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Influence of Anogeissusleiocarpus Stem Bark Extract on the Fatty Acid Composition in Meat of Broiler Chickens

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Abstract: *There is a global increasing awareness on the use of medicinal plants as organic alternatives to antibiotics due to the presence of phytochemicals in them to curb the dangers of antimicrobial resistance, environmental pollution and presence of toxic residues in animal products.This experiment was conducted to evaluate the influence of Anogeissusleiocarpus stem bark extract (ALSB) on the fatty acid composition in meat of broiler chickens. 600 1-day-old broiler chicks (Cobb 500) of mixed sex were randomly assigned to 6 dietary treatments (T1, T2, T3, T4, T5 and T6) of 5 replicates consisting of 20 birds each in a completely randomized design (CRD), The experiment lasted for 56 days, feed and water was fed ad libitum and other management practices were carried out throughout the period of the experiment. Birds in T1 and T2 were fed basal diet with 1.25 g and 1.50 g Oxytetracycline/liter of water while T3, T4, T5 and T6 were fed basal diet with 20, 40, 60 and 80 ml/liter Anogeissusleiocarpus stem bark extract (ALSB) respectively.The results showed that significant (P<0.05) differences were observed in saturated fatty acid (SFA), polyunsaturated fatty acid (PUFA) and omega-6/omega -3 ratio (n-6: n-3) values obtained in the breast and meat composition. Saturated fatty acid (SFA) in breast meat was highest in T1 and T2 (53.10 % and 49.90 %), intermediate in T3 and T4 (40.90 % and 40.02 %) and lowest in T5, T6 (35.92 % and 35.90 %) (P < 0.05). Similarly SFA in thigh meat was maximum at T1 and T2 (50.80 %, 50.60 %), midway T3, T4 (42.11, 41.00 %) and minimum T5, T6 (32.08, 32.00 %) (P < 0.05).PUFA was highest among birds fed (ALSB). It can be concluded that feeding broilers up to 400 mg/kg highly influenced the composition of fatty acid in broiler meat.*

Keywords: *Anogeissusleiocarpus, broilers, fatty acid, phytochemicals, Oxytetracycline.*

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Introduction

In recent years, there has been increasing interest in identifying nutritional and safe sources of feed additives especially from medicinal plant origin (Alagbe, 2019; Alagbe, 2022). Medicinal plants are mostly preferred because they are widely available, safe, efficient and environmental friendly (Adewale*et al*., 2020; Shittu and Alagbe, 2021). The safety of plants lies in their ability to produce

secondary metabolites or phytochemicals which are highly therapeutic and easily metabolized by the cells of animals (Singh *et al*., 2020; Akintayo and Alagbe, 2020). A wide range of medicinal plant parts are target for extraction including; roots, leaves, barks, fruits, seeds and twigs (Olafadehan*et al*., 2020; Adewale*et al*., 2020; Sigh *et al*., 2021). Each of these parts have varying concentration of phytochemicals due to different geographical location, methods of extraction, age of plants, parts of plants used and processing methods (Olafadehan et al., 2020; Agubosi*et al*., 2021; Alagbe, 2022). Alagbe (2022) reported that phytogenic feed additives are preventing the incidence of diseases and promoting food safety (Alagbe and Motunrade, 2021). Globally, there are over 50,000 medicinal plant species, yet only a few ones have been thoroughly researched and are still underexplored (Singh *et al*., 2020; Shittu*et al*., 2021).

Anogeissusleiocarpus(Combretaceae) also known as 'axlewood' is an evergreen tree found in Africa and Asia which can grow up to 30 m in height with a finely publescent stems and alternate to sub-opposite elliptical to oval leaves (Arbonnier, 2004; Odugbemi and Akinsulire, 2008). The plant has been reported to be loaded with several bioactive chemicals, for instance, the leaves have been traditionally used for the treatment of gastro-intestinal infections, fever, pneumonia, asthma, sexually transmitted infections, tuberculosis and cough (Mann *et al*., 2009). The stem bark can be topically applied on the wounds of animals to heal and prevent the entry of pathogenic bacteria (Mann *et al*., 2007; Adeleye*et al*., 2003), while the roots is used against for the treatment of endoparasites in ruminants (Adigun *et al*., 2000; Agaie*et al*., 2007). Scientific reports showed the *Anogeissusleiocarpus* extract has proven to function as an antibacterial (Mann *et al*., 2008), anti-inflammatory (Emeje*et al*., 2011), immunomodulatory (Mann *et al*., 2010), cytotoxic (Kabore*et al*., 2010), hepato-protective, antioxidant properties (Barku and Abban, 2013) and miracicidal activities (Ahmed and Wudil, 2013; Adejumobi*et al*., 2008).Therefore this experiment was carried out to determine the effects of*Anogeissusleiocarpus*stem bark extract on the fatty acid composition in meat of broiler chickens.

Materials and methods

Experimental site

The experiment was carried out at Division of Animal Nutrition, Sumitra Research Institute, Gujarat, India during the month of November, 2021.

Collection and identification of *Anogeissusleiocarpus* stem bark

Stem bark of *Anogeissusleiocarpus* was collected from Sumitra Research Institute Gujarat, India in October, 2020. It was identified and authenticated by a certified taxonomist Singh Amita and deposited at the herbarium with voucher number 231SOA.

Extraction of *Anogeissusleiocarpus* stems bark extract

The collected sample was thoroughly washed and air dried for 15 days on a flat clean pan to retain the bioactive chemicals in the plant until a constant weight was obtained. The dried stem bark was pulverized with a milling machine. 200 grams of pulverized *Anogeissusleiocarpus* stem bark was soaked into 1000 mL distilled water for 72 hours with occasional stirring. The mixture was filtered with Whatman No.1 filter paper and the extract was stored in a well labeled plastic container at 40^{o}C.

GC-MS analyses of *Anogeissusleiocarpus* stem bark extract (ALSB)

GC-MS analyses of *Anogeissusleiocarpus* stem bark aqueous extract was carried out using 5975 C series GC/MSD system from Agilent technologies with inert ion source 350^{o}C equipped with triple axis HED-EM detector mass analyzer with scanning speed and mass range of 12,500 u/s and 1050 u respectively. The relative percentage amount of each component was calculated by comparing its

average peak area to the total areas. Identifications of the compounds were based on mass spectral matching with standard compounds in National Institute of Standard and Technology (NIST) as presented in Table 2.

Animal management, design and experimental diets

A total number of 600 1-day-old broiler chicks (Cobb 500) of mixed sex were used for this experiment. Animals were sourced from a reputable hatchery in India and randomly assigned to into six treatments; each of the treatments had 5replicates with 20 birds in a completely randomized design. Prior to the arrival of the chick's experimental pens were thoroughly disinfected. Feed and fresh clean water was provided*ad libitum*. Experimental diet (starter, grower and finisher) was formulated to meet the nutrient requirement of the birds as presented in Table 1. Birds in treatment 1 (T1) was fed basal diet + 1.25 gof Oxytetracyclin/liter of water, T2: basal diet + 1.50 g of Oxytetracycline/liter of water, T3, T4, T5 and T6 were fed 20 mL, 40 mL, 60 mL and 80 mL per litre of water.

Specifics

Proximate composition of meat sample

NIRS^{TM} model DS 37700 Netherlands (automatic analyzer) was used to analyze the samples from the experimental diet. The kit has a dimension of 360 × 450 × 250 mm (w × d × h) of 25 kg, wavelength range 500 – 3000 nm, silicon (600 – 1500 nm) as detector, optical wavelength 9.00 ± 0.1 nm, spectral resolution (0.8 nm), photometric noise (650 – 3000 nm), wavelength accuracy < 0.003 nm and analysis time < 1minutes.

Fatty acid analysis of breast and thigh meat

The fatty acid composition was carried out using gas liquid chromatography model YL 6500 GLC, Josco Spain with specification of L740 × W500 × H 940 mm with pore size range of 0.35 nm – 500 nm, pore volume 0.0001 cm^3/g, pressure censor ± 0.15 %, temperature (15 – 40^oC) and humidity (10 – 90 %) equipped with a capillary column (30 m × 0.25 mm × 0.20 µm) and hydrogen carrier gas.Meat samples collected from 5 randomly selected birds, slaughtered and meat samples were collected from the thigh and breast meat. It was thereafter blendedseparately in a laboratory food processor (model 02A-OTC Amani, China). 2g of each sample were hydrolysedfor 1.5 hour at 50^oC in 1N potassium hydroxide in methanol and neutralized with sulphuric acid.Fatty acids were presented as percentage of the total amount of the methyl esters (FAME) identified (Christie, 1973).

Statistical analysis

All data were subjected to one -way analysis of variance (ANOVA) using SPSS (25.0) and significance means were separated using Duncan Multiple Range Test of the same software.

Table 1: Composition of experimental diets

Materials	Starter (1-21 days)	Grower (22-35 days)	Finisher (36-56 days)
Maize	50.00	56.00	60.50
Wheat offal	6.00	7.00	8.05
Soya meal	30.55	22.00	21.00
Groundnut cake	10.00	11.55	6.05
Fish meal (65%)	2.00	2.00	2.00
Bone meal	0.60	0.40	0.40
Limestone	0.30	0.30	0.20

Lysine	0.20	0.20	0.15
Methionine	0.20	0.20	0.20
**Premix	0.25	0.25	0.25
Salt	0.30	0.30	0.30
Total	**100.0**	**100.0**	**100.0**
Determined analysis			
Crude protein	23.08	20.11	19.33
Ether extract	5.03	4.87	4.28
Crude fibre	3.06	3.95	3.42
Calcium	1.28	1.41	1.62
Phosphorus	0.77	0.90	0.95
Lysine	1.17	1.29	1.60
Meth +Cyst	0.87	0.82	0.51
ME (Kcal/kg)	2936	2800.4	3100.2

*****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.
******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.

Table 2: GC-MS result of *Anogeissusleiocarpus* stem bark aqueous extract

Compounds	Area (%)	R.T	Group	Functions
γ-sitosterol	12.49	5.41	Alkaloids	Anti-inflammatory
Methyltetracosanoate	10.11	10.04	Alkaloids	Analgesics
Phytol	2.50	9.71	Terpenoids	Antimicrobial and antifungal, hypolipidemic
Quercetin -3-glucoside	21.67	10.10	Flavonoids	Hepato-protective, antimicrobial
Ellagic acid	0.77	17.12	Flavonoids	Anti-inflammatory
β-phenethylamine	14.35	19.81	Alkaloids	Anti-inflammatory
Campsterol	3.75	1.04	Steroids	Anti-inflammatory
3-butylindolizidine	2.04	18.41	Alkaloids	Anti-inflammatory
Gallic acid	1.71	0.33	Phenols	Antioxidants
4-hydroxyl benzoic acid	0.45	21.06	Phenols	Antioxidants
Dimethylamine	3.93	7.55	Phenols	Antioxidants
Dihyroxylacetone	5.16	0.40	Flavonoids	Antimicrobial and anti-inflammatory, antioxidants
2,4-bis(1-phenylethyl) phenol	4.70	0.55	Phenols	Antioxidants

Table 4: Fatty acid (breast meat) composition of broiler chicks fed *Anogeissusleiocarpus* stem bark extract (ALSB)

Treatments	T1	T2	T3	T4	T5	T6	SEM
C12:0	2.92^{a}	2.07^{a}	1.60^{b}	1.52^{b}	1.50^{c}	1.25^{c}	0.18
C14:0	3.10^{a}	2.45^{b}	2.26^{b}	1.92^{c}	1.60^{c}	1.40^{c}	0.06
C16:0	16.90^{a}	16.33^{b}	14.07^{b}	13.10^{c}	12.63^{c}	10.44^{c}	1.33
C18:0	9.63^{a}	6.06^{a}	5.13^{b}	4.08^{b}	3.96^{b}	3.00^{b}	0.65
C20:0	3.87^{a}	2.81^{b}	1.77^{c}	1.40^{c}	1.33^{c}	1.30^{c}	0.10
C22:0	0.38^{a}	0.24^{b}	0.23^{b}	0.26^{b}	0.30^{a}	0.20^{b}	0.29
C14:1c	1.96^{b}	3.01^{a}	3.38^{a}	3.56^{a}	3.60^{a}	4.21^{a}	0.12
C16:1c	2.00^{b}	2.26^{b}	3.25^{a}	3.36^{a}	3.59^{a}	5.57^{a}	0.04
C18:1c	10.3^{c}	13.0^{b}	13.8^{b}	14.2^{a}	15.1^{a}	18.6^{a}	1.50
C18:1n9 t	1.20^{c}	1.35^{b}	1.51^{a}	1.58^{a}	1.62^{a}	1.83^{a}	0.44
C18:1n9C	0.11^{c}	0.28^{b}	0.33^{a}	0.39^{a}	0.42^{a}	0.75^{a}	0.17
C:22:1	0.12^{c}	0.55^{b}	0.76^{a}	0.81^{a}	0.88^{a}	1.00^{a}	0.05
C18:2n 6	10.22^{c}	16.42^{b}	18.28^{b}	22.40^{a}	23.88^{a}	25.08^{a}	0.20
C20:5n3	0.56^{b}	1.20^{a}	1.42^{a}	1.55^{a}	1.72^{a}	2.00^{a}	0.01
C18:3n3	5.20^{c}	6.29^{b}	7.33^{b}	9.09^{b}	12.4^{a}	13.8^{a}	0.27
C20:4n6	2.66^{c}	3.70^{c}	4.90^{b}	5.96^{b}	7.17^{a}	8.04^{a}	1.33
C20:3n 6	0.62^{c}	1.42^{b}	2.33^{b}	3.05^{a}	4.01^{a}	5.02^{a}	0.17
C22:6n3	0.44^{c}	1.96^{c}	2.04^{b}	2.71^{b}	3.03^{a}	4.02^{a}	0.10
^{1}TSFA	53.10^{a}	49.40^{a}	40.90^{b}	40.02^{b}	35.92^{b}	35.90^{b}	0.42
^{2}USFA	46.90^{c}	45.60^{b}	59.10^{b}	59.98^{b}	60.08^{a}	60.10^{a}	0.56
^{3}MUFA	24.50^{a}	25.49^{a}	25.17^{a}	20.88^{a}	18.68^{b}	17.08^{b}	2.50
^{4}PUFA	22.40^{c}	25.11^{c}	33.93^{b}	39.10^{b}	41.40^{a}	43.02^{a}	1.88
n:3:n-6	5.10^{a}	4.06^{a}	3.77^{b}	3.51^{b}	3.42^{b}	3.40^{c}	1.20
Atherogenecity	0.67^{a}	0.60^{a}	0.42^{b}	0.37^{b}	0.32^{b}	0.30^{b}	0.01

T1: basal diet + 1.25 g oxytetracycline /litre of water; T2: basal diet + 1.50 g oxytetracycline /litre of water; T3: basal diet + 20 ml ALSB/liter of water; T4: basal diet + 40 ml ALSB/liter of water; T5: basal diet + 60 ml ALSB/liter of water; T6: basal diet + 80 ml ALSB/liter of water; ^{1}Total saturated fatty acid= C12:0 + C14:0 + C16:0 + C18:0 + C20:0 +C22:0; ^{2}Unsaturated fatty acid = (3 + 4); ^{3}Mono unsaturated fatty acid= C14:1C + C16:1$_{C}$ + C18:1$_{C}$ + C18:1n9t + C18:1n9c + C22:1; ^{4}Polyunsaturated fatty acid = 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)/ε, of UFA; SEM: Standard error of mean

Table 5: Fatty acid (thigh meat) composition of broiler chicks fed *Anogeissusleiocarpus* stem bark extract (ALSB)

Treatments	T1	T2	T3	T4	T5	T6	SEM
C12:0	2.41^{a}	2.00^{a}	1.37^{b}	1.21^{b}	1.08^{c}	1.00^{b}	0.03
C14:0	2.50^{a}	2.00^{b}	1.26^{b}	1.20^{c}	1.16^{c}	1.11^{c}	0.10
C16:0	20.10^{a}	19.10^{a}	10.34^{c}	10.10^{c}	9.09^{c}	9.00^{c}	1.25
C18:0	9.00^{a}	7.22^{a}	3.88^{b}	3.60^{b}	3.06^{c}	3.00^{c}	0.65
C20:0	4.10^{a}	4.00^{a}	1.93^{c}	1.90^{c}	1.70^{c}	1.50^{c}	0.12
C22:0	0.51^{a}	0.30^{b}	0.25^{b}	0.19^{b}	0.11^{a}	0.10^{c}	0.03
C14:1c	2.10^{b}	2.01^{b}	3.20^{a}	3.16^{a}	3.10^{a}	3.04^{a}	0.84
C16:1c	2.00^{c}	2.10^{b}	3.10^{b}	3.60^{b}	3.99^{b}	4.17^{a}	0.10
C18:1c	10.02^{b}	10.10^{b}	14.74^{a}	15.00^{a}	17.08^{a}	18.44^{a}	1.01

C18:1n9 t	1.15^{c}	1.90^{c}	1.91^{a}	2.11^{a}	2.28^{a}	2.41^{a}	0.77
C18:1n9C	0.12^{c}	0.18^{c}	0.66^{b}	0.79^{b}	0.85^{a}	0.96^{a}	0.44
C:22:1	0.08^{c}	0.61^{b}	1.67^{a}	1.91^{a}	2.00^{a}	2.01^{a}	0.12
C18:2n 6	10.77^{b}	10.02^{b}	19.25^{a}	21.00^{a}	23.06^{a}	23.41^{a}	0.10
C20:5n3	0.51^{c}	1.00^{b}	1.95^{a}	2.00^{a}	2.06^{a}	2.40^{a}	0.02
C18:3n3	8.00^{b}	9.11^{b}	14.36^{a}	14.77^{a}	15.07^{a}	16.24^{a}	0.17
C20:4n6	4.18^{b}	5.62^{b}	8.00^{a}	8.06^{a}	8.57^{a}	9.33^{a}	1.01
C20:3n 6	1.00^{b}	1.41^{b}	2.97^{b}	3.20^{b}	3.40^{a}	3.58^{a}	0.22
C22:6n3	1.10^{b}	1.51^{b}	3.00^{a}	3.84^{a}	4.00^{a}	4.02^{a}	0.10
^{1}TSFA	50.88^{a}	50.60^{a}	42.11^{b}	41.00^{b}	32.08^{b}	32.00^{b}	6.05
^{2}USFA	44.12^{b}	45.40^{b}	58.89^{a}	59.00^{a}	59.92^{a}	60.00^{a}	3.72
^{3}MUFA	24.94^{a}	23.58^{a}	29.49^{a}	21.35^{a}	19.82^{b}	19.48^{b}	2.51
^{4}PUFA	24.18^{c}	27.82^{c}	33.40^{b}	37.65^{b}	40.10^{a}	40.52^{a}	7.60
n:3:n-6	1.38^{c}	1.22^{c}	3.93^{b}	3.80^{a}	3.00^{a}	3.82^{a}	0.01
Atherogenecity	0.84a	0.73a	0.56^{b}	0.47^{c}	0.40^{c}	0.39^{c}	0.02

T1: basal diet + 1.25 g oxytetracycline /litre of water; T2: basal diet + 1.50 g oxytetracycline /litre of water; T3: basal diet + 20 ml ALSB/liter of water; T4: basal diet + 40 ml ALSB/liter of water; T5: basal diet + 60 ml ALSB/liter of water; T6: basal diet + 80 ml ALSB/liter of water; ^{1}Total saturated fatty acid= C12:0 + C14:0 + C16:0 + C18:0 + C20:0 +C22:0; ^{2}Unsaturated fatty acid = (3 + 4); ^{3}Mono unsaturated fatty acid= C14:1C + C16:1$_{C}$ + C18:1$_{C}$ + C18:1n9t + C18:1n9c + C22:1; ^{4}Polyunsaturated fatty acid = 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)/ε of UFA; SEM: Standard error of mean.

Results and discussion

Table 2 revealed the GC-MS of *Anogeissusleiocarpus* stem bark extract (ALSB). 13 bioactive compounds were identified and the result showed the presence of γ-sitosterol (12.49 %),methyltetracosanoate (10.19 %), phytol (2.50 %),quercetin -3-glucoside (21.67 %), ellagic acid (0.77 %), β-phenethylamine (14.35 %), campsterol (3.75 %), 3-butylindolizidine (2.04 %), gallic acid (1.71 %), 4 hydroxyl benzoic acid (0.45 %), dimethylamine (3.93 %), dihydroxylacetone (5.16 %) and 2,4 –bis1 phenylethyl phenol (4.70 %) respectively. These biologically active compounds or phytochemicals act as synergistic agents which allow nutrients to be utilized by living organisms more efficiently. They shield plants from severe environmental hazards like pollution, drought, stress, pathogenic attacks and ultraviolet exposure (Azmatullah*et al*., 2018).Fatty acid composition in breastmeat of broiler chickens fed *Anogeissusleiocarpus* stem bark extract (ALSB)is presented in Table 4. The identified fatty acids contained in the sample includes:C12:0 (Lauric acid), C14:0 (myristic acid), C16:0 (palmitic acid), C18:0 (stearic acid), C20:0 (arachidic acid), C22:0 (behenic acid), C14:1c (palmitoleic acid), C16:1c (linoleic acid), C18:1c (oleic acid), C18:1n9t (elaidic acid), C18:1n9c (linolelaidic acid), C:22:1 (erucic acid), C20:5n3 (eicosapentenoic acid), C18:3n3 (α – linolenic acid), C20:4n6 (arachidonic acid), C20:3n6 (dihomogammalinolenic acid) and C22:6n3 (docosahexenoic acid). The values obtained ranged from 1.25 – 2.92 %, 1.40 – 3.10 %, 16.90 – 10.44 %, 3.00 – 9.63 %, 1.30 – 3.87 %, 0.24 – 0.38 %, 1.96 – 4.21 %, 2.00 – 5.57 %, 10.30 – 18.60 %, 1.20 – 1.83 %, 0.11 – 0.75 %, 0.12 – 1.00 %, 10.22 – 25.08 %, 0.56 – 2.00 %, 5.20 – 13.80 %, 2.66 – 8.04 %, 0.62 – 5.02 % and0.44 – 4.02 % respectively. Total saturated fatty acid [TSFA; 39.90 – 53.10 %], unsaturated fatty acid [USFA; 46.90 – 60.10 %], polysaturatedfatty acid [PUFA; 22.40 – 43.20 %], omega 3: omega 6 [ω3:ω6; 3.40 – 5.10 %] and atherogenecity [0.30 – 0.67 %]. TSFA and atherogenecity values were maximum at T1 and T2 and minimum in T3-T5 (P<0.05) while USFA was maximum in T5 and T6, midway in T2-T4 and minimum in T1 (P<0.05). Table 5 reveals the fatty composition in thigh meat of broiler chickens fed *Anogeissusleiocarpus* stem bark

extract. [C12:0; 1.00 – 2.14 %], [C14:0; 1.11 – 2.50 %], [C16:0; 9.00 –25.00], [C18:0; 3.00 – 9.00 %], [C20:0; 1.50 – 4.10 %], [C22:0; 0.10 – 0.51 %], [C14:1c; 2.01 – 3.20 %], [C16:1c; 2.00 – 4.17 %], [C18:1c; 10.02 – 18.44 %], [C18:1n9t; 1.15 – 2.41 %], [C18:1n9c; 0.12 – 0.96 %], [C:22:1; 0.08 – 2.01 %], [C20:5n3; 0.51 – 2.40 %], [C18:3n3; 8.00 – 16.24 %], [C20:4n6; 4.18 – 9.33 %], [C20:3n6; 1.00 – 3.58 %], [C22:6n3; 1.10 – 4.02 %], TSFA [40.00 – 50.88 %], USFA [49.12 – 60.00 %],[ω3:ω6; 2.82 – 6.38 %] and atherogenecity [0.39 – 0.84 %]. TSFA, USFA,ω3:ω6 and atherogenecityvalues were significantly different among the treatment (P<0.05). According to Akintayo and Alagbe (2021), meats from birds are low in lipids or fats, but high in polyunsaturated fatty acid making allowing it perform a central role in biological processes. Results from the breast and thigh meat composition revealed that birds in T2-T6 had better PUFA level compared to the control T1 (P<0.05). *Anogeissusleiocarpus* stem bark extract contains some vital bioactive chemicals (Table 2) which could modulate the PUFA level in meat as well as their shelf life, thus promoting food safety (Alagbe, 2022; Adewale*et al*., 2021). Unsaturated fatty acid (MUFA + PUFA) have also been reported to play a major role as an immune booster (Shittu*et al*., 2021;Bederska*et al*., 2013). It can also work synergistically with phytochemicals in *Anogeissusleiocarpus* stem bark extract to scavenge free radicals (Attia*et al*., 2020). According to Arguwani*et al*. (2019); Al-kalifa*et al*. (2012), balancedω3:ω6 in diet are important in egg, meat and milk quality as well as antibody formation in the white blood cell. However, increase dietary intake of ω3 could result to production of harmful cholesterol and cardiovascular infection while elevated ω6 could impair fetal development and excessive inflammatory response (Swiatkiewicz*et al*., 2015). ω3:ω6 values obtained in this study agrees with the findings of Alagwany*et al*. (2019) who placed the optimum ω3:ω6 to be between 2-4. High PUFA level was also reported by Hashemipour*et al*. (2013); Erener*et al*. (2011) who fed broilers thyme and green tea extract respectively. Elevated satuarated fatty acid in the diet of animals could result in coronary heart disease and other harmful impact on the health (Konieczka*et al*., 2017). However, high SFA was recorded in T1 and T2 compared to the other treatment (P<0.05) this may indicate a harmful residual toxicity in their products. Artheriogenicity index significantly (P<0.05) decreases from treatment 1 – 6. Birds in T3-T6 had the lowest value which is an indication of meat safety (Park and Kim, 2018). However, the results revealed that dietary supplementation of ALSB reduced cholesterol level in meat (hypolidemic), thus it could possibly lower the risk of cardiovascular infection conditions in humans.

Conclusion

*Anogeissusleiocarpus*extract has also proven to be a modulator of fatty acids in broiler meat by increasing the proportion of polyunsaturated fatty acid (PUFA) in the meat. Polyunsaturated fatty acid has the ability to regulate a wide set of homeostatic and inflammatory process linked to numerous diseases either directly or via transformation into locally bioactive metabolites. It can be included up to 80 mL/liter in the diet of broilers without causing any negative effect on the health of the animals.

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