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NUTRIENT DIGESTIBILITY AND ECONOMY OF FEED CONVERSION OF BROILER CHICKENS FED DIETS CONTAINING DIFFERENT TYPES OF OILS AS A REPLACEMENT FOR MAIZE AT STARTER PHASE

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ABSTRACT

The aim of the experiment which lasted for 4 weeks was to evaluate the Nutrient Digestibility and Economy of feed conversion of Broiler chickens fed diet containing different types of oil as a replacement for maize. A total of 180 day old Ross chicks were randomly allocated into5 dietary treatments which were T1 (0% inclusion level of oil), T2 (4% inclusion level of palm oil), T3 (4% inclusion level of palm kernel oil), T4 (4% inclusion level of a branded commercial vegetable oil) and T5 (4% inclusion level of sheabutter oil) each comprising 3 replicates with 38 birds per replicate. The apparent nutrient digestibility at the starter phase shows no significant differences (p>0.05) in dry matter (DM) and crude protein (CP) among the dietary treatments. However, significant differences (P<0.05) were recorded in crude fiber (CF), Ether Extract, Ash, Nitrogen and total digestible nutrients (TDN) among all the treatments. The Economy of feed conversion efficiency at the starter phase shows no significant differences (P>0.05) among the dietary treatment in total feed intake (TFI), final weight gain (FWG) and feed conversion ratio (FCR). However, significant differences were recorded in feed cost (FC)/Kg, total cost of feed intake (TCFI) and FC/ weight gain (WTG) among the dietary treatments.. It is therefore concluded that inclusion of palm oil in the broiler chicken diet at up to 4% level has no detrimental effect on the broiler chickens and total digestible nutrients at the starter phase. It was therefore recommended that farmers and animal nutritionist should adopt the inclusion of palm oil at up to 4% in the diet of broiler chicken for efficient nutrient digestion..

Key words: Broiler chickens, Starter phase, Different oils, Nutrient digestibility; economy of feed conversion,

INTRODUCTION

The high nutritive value and short cycle of production make poultry products the ideal animal protein source for feeding the world's human population. However, high feed cost remains a major impediment to efficient poultry production (**Ani and Okeke, 2011)**. Many traditional ingredients used in poultry diets are forecast to be in short supply mainly as a result of the increase in human population and unfavorable climatic conditions (Cribb, 2010). The growing demand for traditional energy and protein feed ingredients as food by the ever-growing world's human population and other industrial uses has increased research interest in alternative cheaper ingredients for poultry feeding (**Ani and Okeke, 2011).**

In Nigeria, the most important factor limiting against expansion of poultry industry is the shortage and high cost of feed ingredients, particularly grains (Oluyemi and Roberts, 2000). The use of maize in ration formulation is becoming expensive because of scarcity following increasing pressure on it as staple food for human, feed for livestock and industrial raw materials; thus, there is a concomitant increase in the cost of poultry products (Effiong and Akpan, 2017).

MATERIALS AND METHODS

The study was conducted at the Poultry Unit of the Department of Animal Production Teaching and Research Farm Bosso Campus, Federal University of Technology Minna Niger state.

Source of Experimental Animals

A total number of 180 day old Ross 308 birds were sourced from Agrited Farm Limited, Ibadan, Oyo State and were used for the experiment.

Source of oils

Four (4) different oils were sourced from Engr. A.A Kure Ultra-Modern Market in Minna, Niger State.(palm oil, palm kernel, a brand of commercial oil and sheabutter oil)

Experimental Diets

Five (5) isonitrogenous and isocaloric diets were formulated using different oil types at 4% inclusion level, which were: T1 (0% inclusion level of oil), T2 (4% inclusion level of palm oil), T3 (4% inclusion level of palm kernel oil), T4 (4% inclusion level of a brand commercial vegetable oil) and T5 (4% inclusion level of shea butter oil) respectively.

Experimental Design

A completely randomized design (CRD) was used with each treatment having 3 replicates with 12 birds per replicate making a total 38 birds per treatment and overall total of 180 birds.

Economy of Feed Conversion

This was used to determine feed cost per kilogram weight gain. It was calculated from the values obtained from the total cost of feed per kilogram and feed conversion ratio; (FCR)
Feed cost per weight =feed cost per kilogram x FCR . (Yahaya, 2014)

Experimental Animals and their Management

A total of 180 Ross 308 birds were kept under an intensive management system for the period of eight weeks of experiment. The birds were managed on a deep litter system. The birds were brooded for three weeks and daily routine management which include washing of drinkers, provision of drinking water and feed *ad libitum*, vaccinations were done as at when due. .

Results and Discussion

The proximate composition of the experimental diets is presented in table 1. The table shows a Crude protein of 22.50% in T5 to the lowest level of Crude protein 20.30% in T3, while Crude fiber ranged from 8% in T4 to 3.50% in T2, Ether Extract also ranges from 30.0% in T2 and the lowest in T1 having 16.5%, Ash also ranges from 10.0% in T1 and 4.50% (the lowest) in T2. while Nitrogen Free Extract (NFE) ranges from 40.90% in T3 and 33.55% (lowest) in T2

Nutrient Digestibility of broiler chickens fed diets containing different type of oils at the starter phase

The result showed crude fibre, ether extract, Ash and Nitrogen Free Extract digestibility were significantly ($P<0.05$) affected by the inclusion of the oils. However, Dry matter and Crude Protein digestibility were not affected.($P>0.05$).

No particular trend was noticed in the apparent nutrient digestibility. The Total Digestibility Nutrient was also affected. The result of the total digestibility nutrients showed that T2 (palm oil) had the best Total Digestibility Nutrients while T1 (Control Diet), T3 (palm kernel oil) and T5 (shea butter) had lower values.

Economy of Feed Conversion Efficiency at Starter Phase

Table 3 represent the economy of cost of broiler chicken fed diet containing different types of oil as replacement for maize. The results analyzed showed a significant difference ($p< 0.05$) among treatments. There were no significant differences ($P>0.05$) on the final weight gain, feed conversion ratio (FCR) and total feed intake from birds fed the various oil types. On the cost of feed per kg, treatment with the inclusion of palm kernel oil (T3) has the best having 110.34 (₦/kg) followed by T2 having 108.26(₦/kg) with Control (T1) having 102.38 (₦/kg) being the least. T4 (vegetable oil) 109.36 (₦/kg) and T5 (shea butter oil) 109.30 (₦/kg) were statistically not different.($P>0.05$) .

The apparent nutrient digestibility of broiler chickens fed diets containing different oils were significantly affected ($p< 0.05$) at the starter phases of the experiment, no particular trend was shown in the results of the digestibility while total digestible nutrients (TDN) indicated that birds fed diet with 4% inclusion of palm oil (T2) had better total digestible nutrient, which disagree with the findings of Kavouridou *et al*. (2008) who stated that diet containing palm oil had reduced digestibility.

The feed cost parameters were significantly ($p<0.05$) affected by the inclusion of oils in the diet of the broiler chickens with the exception of the total feed intake, final weight gain, feed conversion ratio. While the feed cost (₦383.29) per weight gain inT3 (palm kernel oil) was significantly the highest ($p<0.05$) compared to other dietary treatments at the starter phase. Bello *et al.* (2011) reported a range of 183.96₦/kg-231.36₦/kg from broiler birds fed dietary levels of 10 to 40% of palm kernel cake.

Table 1. Proximate Composition of the Experimental Diets Fed to the Birds at Starter phase

Treatment%	T1	T2	T3	T4	T5
Dry matter	92.40	92.20	92.20	92.60	92.20
Crude protein	22.03	20.65	20.30	21.45	22.50
Crude fiber	4.50	3.50	6.00	8.00	4.00
Ether extract	16.5	30.0	17.00	17.50	19.00
Ash	10.0	4.50	8.00	9.00	8.50
Nitrogen free extract	39.32	33.55	40.90	36.65	38.20

Table 2:Nutrient Digestibility of broiler chickens fed diets containing different type of oils

at the starter phase

TREATMENTS	T1	T2	T3	T4	T5	SEM	LS
DM	88.07	81.31	84.21	81.65	88.31	0.85	NS
CP	79.39	73.17	71.61	74.45	82.22	1.61	NS
CF	88.45^{ab}	86.38^{ab}	84.17^{b}	90.43^{a}	88.43^{ab}	0.88	**
EE	98.34^{a}	79.09^{b}	98.04^{a}	98.63^{a}	99.07^{a}	2.08	**
ASH	72.87^{a}	29.77^{c}	54.73^{b}	62.14^{ab}	67.85^{ab}	4.51	**
NFE	90.62^{a}	89.82^{a}	90.44^{a}	90.71^{a}	85.65^{b}	0.67	**
TDN	78.73^{c}	96.59^{a}	81.65^{c}	90.97^{ab}	84.81^{bc}	2.00	**

$^{a, b, c}$ means with different superscript on same row differ significantly ($p < 0.05$)

SEM - Standard error of means, LS; level of significant

Table 3: Economy of Feed Conversion Efficiency of the Broiler Chickens at Starter Phase

TREATMENTS	T1	T2	T3	T4	T5	SEM	LS
TFI (kg)	7.00	6.13	6.33	6.52	6.99	0.14	NS
FC/kg (₦)	102.34^{c}	108.26^{b}	110.46^{a}	104.36a^{b}	109.30^{ab}	0.80	*
TCFI	716.83^{ab}	663.96^{b}	669.21^{ab}	713.02^{ab}	764.25^{a}	13.93	*
FWG (g)	229.74^{ab}	217.70^{ab}	203.0^{b}	214.10^{ab}	237.43^{a}	4.46	*
FCR	3.19	3.35	3.47	3.32	3.30	0.05	NS
FC/WTG	326.46^{e}	362.67^{b}	383.29^{a}	346.47^{d}	360.69^{c}	5.04	*

$^{a, b, c}$ means with different superscript on same row differ significantly ($p < 0.05$)

TFI: Total feed intake (kg), FC/kg: feed cost per kilogram (₦/kg), TCFI:Total cost of feed intake (₦/kg), FWG: Final weight gain (g)

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