05). TSFA values were highest in treatment 1, intermediate in treatment 2, and lowest in treatments three through six. Omega 3: omega 6 fatty acid and atherogenicity index were significantly (P<0.05) different among the treatments. *Prosopis africana* oil also influenced the color, flavor, tenderness, juiciness, texture, and general acceptability of broilers meat. It was concluded that the dietary supplementation of *Prosopis africana* oil has several phytoconstituents that can modify the fatty acid of meat, enhancing its quality, shelf life and sensory attributes. Without having a negative impact on the health of birds. It can be added to the diet of broiler chickens up to 800 mg per kilogram.

Keywords *Phytochemicals, Prosopis africana oil, fatty acid, sensory qualities, Oxytetracycline*

INTRODUCTION

The need for the animal sector to create ever-more-sophisticated strategies for producing animal protein in increasingly environmentally and economically responsible ways is growing. In addition to setting up ethical and environmentally friendly structures for subsequent generations, this is done to ensure that food is safe for consumption today (Gasco et al., 2020; Kianfar, 2021). The incorporation of feed additives to accomplish these objectives has grown increasingly crucial as regulations and consumer interest demand that nutrition for animals is gain more accurate than ever, particularly in light of the worldwide prohibition on the use of antibiotic growth promoters that was implemented in 2009 by the European Union and other nations (Asoudeh et al., 2022; Luthada-Raswiswi et al., 2021). Phytogenic compounds are the most viable class of feed additives

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among antibiotic replacements.
Due to their wide spectrum of efficiency and additional benefits on sustainability and safety, phytogenic feed additives are expected to have a bright future in animal nutrition (Malyugina et al., 2021; Mordenti et al., 2021). Phytogenic feed additions include a variety of plants, including herbs, spices, and essential oils obtained from plants, including *Prosopis africana* oil (Ayanwuyi et al., 2010; Falade & Akeem, 2020b; Obode et al., 2021). Because of the variety of their constituents and other impacting variables like location, harvest, species, stage, and storage conditions, *Prosopis africana* essential oils exhibit some diversity in their chemical composition. Numerous constituents of essential oils have antibacterial properties (Ali et al., 2022; J.O., 2022). For instance, Prosogerin A and B in Prosopis essential oil work alongside the cell membrane to create their antibacterial effects. The linking of an ion through the cell membrane results from this contract, which alters the shape of the membrane structure (Adekiya et al., 2019; El-Imam et al., 2022).
(Nwokocha & Williams, 2016) observed that essential oil might modify the fatty acid composition of the flesh of broiler chickens and relieve the growth depression caused by a challenge with Clostridium perfringens, by (Falade & Akeem, 2020a; Yanda et al., 2022) findings. *Prosopis africana* oil supplementation up to 800 mg/kg was found to enhance growth performance, boost the number of fecal lactobacillus, lower Escherichia coli counts, and stimulate animal immunological responses, according to (Ishola et al., 2011; Oni et al., 2020; Yanda et al., 2022). Numerous studies suggest beneficial impacts on the morphology of the digestive tract in chickens. Birds fed *Prosopis africana* oil-supplemented diets showed increased trans-epithelial resistance of the duodenal mucosa (Nadaf et al., 2015; Oria et al., 2022).
Prosopis africana essential oil has a wealth of potential and contains naturally occurring bioactive substances. Presuming that it cannot be hazardous to animals at a specific amount is incorrect. Modulating the meat's polyunsaturated fatty acid will extend its shelf life and contribute to a decrease in the prevalence of cardiovascular ailments which can be achieved by the supplementation of essential oil in the diet of birds (Elijah et al., 2019; Nnamani et al., 2022). Therefore this study was undertaken to evaluate the effects of dietary supplementation of *Prosopis africana* essential oil on sensory evaluation of meat quality of broiler chickens.

RESEARCH METHOD

Experimental site

The Department of Animal Science, Faculty of Agriculture, University of Abuja Teaching and Research Farm, Main Campus, located along Airport Road, Gwagwalada, Abuja, Nigeria was where this study was conducted. The Gwagwalada Area Council's administrative center is in Gwagwalada, which is situated between latitudes 8^{o}571 and 8^{o}551N and longitudes 7^{o}051 and 7^{o}061E (NPC, 2006).

Gathering, and identifying a sample of plants and *Prosopis africana* oil extraction

Prosopis africana seeds used in this investigation were from the Gwagwalada area. The seeds were recognized and confirmed by the Department of Crop Protection Herbarium, University of Abuja, Gwagwalada, Nigeria, with voucher code ANS - 2021D.
The steam-distillation process, which also requires the use of an electronic scale, a round-bottom flask, water from distillation, a heating mantle composed of glass fiber, a measuring cylinder, and a separatory funnel, was used to extract *Prosopis africana* oil. A round-bottom flask was filled with 250 mL of distilled water and 50 g of pulverized Prosopis seed. The condenser was set up above the flask with a circular bottom after the mixture was transferred to a glass yarn heating mantle and heated to a temperature of eighty degrees centigrade. The mixture is forced to boil for a period of

fifteen minutes, after which the distillate is gathered in a beaker until no more oil drips are visible, and then it is poured into a separatory funnel to yield *Prosospis africana* oil.

Diets and other aspects of animal care

540 mixed-sex broiler chicks (Arbo Acres) were randomly distributed into 6 treatments, each containing six replicates of 15 birds. The birds were bought from a well-known commercial hatchery in Oyo State, Nigeria. In a galvanized battery cage with semi-open pens measuring (100 cm ×75 cm × 50 cm) (length depth height), galvanized hand feeders and automatic nipple drinkers were installed. When the chicks arrived, they were measured to determine their average beginning body weight before being fed anti-stress (Vitalyte wsp + glucose) at a rate of 2 grams of glucose to 5 liters of water. A random experimental design was used in this study. Diets were created based on the nutritional requirements for broilers published by NRC (1994), which are displayed in Table 1. The trial diet contains 23.30% crude protein (CP), 21.40% CP, and ME at the starter phase (1-28 days) and finisher phase (29-56 days) of 2991.5 Kcal/kg and 3108.1 Kcal/kg, respectively. All birds had unlimited access to food and water for the eight weeks of the trial. Vaccination schedule is presented in Table 2.

The experimental set –up is shown as follows:

First-line treatment (T1) *Prosopis africana* oil -free basic diet

2nd-line treatment (T2): oxytetracycline 2.5 g/kg added to the standard diet

3rd-line treatment: basal diet plus 200 mg per kg Prosopis *africana* oil

Fourth-line treatment (T4): basal diet plus 400 mg per kg *Prosopis africana* oil

Fifth-line treatment (T5): basal diet plus 600 mg per *Prosopis africana* oil

Sixth-line treatment (T6): basal diet plus 800 mgkg of *Prosopis africana* oil

Data collected

Meat sample fatty acid content

Twelve birds per group had their breast and thighs removed, and the overall lipids from all these parts were obtained using Bligh and Dyer's method (1959). According to Christie's description, 0.01 % sulfuric acid solution in dry methanol was used for 14 hours to produce the methyl esters of the total lipids that were extracted by sample preparation thin layer chromatography (1973). Gas-liquid chromatography examination employing a chromatograph CSi 200 fitted with a capillary column (DM-2330:30 m 0.25 mm 0.33 m) with hydrogen as a carrier gas was used to assess the fatty acid contents of lipid content. The temperature of the detector and injectors was 230 ^{o}C, and the oven temperature was first set to 160 ^{o}C for 0.2 min. After that, it was increased to 220 ^{o}C at a speed of five ^{o}C min-1 and maintained there for 5 min comparing the retention periods of the benchmarks to the methyl esters allowed for their identification. By contrasting the comparable chain length with that of genuine fatty acid methyl esters, the peaks were identified. With the use of the Agilent gas chromatography chem station software, peak areas were calculated automatically (Gujarat Technologies, USA). The fatty acid concentrations are expressed as a proportion of the overall amount of peaks that were recorded for each sample and were recognized.

Sensory assessment

10 panelists conducted a sensory assessment of cooked samples of minced broiler chicken breast and thigh meat from six birds per treatment (from birds used for fatty acid investigation). The panelists assessed a number of factors, including color, juiciness, flavor, tenderness, and overall acceptability. Every representative of the panel received a tagged sample of beef, which was distributed one by one. After consuming every meat sample, each participant rinsed their mouth

completely with warm water to prevent a baggage effect. Using only a nine-point hedonic scale, the panelists assigned scores: (i) Very dislike; (ii) Extremely dislike (iii) Medium dislike (iv), Minor dislike (v), Middle dislike (vi), Minor dislike (vii), Moderate dislike (viii), Extreme dislike (ix), and Like slightly.

Proximate analysis of experimental feed

Analysis of feed of experimental feed was done using Phoenix 5000 near infra-red (NIR) feed analyzer with the following specifications; wavelength (1100 – 2500 nm), photometric noise (< 15 μAu in standard range), measurement mode (reflectance or transfectants), wavelength accuracy (< 0.3 nm for Blue Sun selected published peak positions of NIST SRM 1920a standard), wavelength reproducibility (0.02 nm based on Blue Sun Scientific specific diagnostic test), analysis time (10 to 60 seconds), ambient humidity (< 85 % RH) and detector (high performance InGaAs extended ranged detector).

Statistical investigation

Using SPSS (25.0), a one-way analysis of variance was performed on all data, and Duncan multiple range tests were used to identify significant means (Duncan, 1955). If P< 0.05, significance was deemed to exist.

Table 1: Ingredient composition of the experimental diets

Components	Starters mash (0-4 weeks)	Finishers mash (5-8 weeks)
Maize	52.00	60.00
Wheat offal	2.50	5.00
Soya bean meal	30.00	25.00
Groundnut cake	8.00	4.00
Fish meal (72%)	2.00	2.00
Limestone	1.50	1.50
Bone meal	3.00	3.00
Lysine	0.20	0.20
Methionine	0.20	0.20
*Premix	0.25	0.25
Salt	0.30	0.30
Toxin binder	0.10	0.10
Total	100.0	100.0
Determined analysis (% DM)		
Crude protein	23.30	21.40
Crude fibre	4.18	5.01
Ether extract	4.03	4.47
Calcium	1.50	1.60
Phosphorus	0.58	0.66
Energy (Kcal/kg)	2900.3	3200.8

*Premix supplied per kg diet: - vit A, 13,000 I.U; vit E, 5mg; vit D3, 3000I.U, vit K, 3mg; vit B2, 5.5mg; Niacin, 25mg; vit B12, 16mg; choline chloride, 120mg; Mn, 5.2mg; Zn, 25mg; Cu, 2.6g; folic acid, 2mg; Fe, 5g; pantothenic acid, 10mg; biotin, 30.5g; antioxidant, 56mg (starter's mash)

**Premix supplied per kg diet: - vit A, 9,000 I.U; vit E, 10mg; vit D3, 1500I.U, vit K, 3.8mg; vit B2, 10 mg; Niacin, 15mg; vit B12, 10mg; choline chloride, 250mg; Mn, 5.0mg; Zn, 56mg; Cu, 1.6g; folic acid, 2.8mg; Fe, 5.1g; pantothenic acid, 10mg; biotin, 30.5g; antioxidant, 56mg (finisher's mash)

Table 2: Vaccination program for birds

Age/day	Vaccines	Route of administration
7	Lasota (1st dose)	Drinking water
11	Gumboro (1st dose)	Drinking water
15	Lasota (2nd dose)	Drinking water
21	Gumboro (2nd dose)	Drinking water
28	Gumboro (3rd dose)	Drinking water

FINDINGS AND DISCUSSION

The impact of *Prosopis africana* oil on the chicken breast flesh

Table 3 shows the impact of *Prosopis africana* oil on the chicken broiler's breast muscle. Myristoleic acid, palmitic acid, stearic acid, arachidic acid, behenic acid, oleic acid, elaidic acid, erucic acid, vaccenic acid, linolenic acid, -linolenic acid, eicosapentaenoic acid, docosahexaenoic acid, and linoleic acid values varied from 12.7 to 22.1 percent, 5.02 to 11.1 percent, 1.73 – 4.10 percent, 0.10 – 0.30 percent, 1.25 – 3.94 percent, 2.01 – 4.03 percent, 10.9 – 23.7 percent, 1.00 – 1.93 percent, 0.10 – 1.02 percent, 11.7 – 25.1 percent, 0.61 – 1.34 percent, 2.80 – 13.9 percent, 1.17 – 3.21 percent, 0.42 – 1.64 percent and 0.10 – 1.72 percent correspondingly. Omega 6: Omega 3 (2.60–3.11 percent), total saturated fatty acids [TSFA; 16.94–53.80 percent], unsaturated fatty acids [USFA; 36.20–83.06 percent], with atherogenic index (0.25–0.92 percent). Whereas USFA readings appeared statistically ($P<0.05$) different between treatments, TSFA values were considerably ($P<0.05$) higher in T1 and T2, midrange in T3, with the smallest in T4, T5, as well as T6.

Table 3: The impact of *Prosopis africana* oil on the chicken breast flesh

Fatty Acids	T1	T2	T3	T4	T5	T6	SEM	*P*-value
C14:0	3.10^{a}	2.91^{b}	2.41^{b}	2.21^{b}	2.19^{c}	2.02^{c}	0.63	0.08
C16:0	22.1^{a}	20.0^{b}	14.2^{b}	14.1^{c}	13.7^{c}	12.7^{c}	1.30	0.02
C18:0	11.1^{a}	10.3^{b}	6.72^{b}	6.01^{c}	5.64^{c}	5.02^{c}	0.72	0.80
C20:0	4.10^{a}	3.11^{a}	2.50^{b}	2.26^{b}	1.81^{c}	1.73^{c}	0.23	0.08
C22:0	0.30^{a}	0.27^{b}	0.20^{b}	0.15^{b}	0.14^{b}	0.10^{b}	0.04	0.29
C14:1c	1.25^{c}	1.14^{a}	2.91^{a}	3.11^{a}	3.90^{a}	3.94^{a}	0.08	0.46
C16:1c	2.01^{b}	2.71^{b}	3.41^{b}	3.48^{a}	3.56^{a}	4.03^{a}	0.06	0.50
C18:1c	10.9^{c}	14.2^{b}	20.1^{b}	21.8^{a}	23.1^{a}	23.71^{a}	1.05	0.40

C18:1n9t	1.00[c]	1.13[b]	1.51[b]	1.54[b]	1.80[a]	1.93[a]	0.08	0.27
C18:1n9c	0.61	0.80	1.00	1.05	1.40	1.44[a]	0.03	0.21
C:22:1	0.10[b]	0.17[a]	0.84[a]	0.92[a]	1.00[a]	1.02[a]	0.06	0.61
C18:2n6	11.7[c]	14.0[b]	21.5[a]	23.1[a]	24.6[a]	25.1[a]	0.54	0.37
C18:5n3	0.61[c]	0.65[b]	0.93[b]	1.10[b]	1.28[a]	1.34[a]	0.07	0.75
C18:3n3	2.80[c]	3.09[b]	7.36[b]	9.19[a]	11.3[a]	13.9[a]	0.40	0.31
C20:4n6	1.17[b]	1.85[b]	2.50[b]	2.67[b]	3.06[a]	3.21[a]	0.18	0.20
C20:3n6	0.42[b]	0.78[a]	1.10[a]	1.35[a]	1.40[a]	1.64[a]	0.12	0.004
C22:6n3	0.10[c]	0.25[b]	0.84[b]	1.02[b]	1.63[a]	1.72[a]	0.10	0.02
TSFA[1]	53.80[a]	50.70[a]	39.21[b]	18.67[c]	17.80[c]	16.94[c]	2.71	0.21
TUFA[2]	36.20[c]	49.30[b]	79.45[a]	81.33[a]	82.20[a]	83.06[a]	4.47	0.05
MUFA[3]	20.08[c]	27.90[b]	34.10[a]	35.22[a]	35.60[a]	36.06[a]	2.32	0.01
PUFA[4]	26.12[c]	31.40[b]	45.35[a]	46.11[a]	46.60[a]	47.00[a]	2.60	0.02
n-6:n-3[5]	3.58[a]	3.11[a]	3.00[a]	2.92[b]	2.77[b]	2.60[b]	0.03	0.01
Ant. Index[6]	0.92[a]	0.97[a]	0.62[b]	0.50[b]	0.36[c]	0.25[c]	0.01	0.001

[1]Total saturated fatty acid= C14:0 + C16:0 + C18:0 + C20:0 +C22:0
[2]Unsaturated fatty acid [TSFA] = (3 + 4)
[3]Mono unsaturated fatty acid [TMUFA] = C14:1C + C16:1_C + C18:1_C + C18:1n9t + C18:1n9c + C22:1
[4]Polyunsaturated fatty acid [TPUFA] = C18:2 n6 + C20:5 n3 + C18:3n3 + C20:4n6 + C20:3n6 + C: 22:6n3
[5]n-6: n-3 = (C18:2 n6 + C20:4n 6 + C20:3n 6 / (C20:5n 3 + C18:3n 3 + C:22 6n 3), [6]Antherogenic index = (C12:0+ 4×C14:0+ C16)/∑ of UFA

The potential impact of *Prosopis africana* oil on the chicken broiler's thigh muscle

The impact of *Prosopis africana* oil here on the thigh muscles of broiler chickens is shown in Table 4. Myristyic acid [C14:0; 2.18 – 3.18 percent], palmitic acid [C16:0; 14.3 – 22.9 percent], strearic acid [C18:0; 4.18 – 11.20 percent], arachidic acid [C:20; 1.45 – 4.21 percent], behenic acid [C:22; 0.20 – 0.31 %], myristoleic acid [C14:1c; 1.81 – 2.66 %], palmitoleic acid [C16:1c; 2.01 – 3.40 percent], oleic acid [C18:1n 9t; 1.20 – 2.00 percent], elaidic acid [C18:1n 9c; 0.51 – 1.00 %], erucic acid [C22:1; 0.13 – 0.87 percent], vaccenic acid [C18:2n6; 15.4 – 24.0 percent], linolenic acid [C18:5n3; 0.88 – 1.89 percent], α-linolenic acid [C18:3n3; 3.04 – 15.6 percent], eicosapentaenoic acid [C20:4n6; 2.08 – 4.00 percent], docosahexaenoic acid [C20:3n6; 0.92 – 1.88 percent] and linoeladic acid [C22:6n3; 0.05 – 2.31 percent], total saturated fatty acid [TSFA; 20.18 – 49.80 percent], monosaturated fatty acid [TMUFA; 23.12 – 31.22 percent] and polyunsaturated fatty acid [TPUFA; 27.08 – 47.60 percent]. The highest levels of PUFA and MUFA were found in T3-T6, whereas the lowest levels were found in T1 ($P<0.05$). The therapies had a substantial ($P<0.05$) impact on TSFA.

Table 4: Potential impact of *Prosopis africana* oil on the chicken broiler's thigh muscle

F. Acids	T1	T2	T3	T4	T5	T6	SEM	*P*-value
C14:0	3.18^{a}	2.48^{b}	2.42^{b}	2.37^{b}	2.21^{c}	2.18^{c}	0.08	0.32
C16:0	22.9^{a}	18.0^{b}	17.2^{b}	16.3^{c}	15.0^{c}	14.3^{c}	0.51	0.61
C18:0	11.2^{a}	8.71^{b}	7.62^{b}	6.00^{c}	5.73^{c}	4.18^{c}	0.30	0.31
C20:0	4.21^{a}	3.93^{a}	2.81^{b}	2.40^{b}	1.88^{c}	1.45^{c}	0.73	0.74
C22:0	0.31^{a}	0.21^{b}	0.27^{b}	0.20^{b}	0.24^{b}	0.20^{b}	0.07	0.005
C14:1c	1.81^{c}	2.88^{a}	2.73^{a}	2.91^{a}	2.97^{a}	2.66^{a}	0.08	0.007
C16:1c	2.01^{b}	2.21^{b}	2.93^{b}	3.18^{a}	3.51^{a}	3.40^{a}	0.04	0.28
C18:1c	13.4^{c}	18.7^{b}	19.5^{b}	21.0^{a}	21.7^{a}	22.8^{a}	0.26	0.02
C18:1n9t	1.20^{c}	1.51^{b}	1.40^{b}	1.44^{b}	1.86^{a}	2.00^{a}	0.06	0.02
C18:1n9c	0.51^{c}	0.56^{c}	0.80^{b}	0.83^{b}	0.87^{b}	1.00^{a}	0.02	0.11
C:22:1	0.13^{b}	0.47^{a}	0.51^{a}	0.53^{a}	0.66^{a}	0.87^{a}	0.04	0.64
C18:2n6	15.4^{c}	19.8^{b}	22.0^{a}	22.8^{a}	23.4^{a}	24.0^{a}	0.23	0.16
C20:5n3	0.88^{c}	1.05^{b}	1.10^{b}	1.14^{b}	1.51^{a}	1.89^{a}	0.18	0.0001
C18:3n3	3.04^{c}	8.08^{b}	10.3^{b}	13.1^{a}	14.3^{a}	15.6^{a}	0.22	0.06
C20:4n6	2.08^{b}	2.21^{b}	2.59^{b}	2.87^{b}	3.81^{a}	4.00^{a}	0.05	0.02
C20:3n6	0.92^{b}	1.08^{a}	1.17^{a}	1.21^{a}	1.28^{a}	1.88^{a}	0.01	0.001
C22:6n3	0.05^{c}	1.35^{b}	1.40^{b}	1.44^{b}	2.00^{a}	2.31^{a}	0.61	0.03
TSFA[1]	49.80^{a}	40.56^{a}	30.40^{b}	25.80^{c}	21.56^{c}	20.18^{c}	0.06	0.05
TUFA[2]	50.20^{c}	56.14^{b}	70.60^{a}	75.20^{a}	79.44^{a}	78.82^{a}	0.02	0.001
MUFA[3]	23.12^{c}	25.70^{b}	29.85^{b}	31.41^{a}	32.38^{a}	31.22^{a}	0.14	0.26
PUFA[4]	27.08^{c}	33.74^{b}	40.75^{a}	43.79^{a}	47.06^{a}	47.60^{a}	0.47	0.02
n-6:n-3[5]	3.91^{a}	3.00^{a}	2.97^{b}	2.80^{b}	2.77^{b}	2.59^{b}	0.03	0.001
Ant. Ind[6]	0.82^{a}	0.72^{a}	0.54^{b}	0.50^{b}	0.42^{c}	0.38^{c}	0.05	0.012

[1]Total saturated fatty acid [TSFA] = C12:0 + C14:0 + C16:0 + C18:0 + C20:0 +C22:0
[2]Unsaturated fatty acid = (3 + 4)
[3]Mono unsaturated fatty acid [TMUFA] = C14:1C + $C16:1_C$ + $C18:1_C$ + C18:1n9t + C18:1n9c + C22:1
[4]Polyunsaturated fatty acid [TPUFA] = C18:2 n6 + C20:5 n3 + C18:3n3 + C20:4n6 + C20:3n6 + C: 22:6n3
[5]n-6: n-3 = (C18:2 n6 + C20:4n 6 + C20:3n 6 / (C20:5n 3 + C18:3n 3 + C:22 6n 3), [6]Antherogenic index = (C12:0+ 4×C14:0+ C16)/∑ of UFA

Sensory assessment of fed broiler chicken fed *Prosopis africana* oil

Table 5 presents the sensory evaluation of broiler chicken given various amounts of *Prosopis africana* oil. The color, flavor, texture, juiciness, tenderness, and general acceptability of the breast and thigh meat were all significantly (P<0.05) influenced by the treatments.

Table 5: Sensory assessment of broiler chicken fed *Prosopis africana*

Parameters	T1	T2	T3	T4	T5	T6	SEM	*P*-value
Breast meat								
Color	4.62^b	4.90^b	6.01^a	6.50^a	6.59^a	6.73^a	0.10	0.96
Flavor	5.05^b	5.20^b	6.18^a	6.22^a	6.27^a	6.35^a	0.09	0.60
Texture	4.73^b	4.86^b	5.40^a	5.51^a	5.60^a	5.62^a	0.08	0.58
Juiciness	5.06^c	5.11^c	6.86^b	6.92^b	7.06^a	7.11^a	0.11	0.72
Tenderness	4.10^c	4.42^c	5.92^b	6.06^a	6.12^a	6.19^a	0.10	0.69
Acceptability	4.96^d	5.00^c	6.67^b	6.91^b	6.96^b	7.60^a	0.07	0.50
Thigh meat								
Color	4.09^c	4.62^c	6.61^b	6.68^b	7.03^a	7.05^a	0.24	0.07
Flavor	3.81^b	3.90^b	6.00^a	6.04^a	6.81^a	6.88^a	0.06	0.17
Texture	5.06^b	5.11^b	7.03^a	7.30^a	7.50^a	7.55^a	0.30	0.57
Juiciness	3.60^c	4.57^b	6.29^b	7.00^a	7.08^a	7.15^a	0.04	0.72
Tenderness	4.71^d	5.33^c	6.92^b	7.00^a	7.08^a	7.21^a	0.94	0.59
Acceptability	4.29^d	5.86^c	6.22^b	6.83^b	6.90^b	7.10^a	0.05	0.87

Standard error of the mean (SEM) T1: control diet with no *Prosopis africana* oil; T2: control diet plus 2.5g/kg oxytetracycline; T3: baseline diet plus 200 mg; T4: baseline diet plus 400 mg; T5: control diet plus 600 mg; T6: basal diet plus 800 mg *Prosopis africana* oil.

Discussion

Poultry meat has a low lipid content and a disproportionately high quantity of polyunsaturated fatty acids, according to [29, 30, and 39]. The amount and make-up of meat fat may shift in response to alterations in the lipid profile of an animal's diet [30-34]. The results of the present investigation showed that, in comparison to the other treatments, dietary supplementation of *Prosopis africana* oil enhanced the contents of polyunsaturated fatty acids (TPUFA) in the breast and thigh meat (P<0.05). Saturated fatty acid (TSFA) on the other hand, declined as *Prosopis africana* oil levels increased in all regimens. The current finding is consistent with those of [35-37] who found that broiler chicken meat given two herbal extracts and virginiamycin had increased TPUFA and reduced TSFA contents. Similar findings were made by [38, 40], who found that broiler chicken thigh meat had larger TPUFA concentrations and a better n-6: n-3 fatty acid ratio when oregano essential oil was added to the diet at a rate of 400 mg/kg. These results provide strong evidence that *Prosopis africana* oil can alter the nutritional value of broiler meat because phytonutrients were present in the sample. [41 – 43] assert that appropriate antibody synthesis in animals depends on the dietary n-6: n-3 ratio. To prevent inflammatory reactions and other associated health risks, the ratio of omega-3 to omega-6 fatty acids ought to be between 1 and 4 [44, 46]. In this investigation, broiler chicks given *Prosopis africana* oil showed a more favorable ratio of omega-6 to omega-3 fatty acids. Dietary *Prosopis africana* oil was found to alter monosaturated fatty acids (TMUFA) in the flesh, it increases more noticeably in the breast than the thigh, which results in a larger overall concentration of TMUFA. [45] noted an increase in TMUFA in the breast meat of broilers given green tea extract, which is consistent with the current findings.

Additionally, broiler chickens given various combinations of essential oils showed a higher concentration of MUFA in the flesh of their breast and thighs. According to [46]. The presence of phytonutrients in *Prosopis africana* oil helps lower the surplus synthesizing TSFA, which inhibits the biosynthesis of TMUFA and may be responsible for the rise in TMUFA contents in the breast and thigh meat [45]. A rise in high-density lipoprotein (HDL) will lead to a rise in the ratio of HDL cholesterol to overall cholesterol as well as the Anthrogenicity index. [28, 30] reported that the atherogenicity index (ANI) is used to gauge the safety of meat; the lower the ANI, the more secure the meat is, and vice versa. This suggests that essential oils have no adverse effects on lipid quality.

Evaluation of the sensory assessment in broiler chicken fed *Prosopis africana* oil

The present study's findings revealed that the cooked breast and thigh meat had considerable (P<0.05) differences in color, flavor, tenderness, juiciness, texture, and general acceptability. The current observations are consistent with those of [47] who discovered that feeding broiler chickens 200 mg/kg of clove and lemongrass oil considerably (P <0.05) changed how the meat's flavor was perceived. [48] found comparable outcomes, noting that the addition of thyme oil can significantly alter the taste, softness, color, and general acceptance of the meat between groups. It was discovered that the chicken flesh samples given 300 mg/kg thyme oil were tastier, softer, and had a more vibrant color. Because the panelists judged that the thigh and breast meat from broilers administered *Prosopis africana* oil had better texture, flavor, tenderness, juiciness, and general acceptance relative to other treatments, the results of this trial imply that the addition of *Prosopis africana* oil could improve the taste of broilers meat.

Conversely, [49] reported that dietary supplementation of garlic oil at 50 mg/kg did not significantly (P>0.05) alter the color, softness, flavor, or general acceptance of breast meat. The disparities in these results could be attributed to the differences in the composition of bioactive compounds in essential oils. The occurrence of carotene in *Prosopis africana* oil may have impacted the substantial variations in color found (P<0.05) in the breast and thigh meat [28]. The current condition of the meat colors, pre-slaughter variables (genetics, feed, managing, stress, temperatures and cold stress, gaseous surroundings), slaughter, chilling, and subsequent processing situations (stunning methods, the inclusion of nitrates, components, pH, last cooking temperatures, reducing circumstances, and irradiation) are the main factors affecting meat color [50-53]. The maturation of the connective tissues, the contractile condition of the myofibrillar proteins, environmental stress, scalding temperature, the maturity level of the birds, the rate of rigor improvement, the rate of cooling, and the filleting period are the primary variables impacting meat tenderness [51, 54].

CONCLUSION

It was determined that *Prosopis africana* oil has several phytoconstituents with the potential to alter the fatty acid composition of meat. Its addition to the diets of birds is not linked to any adverse consequences, such as the deposit of hazardous carcass residue that is related to the use of antibiotic growth promoters. Broilers' diet can be supplemented with Prosopis essential oil (800 mg/kg) to enhance sensory attributes.

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