Assessing the changes in lipid profile of broiler finisher chicken fed diets containing processed *Balanite aegyptiaca* Fruit Meal

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Abstract

The aim of this study was to evaluate the changes in lipid profile of broiler finisher fed diets containing processed *Balanite aegyptiaca* Fruit Meal. A total of 315-day old broiler finisher chickens of Ross breed were used. The birds were assigned to five dietary treatments with three replicate consisting of twenty one (21) chickens per replicate in a completely randomized design and lipid profile of the birds were evaluated. It was found that *Balanite aegyptiaca* Fruit Meal did not reduce lipid parameters in the chicken as significantly ($P<0.05$) high values of lipids profile were recorded but were within the normal range for broilers. It was concluded that the use of *Balanite aegyptiaca* Fruit Meal had no effect on lipid profile of broilers and cannot be used as a fat reducing agent.

Key Words: Lipid Profile, *Balanite aegyptiaca*, Broiler finisher

Introduction

In recent time, a lot of people are paying attention to the type of diet they consume in order to maintain a healthy life style. Some of the diets that pose potential health threat are fatty and oily food, red meat (because of their high cholesterol) amongst others. Lyon, (2000) observed a gradual shift from the consumption of conventional animal protein sources (cattle, sheep, swine, goat and poultry) to a class of livestock referred to as non-conventional livestock. It now becomes pertinent for animal scientist to produce lean meat to meet with these recent demands of the populace.

Broiler industry is a source of nutrition, provides rural employment and fulfils all nutritional standards. Broilers as a meat source also have fast growth rate and the meat is generally accepted by all categories of people. In addition, depressed hepatic cholesterol levels in chicken were observed by Sklan *et al*. (1992).

The different parts of *Balanite aegyptiaca* plant (leaves, bark, fruit or root) can serve multipurpose medicinal application as antidiabetic, hypocholesterolemic, hepatopro-tective, cardioprotective**,** antioxidant, antiviral, antibacterial, anti-inflammatory, anti-nociceptive, analgesic and anthelmintic (3).

The aim of this study is to evaluate the changes in lipid profile of broiler finisher fed diets containing processed *Balanite aegyptiaca* Fruit Meal.

Materials and Methods

Experimental Site

The experiments were carried out at the teaching and research farm, of the Department of Animal Science Ahmadu Bello University, Zaria. The Departmental farm is located on latitude 11^0 $9^{'}$ $45^{''}$ N and longitude 7^0 $38^{'}$ $8^{''}$ E, at an altitude of 610m above sea level. The temperature of the area ranges between 26-40^{o}C depending on the season while the relative humidity during the dry and wet seasons

are 21 and 72% respectively. The wet periods in Zaria are between May and October with annual rainfall of about 1500mm (IAR, 2012).

Collection of *Balanites aegyptiaca* fruits

Raw samples of *Balanites aegyptiaca* fruits were collected from various locations in Mai-Adua Local Government Area of Katsina State.

Processing of *Balanites aegyptiaca*fruit

Balanites aegyptiaca fruit meal was processed by soaking, boiling, roasting and fermentation.

Experimental design and management of experimental chickens

Three hundred and fifteen (315) day old broiler chicks of Ross breed were used in this experiment. The chicks were weighed and allotted to five dietary treatments each replicated thrice with twenty-one (21) chickens per replicate in a completely randomized design. The chickens were raised on deep litter with feed and water provided *ad libitum*. Management practices ideal for broiler chickens was strictly adhered to.

Experimental diets

Five broiler starter and finisher diets were formulated to meet the nutrient requirement of the chickens according to recommendations by NRC (1994). Treatment 1 is the control (T_1) and treatments 2 – 5 contained 20% each of the differently processed seeds. The composition of the experimental diet is presented in Tables 1.

Lipid profile evaluation

Blood samples (5ml) were collected by severing the jugular vein at 10.00h from four birds chosen randomly from each treatment of birds respectively into sample bottles without anticoagulant. Serum harvested was used to evaluate for lipid profile. They were determined by using chemical commercial kits with the help of auto analyzer.

Statistical Analysis

All the data collected from the experiment were subjected to analysis of variance (ANOVA) using general linear model of Statistical Analysis System (SAS, 2003) Software package. Significant differences between means were compared using Dunnetts Test in the SAS package.

Results and Discussion

Table 2 shows the lipid profile of broiler chickens fed diets containing differently processed *Balanite aegyptiaca* fruit meal. Triglycerides, low and high density lipoprotein differ significantly ($P<0.05$) across the dietary treatments with the exception of total protein and cholesterol which were similar ($P>0.05$) across the dietary groups. The normal ranges observed in cholesterol and total protein across the treatment groups imply adequate protein and energy metabolism. This showed that the diets had adequate nutritional quality and good amino acid balance as was reported by Eggum (1989).

Although there was no significant difference in cholesterol levels across the treatments, however the rising numerical trend observed showed that *Balanite aegyptiaca* may have limited capacity to lower cholesterol level at higher inclusion levels. This could be attributed to the higher crude fiber of *Balanite aegyptiaca* which may have affected carbohydrate metabolism (Abdullahi, 2018). The same phenomenon could possibly explain the low level of triglyceride in the serum of chickens fed the control diet, which in turn resulted in less fatty adipose tissues recovered from the treatment group.

Chickens fed *Balanite aegyptiaca* based diets showed increased high density lipoprotein (HDL) levels compared to those on the control diet. This shows that *Balanite aegyptiaca* improves animal health as it encourages the build-up of high density lipoprotein (good cholesterol). This may also play a significant role on the consumers' viewpoint of chickens raised on *Balanite aegyptiaca* based diets, as medical studies have shown that HDL can reduce the risk of developing atherosclerotic plaques around the soft organs in the body.

Conclusion and Recommendation

It was concluded that the use of *Balanite aegyptiaca* Fruit Meal had no effect on lipid profile of broilers and cannot be used as a fat reducing agent. *Balanite aegyptiaca* can be used to improve the nutrient quality of the diet, body metabolism and nutritional status of the birds. It was recommended that 20% *Balanite aegyptiaca* can be used in broiler finisher's diet for nutritional adequacy of the birds without adverse effect.

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Table 1: Composition of broiler finisher diets containing differently processed fruit meal (5-8 weeks)

Ingredients (%)	T_1 Control	T_2 Soaked BAFM	T_3 Cooked BAFM	T_4T_5 Roasted BAFM	Fermented BAFM
Maize	61.50	61.50	61.50	61.50	61.50
Groundnut cake	20.00	0.00	0.00	0.00	0.00
Soya cake	12.20	12.20	12.20	12.20	12.20
BAFM	0.00	20.00	20.00	20.00	20.00
Bone meal	3.00	3.00	3.00	3.00	3.00
Maize offal	1.50	1.50	1.50	1.50	1.50
Limestone	0.80	0.80	0.80	0.80	0.80
Common Salt	0.30	0.30	0.30	0.30	0.30
*Vitamin Premix	0.30	0.30	0.30	0.30	0.30
Methionine	0.20	0.20	0.20	0.20	0.20
Lysine	0.20	0.20	0.20	0.20	0.20
Total	100.00	100.00	100.00	100.00	100.00

Calculated analysis

ME (Kcal/Kg)	2932	2938	2938	2938	2938
Crude Protein (%)	20.01	19.74	19.74	19.74	19.74
Crude fibre (%)	4.96	4.95	4.95	4.95	4.95
Ether Extract (%)	4.91	4.91	4.91	4.91	4.91
Calcium (%)	1.14	1.14	1.14	1.14	1.14
Phosphorus (%)	0.61	0.62	0.62	0.62	0.62
Lysine (%)	1.20	1.17	1.17	1.17	1.17
Methionine (%)	0.68	0.65	0.65	0.65	0.65
Feed cost/kg diet (₦)	148.00	132.92	131.80	129.80	129.20

*Biomix chick premix provide per kg of diet vit A, 10,000 I.U; vit D3, 2000 I.U; vit. E 23mg; vit K, 2.mg; calcium pantothenate, 7.5mg; B12, 0.015mg; folic acid, 0.75mg; choline chloride, 300mg; vit B1, 1.8mg; vit B2, 5mg; vit B6, 3mg; manganese, 40mg; iron, 20mg; zinc, 53.34mg; copper, 3mg; iodine, 1mg; cobalt, 0.2mg; selenium, 0.2mg

Table 2: Lipid Profile of Broiler Chickens Fed Diets Containing Differently Processed *Balanite aegyptiaca* Fruit Meal

Parameters	Control	Soaked BAFM	Boiled BAFM	Roasted BAFM	Fermented BAFM	SEM
Triglycerides	48.66^{c}	79.67^{a}	77.33^{a}	62.33^{b}	63.00^{b}	3.51
Total Protein (g/dl)	5.67	5.33	5.00	4.90	5.00	2.28
LDL (g/dl)	87.33^{b}	100.66^{a}	83.67^{b}	72.00^{b}	71.33^{b}	7.68
HDL (g/dl)	123.30^{b}	138.60^{a}	149.00^{a}	128.00^{b}	178.67^{a}	25.46
Cholesterol	2.50	2.30	2.53	2.37	2.77	0.99

a, b= Means with different superscript on the same row differ significantly ($P<0.05$), SEM= Standard error of mean, BAFM=*Balanite aegyptiaca* fruit meal, LDL=low density lipoprotein, HDL=high density lipoprotein.