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EFFECTS OF FERMENTED CASTOR SEED MEAL ON CARCASS CHARACTERISTICS OF BROILER FINISHER CHICKENS

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ABSTRACT
The effects of fermented castor seed meal (FCSM) on carcass characteristics of broiler finisher chickenswas evaluated in 29 days. A total of 300 broiler chicks (ROSS 308) strain were randomly allotted to five experimental diets using a Completely Randomized Design (CRD) and replicated 4 times with 15 chicks each. Five experimental diets were formulated to be isocaloric (3000kcal/kg ME) and isonitrogenous (21% crude protein) for broiler finisher chickens with FCSM levels of (0, 25, 50 75 and 100%). Birds were reared in a deep litter system for 4 weeks and fed with known quantity of feed while water was given ad-libitum. Light and other standard routine management practices were strictly observed. The result showed significant ($P<0.05$) increase in the live weight (1473.75g/bird), slaughtered weight (1466.75 g/bird) for birds fed control and 25%FCSM compared to other treatments diets. However, dressed weight (1089.05 g/bird), dressing % (73.37 and 77.83 g/bird), breast (26.19 g/bird), back (10.68 g/bird), thigh (12.35 g/bird), drumstick (12.33 g/bird) and wings (9.98 g/bird) were significantly ($P<0.05$) improved at 25%FCSM compared to the control and other treatments. Based on the result obtained, castor seed meal can replace soybean cake at 25% for better growth and carcass yield.

Keywords: Broiler chicks, Carcass characteristics, Fermentation.

INTRODUCTION

The challenges facing Nigerian Livestock industry today is the high cost of conventional feedstuff used in compounding animal feeds. The conventional protein sources such soya beans cake, groundnut cake, fishmeal and cotton seed cake are not only expensive but also competitive by humans and other livestock industry users (Akinmutimi, 2001).Animal protein plays a vital role in the diet of man, but high cost of it has become a national problem. This is accompanied by the high cost of feeds. This necessitated the need to seek for cheap and affordable alternative sources of feed ingredients in developing countries in order to provide meat at a moderate price. Poultry production especially broiler chicken remains one of the veritable way of achieving sustainable and rapid production of quality protein to meet the increasing national protein demand (Apata and Ojo, 2000; Akinmutimi and Okwu, 2006).Castor seed and castor seed cake are obtained from castor oil plant (*Ricinus communis*). It is an angiosperm that belongs to the *Euphorbiaceae* or spurge family. Thus, castor oil plant is not a legume. It grows in the tropical and temperate regions throughout the world, either wild or cultivated. In Nigeria, commercial production of the castor oil plant is rare. The annual production figure is unknown. The plant is commonly found growing in the wild around homes, farms, streams and river banks. It is called by different names such as "Zurman" in Hausa, "Ukpaka" in Igbo, "Sharai jojo" in Tiv, "Ogiri" in Idoma, "Kpamfini" in Nupe and "Ewe Laa" in Yoruba**.** Castor oil plant is widely cultivated in the southern states of Nigeria where the de-hulled seeds are popularly used as flavour enhancing food condiment (Achin, 2005). It is against this background that fermented castor seed meal was evaluated to determine its effects on carcass characteristics of broiler chickens.

MATERIALS AND METHODS

Experimental site

The experiment was conducted at the Teaching and Research Farm of the Department of Animal ScienceFaculty of Agriculture, Nasarawa State University Keffi, Shabu-Lafia Campus.It is located in the

Guinea Savannah Zone of Middle belt of Nigeria. It lies on Latitude 6^0 15^0 and 9^0 30^0 and longitude 6^0 30^1N and 11^00^1E. The mean annual rainfall is usually 823mm (NIMET, 2010).

Source of feed ingredients

Castor seed was purchased from the local farmers in Lafia main market, Lafia Local Government Area of Nasarawa Statewhile other ingredients such as maize, rice bran, groundnut cake, fish meal, and limestone were purchased from the suppliers in Lafia, Nasarawa State.

Processing (fermentation) of test ingredients

100kg of castor seed was collected and divided into 4 different batches, soaked in 20litres of clean water and covered with polythene leather and allowed to ferment for 72hours after which the water was drained and the sample was oven dried. It was then ground to powder form using a grinding machine and preserved under natural condition. The samples were analyzed for proximate composition at Livestock Laboratory in IAR & T according to the procedures of AOAC (2010). See Table 1

Table 1. Proximate composition of fermented castor seed meal

Crude protein	18.69
Crude fibre	6.14
Ether extract	37.58
Ash	5.37
NFE	28.19
Dry matter	95.97
Metabolizable energy kcal/kg ME	4740.031

Experimental Diet Formulation

Five (5) experimental diets tagged T_1, T_2, T_3, T_4 and T_5 were compounded to be isocaloric (3004 to 3010kcal/kg ME) and iso-nitrogeneous (21%CP) for broiler finisher diets. T_1contain soybean cake which serve as control, while T2 contain 25% FCSM, T3 (50%FCSM), T4 (75%FCSM) and T5 (100%FCSM) respectively. Birds were fed for (1-29) days. The diet were balanced to meet the nutrients requirement of the birds. See Table 2.

Experimental Design

The experiment design was a completely randomized design (CRD). The birds were distributed randomly to five treatments with fifteen (15) birds per replicate. Each treatment was replicated four times and the diet were formulated using feed win software.

Experimental Birds and Management

A total of three hundred (300) unsexed day old broilers chicks (ROSS 308 strain) were obtained from a commercial hatchery in Ibadan, Nigeria. The initial body weight were taken. The birds were brooded together under a deep litter house for the first five days of age to enable them acclimatized to the environment. At seven (7) days of age they were randomly distributed into different compartment separated from each other by wire mash which shall be supported with wooden frame work. They were provided with one 200 watt bulbs to supply light and heat for brooding through electricity. Feed and water were provided to the birds throughout the experiment period (*ad-libitum*).

Carcass Characteristics

At the end of 4weeks feeding trials two birds per replicate was separated at random and starved for about 18 hours to empty their gastrointestinal tract. They were slaughtered, scalded, plucked and eviscerated. The carcass cuts were weighed and expressed as a percentage of live weight according to modified kosher method as described by Abe *et al.* (1996).

Statistical analysis

Data collected were subjected to one way analysis of variance (ANOVA) for CRD using (SPSS, 2007) Model. Significantly different means were separated using Duncan's Multiple Range Test (DUNCAN, 1955).

Table 2.Gross composition of the experimental diets for broiler finisher chickens

Ingredients (%)	T1(0%FCSM)	T2 (25%FCSM)	T3(50%FCSM)	T4(75%FCSM)	T5(100%FCSM)
Maize	36.00	36.00	36.00	36.00	36.00
Maize bran	8.20	8.20	8.20	8.20	8.20
Rice offal	6.00	6.00	6.00	6.00	6.00
Groundnut cake	19.00	19.00	19.00	19.00	19.00
Soybean cake	23.00	17.25	11.5	5.75	0.00
*FCSM	0.00	5.75	11.5	17.25	23.00
Limestone	1.30	1.30	1.30	1.30	1.30
Bone meal	3.00	3.00	3.00	3.00	3.00
Blood meal	2.00	2.00	2.00	2.00	2.00
Salt	0.25	0.25	0.25	0.25	0.25
**Premix	0.25	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25	0.25
Toxin binder	0.50	0.50	0.50	0.50	0.50
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Calculated analysis					
Energy	3004.88	3005.42	3008.96	3009.50	3010.04
Crude protein	21.83	21.72	21.62	21.51	21.41
Crude fibre	3.90	3.97	4.04	4.11	4.17
Ether extract	4.76	4.89	4.02	4.15	4.28
Ash	3.79	3.84	3.89	3.95	4.00
Calcium	1.48	1.47	1.46	1.45	1.43
Available Phosphorus	0.50	0.50	0.50	0.50	0.50
Lysine	1.23	1.32	1.41	1.50	1.59
Methionine	0.54	0.59	0.65	0.69	0.75

*FCSM= fermented castor seed meal, **The vitamin- mineral premix supplied the following per 100kg of diet: vitamin A15,000 I.U, vitamin D3 300,000 I.U.,vitamin E 3,000 I.U., vitamin K 2.50mg, vitamin B_1 (thiamin) 200mg, Riboflavin (B_2) 600mg, pyridoxine (B_6), Niacin 40.0mg, vitamin B_{12} 2mg, Pantothenic acid 10.0mg, folic acid 100mg, Biotin 8mg, choline chloride 50mg, anti-oxidant 12.5mg, manganese 96mg, zinc 6mg, Iron 24mg, Copper 0.6mg, Iodine 0.14mg, Selenium 24mg, cobalt 214mg. ***energy kcal/kg ME was calculated using formula by Pauzenga (1985) ME=37 x % CP+81.1x % EE+35.5 x % NFE.

RESULTS AND DISCUSSION

The result for the effects of natural fermentation on carcass characteristics of broiler finisher chickens is presented in Table 4. The result showed significant ($P<0.05$) increase in the live weight (1473.75g/bird), slaughtered weight (1466.75 g/bird) for birds fed control and 25%FCSM compared to other treatments diets. However, dressed weight (1089.05 g/bird), dressing % (73.37 and 77.83 g/bird), breast (26.19 g/bird), back (10.68 g/bird), thigh (12.35 g/bird), drumstick (12.33 g/bird) and wings (9.98 g/bird) were significantly ($P<0.05$) improved at 25%FCSM than the control and other treatments. The improvement in weights of dressed (1089.05 g/bird), dressing % (73.37 and 77.83

g/bird), breast (26.19 g/bird), back (10.68 g/bird), thigh (12.35 g/bird), drumstick (12.33 g/bird), wings (9.98 g/bird) were due to the inclusion of fermented castor seed meal at 25% in the diet. This observation is in agreement with earlier work of Mustapha *et al.* (2015) who reported that the dressed weight and cut-up parts of economic importance (back, thigh, breast and the drumstick) in broilers showed decreased weightswith increasing levels of replacement of Boiled and Fermented Castor Seed Meal in the diets

Table 4.Effects fermented castor seed meal (FCSM) on carcass characteristics of broiler finisher chickens.

Parameters	T1 (0%FCSM)	T2 (25%FCSM)	T3 (50%FCSM)	T4 (75%FCSM)	T5 (100%FCSM)	SEM	LOS
Live weight (g/bird)	1473.75^{a}	1471.25^{a}	1041.75^{ab}	1070.50^{b}	995.00^{c}	50.08	*
Slaughtered weight (g/bird)	1466.75^{a}	1459.75^{a}	1030.00^{b}	1061.25^{b}	947.50^{c}	52.24	*
Dressed weight (g/bird)	958.25^{b}	1078.50^{a}	808.00^{c}	650.50^{d}	502.50^{e}	48.08	*
Dressing % (g/bird)	65.24^{b}	73.37^{a}	77.83^{a}	60.76^{b}	50.50^{c}	2.42	*
Breast weight (g/bird)	22.46^{b}	26.19^{a}	18.06^{c}	12.40^{d}	5.76^{e}	1.69	*
Back weight (g/bird)	10.03^{b}	10.68^{a}	9.13^{c}	7.53^{d}	3.67^{e}	0.57	*
Thigh weight (g/bird)	11.39^{b}	12.35^{a}	10.19^{c}	8.31^{d}	3.44^{e}	0.73	*
Drumstick weight (g/bird)	10.68^{b}	12.33^{a}	8.62^{c}	7.68^{d}	3.40^{e}	0.70	*
Wings weight (g/bird)	9.34^{b}	9.98^{a}	7.28^{c}	6.82^{c}	3.06^{d}	0.56	*

abc means on the same column having different superscript differ significantly ($p<0.05$); NS = not significantly different ($p>0.05$); SEM = standard error of mean; LOS = level of significant.

CONCLUSION AND RECOMMENDATION

The result of this finding revealed that FCSM can replace soybean cakeat 25% in broiler finisher diets for better growth and development.

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