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EFFECTS OF DIFFERENT DIETARY ENERGY SOURCES ON THE EGG PRODUCTION OF THE JAPANESE QUAIL

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ABSTRACT
The present investigation focused on determining the effects of dietary energy sources (from soya oil, palm kernel oil, cassava meal and corn meal) on egg production by the Japanese quail over a period of 10 weeks in a humid zone. A control diet and four isonitrogenous (28% crude protein; CP) and isocaloric (12.1 MJ/kg) diets were formulated with ninety adult female quail birds randomly allocated in three replications per treatment in a completely randomized design (CRD). Egg production showed significant differences (P< 0.05), which was highest for the palm kernel oil treatment and least for the corn meal treatment group. The study indicated that the inclusion of palm kernel oil in the diets of laying birds was beneficial. The observation reported on the low egg production with high corn diet needs further investigations to ascertain the extent of depression on egg production observed in the study.

Key words: energy sources, egg production, Japanese quail

INTRODUCTION
The contribution of nutrition to the ability of laying birds to produce egg is very significant although, several other factors such as breeds, environmental temperature/humidity, and management systems may also be influential. In a study conducted by Isika *et al*. (1999), it was reported that egg production was significantly increased at 5% broiler offal fat or palm oil in the diets of rearing pullets. Scragg *et al* (1987) further reported a marked improvement in hen day production and egg weight when different sources of oil were included in the diets of layers. In another study, Oluyemi and Okunuga (1975) reported the effect of dietary palm oil and energy on the performance of White Rock breeders in Nigeria and observed that palm oil enhanced egg production.Although, dietary protein is primarily used as a source of amino acids which are the building blocks for body tissues, hence growth and production, they also result in a significant contribution to the energy requirement of the bird, and can, if fat and carbohydrate are in short supply, be used by the animal as its main source of energy.Protein, Carbohydrate and Fat all contain carbon, hydrogen and oxygen, and can thus be oxidized as a source of energy in the body. While proteins and carbohydrates yield around 4 calories of energy per gram, fat yields 9 calories per gram. It is thus, recommended to usually add a source of fat to poultry diet when formulating for high energy diets (Summers, 2000).

Olomu (1984) reported that replacing 50% of maize with wheat offal resulted in higher egg production, while the addition of palm oil had no significant effect on hen day production. The present study was set up to investigate the effects of dietary energy sources on egg production in the Japanese quail in a humid zone.

MATERIALS AND METHODS
The study was conducted on the Teaching and Reserch farm of the Rivers State University of Science & Technology, Port Harcourt. Four Isonitrogenous (28% CP) and Isocaloric (12.1 MJ/kg) diets were formulated with 15% Soya oil, 15% palm kernel oil, 50% cassava meal

and 53% Corn meal respectively. The control diet was formulated to provide 28% CP and 12.1 MJ/kg of metabolizable energy. Ninety adult female quail birds were randomly allocated in a completely randomized design (CRD). The quails were reconditioned for two weeks on a basal diet as control. Eighteen birds were randomly allocated to each of the five dietary treatments A, B, C, D and E (Table 1).

TABLE 1: COMPOSITION OF EXPERIMENTAL DIETS

INGREDIENTS	**CONTROL (A) %**	**SOYA OIL (B) %**	**PALM KERNEL OIL (C) %**	**CASSAVA MEAL (D) %**	**CORN MEAL (E) %**
Corn	30.5	0	0	0	0
Palm Kernel oil	0	0	15.0	0	0
Soya oil	2.5	15.0	0	2.5	0
Cassava Meal	10.0	0	0	50.0	0
Corn offal	4.5	9.0	10.0	0	2.0
Palm Kernel Cake	8.5	3.0	2.0	7.0	4.0
Wheat bran	9.0	39.0	39.0	0	5.0
Soya bean meal	6.0	8.0	8.0	9.0	8.0
Blood meal	15.0	14.0	14.0	17.5	14.0
Fish meal	10.5	8.0	8.0	10.0	10.0
Vit. Premix	0.25	0.25	0.25	0.25	0.25
Bone meal	3.0	3.0	3.0	3.0	3.0
Methionine	0.10	0.10	0.10	0.10	0.10
Lysine	0.35	0.35	0.35	0.35	0.35
Salt	0.30	0.30	0.30	0.30	0.30
CALCULATED/ ANALYSED NUTRIENT COMPOSITION (g/kg)					
Crude Protein %	28.16 / 27.95	28.27 / 28.05	28.21 / 28.00	28.06/27.85	28.35 / 28.05
Met. Energy (MJ/kg)	12.1 / 12.0	12.2 / 12.1	12.2 / 12.1	12.2 / 12.1	12.2 / 12.1
Calcium %	1.84	1.46	1.46	1.54	1.47
Av.Phosphorus %	0.96	1.24	1.23	0.89	1.03
Methionine %	0.640	0.566	0.563	0.580	0.642
Lysine %	2.00	2.01	2.01	2.05	1.95
Fat %	5.98	18.33	18.23	3.93	3.81
Crude Fibre %	4.64	6.01	6.00	5.54	3.44

Each of the five treatments was replicated three times with six quails per replicate and then housed on deep litter per replicate in an open-sided poultry house. The quail birds were fed *ad libitum* with equal quantity of feed for 10 weeks. Feed offered and leftovers were weighed daily while, the birds were weighed in groups at the start of the experiment and at weekly intervals. At the end of the 10th week, the total egg production data for each of the replicates were collated and subjected to analysis of variance (ANOVA) and significant mean differences were separated using least significant difference (L.S.D) (Gill 1978).

RESULTS AND DISCUSSION

The egg production data showed significant difference ($P< 0.05$) amongst the dietary treatments (Table 2).

TABLE 2: Effects of dietary treatments on egg production of Japanese Quails

Parameters	Control (a)	Soya oil (b)	Palm kernel oil (c)	Cassava meal (d)	Corn meal (e)
Daily feed intake (g)	21.47 ± 1.285	24.43 ± 1.285	20.94 ± 1.285	19.91 ± 1.285	22.06 ± 1.285
Dairy weight gain (g)	0.28 ± 0.098	0.30 ± 0.98	0.46 ± 0.098	0.27 ± 0.098	0.47 ± 0.098
Total Egg production (10 wks)	123.00^{d} ± 1.738	107.00^{c} ± 1.738	170.00^{e} ± 1.738	64.67^{b} ± 1.738	31.67^{a} ± 1.738

Data are means of 3 replicates ± SEM (standard error of mean)
$^{a,-,e}$Means within same row with different superscripts are significantly different ($P<0.05$)

The results indicated that the palm kernel oil treatment had the highest egg production, followed by the control diet. Soya oil diet was higher than the cassava meal, while the corn meal had the least total egg production data. The trends in weekly egg production per treatment are shown in Figure 1.

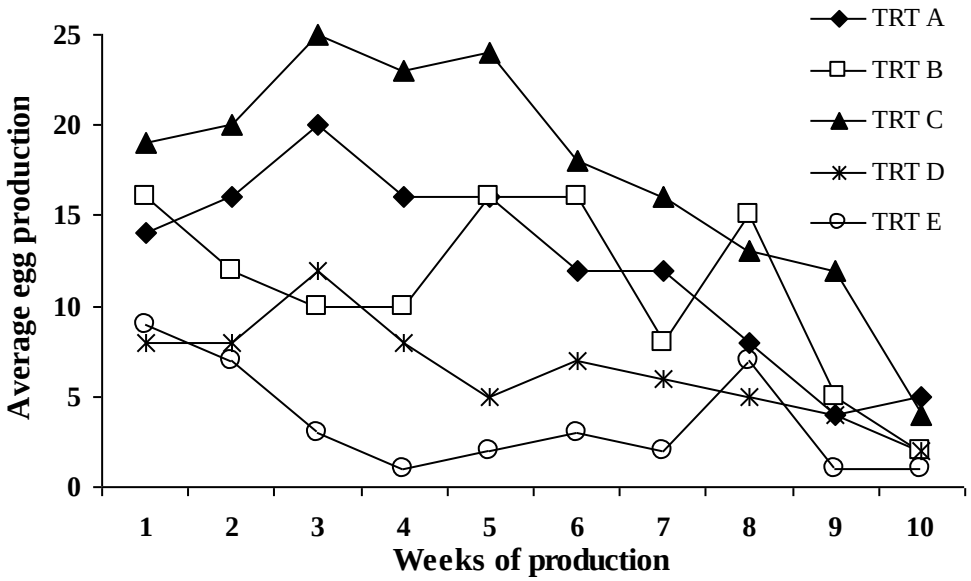

Figure 1: Average weekly egg production of Japanese quail fed different dietary energy sources

In a study conducted by Isika*et al*. (1999), it was reported that egg production was significantly increased ($P< 0.05$) at 5% broiler offal fat or palm oil in the diets of rearing pullets. Oluyemi and Okunuga (1975) reported the effects of dietary palm oil and energy on the performance of White Rock breeders in Nigeria, and observed that palm oil enhanced egg production. This study, which used palm kernel oil, recorded similar observation suggesting that the fatty acid profile in palm oil and palm kernel oil supported egg production. Although the polyunsaturated fat ratio to saturated fats (P.S) in palm kernel oil is low, the present study

showed nonetheless that it could enhance egg production. In another study conducted by Olomu (1984) where 50% of maize was replaced with wheat offal, higher egg production results were obtained for the replacement rations, but the addition of palm oil gave no significant effect on hen day production. The lower total egg production observed for the corn meal dietary treatment in the present study conforms to the report by Olomu (1984). This trend of low egg production with high corn diets could not be fully explained hence, calls for further investigations.

CONCLUSION

The inclusion of palm kernel oil in the diets of laying birds, as observed in the study was beneficial, but the level of inclusion was not determined and so requires further investigations. The control diet in the study, which combined all the ingredients at moderate levels, gave good total egg production. This is an indication that the types of ingredients and levels of inclusion were significant in terms of egg production in layers. The consistent report of low egg production with high maize diets needs to be investigated, to ascertain the egg production depressing effect observed.

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