www.roavs.com EISSN: 2223-0343
RESEARCH OPINIONS IN ANIMAL & VETERINARY SCIENCES

Efficacy of palm oil on commercial chicks: performance traits

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Abstract

The aim of this study was to assess the effect of substituting 10, 20, 30 and 40% of energy supplied by corn in a control diet with energy from palm oil sludge on performance and meat quality of broiler chickens. A total of 200 day old broiler chicks were randomly allocated to 5 treatment at 10 birds/replicate and 4 replicate/treatment. The feeding trial done for 7 weeks and feed intake and group live weight were measured weekly. Three birds per replicate were sacrificed and sample of the thigh, drumstick and breast muscles were taken for meat analysis and oxidative stability. Results showed that the final live weight, weight gain and feed conversion ratio were not significantly ($P>0.05$) influenced by the diets. The total feed intake increased with increasing levels of palm oil sludge in the diets ($P<0.05$). The fat content of selected muscle fat increased with increasing levels of palm oil sludge in the diets ($P<0.05$).

Keywords: Broiler chickens; palm oil; corn; oxidative stability

To cite this article: Faradonbeh OP, H Bagheri and R Soleimani, 2011. Efficacy of palm oil on commercial chicks: performance traits. Res. Opin. Anim. Vet. Sci., 1(12), 766-769.

Introduction

The level of meat and animal protein consumed by Iranian is estimated at 12g per capita per day which is about 20g less than the minimum of 32g daily requirement recommended by the National Research Council (NRC) of the United State of American (Obioha, 1992). Thus, there is the need to increase the level of animal production in Iran and also make animal protein source affordable to the populace. Poultry production provides the opportunity of meeting animal protein from livestock industry in Iran. Poultry meat has a wide acceptance with little or no limitation in terms of tradition and religious taboos as compared to pork, which is rejected by Muslims (Afolami and Oladimeji, 2002).

Cereals constitute the major energy feedstuff and also make up more than one third of the finished feed for poultry. Corn is an important source of energy in human nutrition and due to its high price; it is becoming more expensive to use at high levels in poultry feeds. There is therefore continuous quest for other cheap and indigenous sources of alternative feedstuffs. A by-product of interest in palm oil production in term of substituting energy in conventional monogastric diet is palm oil sludge. Palm oil sludge is the material that remains after decanting the palm oil mill effluent (Devendra et al., 1992). Processing of palm fruit involves six stages (sterilization, stripping, milling, separation, pressing and clarification). The palm oil sludge is collected at the stage of clarification after the palm oil has been skimmed, what remains is called palm oil mill effluent. Palm oil mill effluent is the final liquid discharge after extracting the oil from the fruit bunch; it contains soil particles, residual oil and suspended solid and represents 0.5% of fresh fruit and can cause problem to the entire surrounding ecosystem. Palm oil sludge has a crude protein of 9.6% and metabolizable energy of 4245kcal/kg (Devendra, 1977). This makes it relatively comparable to corn with protein content of 9% and metabolizable energy of 3434 kcal/kg. Dada (1999) reported that 5% palm oil sludge inclusion in finishing broiler chicken diets improved the performance characteristics. Thus palm oil sludge that

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is relatively uneconomical to man could be on alternative to corn in broiler chickens diets. However there is dearth information on the optimum level of inclusion, response of meat to oxidation and economics of production of broiler chickens fed diets containing palm oil sludge.

Materials and Methods

Experimental material

The palm oil sludge used for the experiment was collected from the palm oil processing unit of the South of Iran. The palm oil mill effluent was decanted to collect the palm oil sludge which was air dried and used in the formulation of the experiment diets. The proximate composition of the palm oil sludge used for the experiment is shown in Table 1.

Experimental diets

There were five experimental diets with the gross composition of the starter and finisher diets shown in Table 2. Diet 1 (control) contained corn as the main energy source. The energy supplied by corn in diet was replaced at 10, 20, 30 and 40% by energy supplied by palm oil sludge in diets 2, 3, 4 and 5 respectively.

Experimental Layout

Two hundred day old chicks were used for the experiment. The experimental design was completely randomized and the birds were reared on deep litter.

Table 1: Gross composition of experimental diets (%)

	Starter	Diet			
	1	2	3	4	5
Ingredient % Corn energy replaced with POS	0	10	20	30	40
Corn	56.00	50.40	44.80	39.20	33.60
Corn offal	-	0.50	0.50	0.50	0.50
Soya bean meal	16.00	14.00	13.50	12.00	10.50
Groundnut cake	15.35	14.45	14.40	13.53	13.63
Brewerdry grain	4.00	7.47	9.00	12.53	15.00
Palm oil sludge	-	4.53	9.06	13.59	18.12
Basal diet*	8.65	8.65	8.65	8.65	8.65
Total	100	100	100	100	100
		Finisher	Diet		
Corn	50.00	45.00	40.00	35.00	30.00
Corn offal	13.00	13.00	13.00	13.00	13.00
Soya bean meal	13.00	13.00	13.00	13.00	13.00
Groundnut cake	13.00	13.00	13.00	13.00	13.00
Brewerdry grain	5.30	6.26	7.22	8.18	9.14
Palm oil sludge	-	4.04	8.08	12.12	16.16
Basal diet*	5.70	5.70	5.70	5.70	5.70
Total	100	100	100	100	100
Calculated composition	Starter	Diet			
Crude protein (%)	22.98	22.36	22.37	21.83	21.72
M.E (kcal/kg)	2982.48	2987.27	2994.10	3003.14	3016.17
Ether extract (%)	4.22	5.02	5.84	6.72	7.52
	Finisher	Diet			
Crude protein (%)	19.71	19.33	19.44	19.54	19.66
M.E (Kcal/kg)	2916.86	2936.70	2955.55	2974.38	2998.23
Ether extract (%)	5.20	5.90	6.63	9.35	8.07

Basal diet used in the starter diet contains per kg, Fish meal 5.00, Bone meal 2.50, starter premix 0.25, Methionine 0.25, Lysine 0.15 and Salt 0.50; Basal diet used for formulating the finisher diet contains per kg, Fish meal 1.20, Bone meal 2.50, finisher premix 0.50, Oyster shell 0.50, Methionine 0.25, Lysine 0.15 and Salt 0.50.

Table 2: Proximate composition (%) and gross energy (MJ/Kg) of palm oil sludge

Components	%
Dry matter	77.29
Crude protein	9.85
Crude fibre	9.00
Ether extract	27.30
Ash	2.10
Nitrogen free extract	32.34
Gross energy	9.70

The birds were divided into 5 treatments with each treatment having 4 replicate of 10 birds each. The experiment lasted 7 weeks after a pre-experimental brooding period of one week. Feed and water were given *ad-libitum* and weekly feed intake and group live weights were measured. At the end of the feeding trial, 3 birds/replicate were sacrificed and dissected for sample collection. The breast, drumstick and thigh muscles were deboned and cut into two parts for

Table 3: Performance of broiler chickens fed diets containing palm oil sludge (Mean ± SD)

Diets		1	2	3	4	5
% Corn energy replaced by energy from palm oil sludge.		0	10	20	30	40
Initial live weight	(g)	99.58±0.72	99.58±0.72	99.17±0.72	98.17±0.00	97.17±1.44
Final live weight	(g)	2510.00±51.50	2501.00±16.30	2577.40±82.50	2537.40±51.50	2614.00±47.60
Total weight gain	(g)	2420.41±0.00	2411.40±17.10	2348.20±82.10	2448.70±51.50	2524.90±48.20
Total feed intake	(g)	5502.10±20.30^{a}	5587.40±61.80^{b}	5664.30±33.10^{bc}	5725.60±25.40^{bc}	5798.70±11.80^{c}
Average weight gain	(g/bird/day)	48.98±1.04	48.80±2.39	48.54±1.68	49.57±1.06	51.12±0.09
Feed intake	(g/bird/day)	112.08±0.42^{a}	113.62±1.25^{ab}	115.19+0.68^{bc}	116.52±0.52^{bc}	117.93+0.02^{c}
Feed conservation ratio		2.29±0.05	2.33±0.01	2.38±0.10	2.35±0.06	2.31±0.04

Means with different superscript on the same row are significantly different (P<0.05)

Table 4: Moisture and lipid contents of meat from broiler chickens fed diets containing Palm oil sludge (Mean ± SD)

Diets	% Corn energy replaced by POS	Muscle type	Moisture	Lipid
1	0	Breast	62.83±1.76	8.83±1.10
		Drumstick	73.00±1.00	9.73±0.10
		Thigh	65.17±0.76	11.13±0.25
2	10	Breast	68.75±0.25	8.87±0.38
		Drumstick	69.00±2.50	9.79±0.20
		Thigh	69.83±0.76	11.24±0.78
3	20	Breast	65.17±1.76	8.97±0.98
		Drumstick	63.33±4.04	10.58±1.03
		Thigh	69.67±2.57	11.62±0.93
4	30	Breast	66.83±1.76	9.61±0.36
		Drumstick	70.00±2.00	10.62±0.34
		Thigh	67.00±1.00	12.85±0.18
5	40	Breast	66.75±1.25	9.52±0.52
		Drumstick	67.33±2.25	10.81±0.23
		Thigh	66.00±1.50	13.11±0.26
Statistical Significance				
Diet			NS	***
Muscle type			***	***
Diet * Muscle type			***	NS
Mean separation				
Dietary Effect				
1			67.00±4.74	9.90±1.15
2			69.19±1.40	9.97±1.13
3			67.72±3.24	10.39±1.47
4			67.33±2.25	11.03±1.46
5			66.69±1.60	11.15±1.61
Muscle type effect				
Breast			66.07±2.40^{a}	9.16±0.71^{a}
Drumstick			69.53±2.95^{b}	10.31±0.64^{b}
Thigh			67.53±2.33^{a}	11.99±0.98^{c}

POS –Palm oil sludge, NS = Not significant, *** = P< 0.001, Means with different superscripts within the same column and for the same parameter are significantly different (P<0.05).

oxidative stability study. One part was frozen at -18^{o}C after 6 hours of refrigeration and the other part was refrigerated at 4°C for 6 days prior to frozen storage at –18°C. The fat content of the selected muscle parts was determined using the soxhlet extraction method and the moisture content was also determined using the method described by AOAC (1995). All data were subjected to one-way analysis of variance and 5 x 3 factorial analysis (5 diets x 3 muscle types) as appropriate using the Minitab statistical package (v.10.2 Minitab Inc. USA).

Results and Discussion

The proximate composition of palm oil sludge used for formulating the diets for they study is presented in table 2. It has a crude protein content of 9.85%, which make it comparable to corn with about 10% crude protein. The energy content is relatively high (28.7MJ/Kg) which makes it a good energy source in poultry industry. Table 3 shows the result of the growth performance characteristics of the broiler chickens. The initial weight, final weight, total weight gain, feed conversion ratio and average weight gain were not significantly (P>0.05) influenced by the dietary treatment. However, the total feed intake and average feed intake were significantly (P<0.05) influenced by the treatment. The final weight and average weight gain were highest for birds on diet 4 and 5. The higher weight gain in birds on diets 4 and 5 when compared with those on control diet may be attributed to higher feed intake. Improved performance by finishing broiler chickens at 5% palm oil sludge inclusion in diets was reported by Dada (1999). Similarly, Hertrampt (1998) reported increased daily feed intake and daily weight gain of pigs fed palm oil sludge in place of corn at a level of 15 to 30%. The increase in feed intake with increasing levels of palm oil sludge in the diet may be as a result of improvement in taste or palatability of the diets. The feed conversion ratio of birds was similar. Moisture and lipid content of muscles from chickens fed diets containing palm oil sludge is shown in table 4. The moisture content was not significantly (P>0.05) influenced by the experimental treatments. However,

there was a significant (P<0.05) effect in the muscle type with drumstick having the highest moisture content followed by thigh and least for breast muscle. The moisture contents obtained in the study were within the range of 75 and 86% reported by Adrian et al. (1982). There was a significant (P<0.05) increase in the lipid contents of the muscles with increasing levels of palm oil sludge in the diets. The muscle type was also significantly (P<0.05) influenced with the thigh muscle having the highest lipid content followed by drumstick and least for breast muscle. This agreed with Onibi (2006) who reported that fat deposition is higher in thigh than drumstick and lowest for breast muscles. The thigh fat content in diets 4 and 5 were higher than 12% muscle fat as reported by Adrain et al. (1982).

Conclusion

From the results obtained, it is evident that by replacing corn with palm oil sludge in diets of broiler chickens had no negative effect on growth performance characteristics, Palm oil sludge inclusion in the diet increased the susceptibility of the meat to oxidation and the fat content of muscles up to 30% substitution of corn energy were within the range recommended by Adrian et al. (1982) for broiler chickens, this level could be used to reduce the adverse effect of high lipid content in the meat.

References

Adrian, S., Legend, G. and Frange, R. 1982. *Dictionnaire de Brochimie Alimentary et de Nutrition. Paris Techniqueet Documentation.*

Afolami, C.A. and Oladimeji, O. 2002. Producer response to retail egg in Ogun State, Nigeria: Implication for increased egg production. *Nigerian Journal of Animal Production*, 30 (1): 81 – 86.

AOAC 1995. Official methods of Analysis 16th edition Association of official Analytical Chemists. Washington D.C.

Dada, A. 1999. Effect of Palm oil sludge inclusion in broiler finisher ration. Proc. Annual Conference. Nig. Soc. For Animal Prod., Ilorin, 23rd – 29th March, 1999.

Devendra, C. 1977. Non –conventional feed resources in Asis and the Pacific. Strategies for expanding and utilization at the small farm level. 4th ed. Interntaional Development Research Centre, Singapore. FAO Regional Animal Production and Health Commission for Asia and the Pacific. Bangkok

Devendra, C., Yeong, S.W. and Ong, H.K. 1992. The potential value of palm oil mill effluent (POME) as feed resource for manilas in Malaysia. Proc. of National workshop on oil palm by-product utilization. December 14th -15th May 1992.

Hertrampt, J. 1988. Unconventional feed stuff for livestock. *Muhle Mishfulter Chnik* 125(9): 103-109

Obioha, F.C. 1992 A guide to poultry production in the tropics. Acena publishers Enugu, Nigeria. 1st edition pg 212.

Onibi, G.E. 2006. Dietary oil quality and Vitamin E supplementation. II: effect on carcass and meat quality of broiler chickens. *Bowen Journal of Agriculture,* 3(1): 106 – 115.