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# SERUM BIOCHEMICAL COMPOSITION OF LAYING JAPANESE QUAILS (*COTURNIX COTURNIX JAPONICA*) FED DIETS CONTAINING SUN-DRIED MANGO (*MANGIFERA SPP*) KERNEL MEAL (SMKM)

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**ABSTRACT:** *The study was conducted to evaluate the effect of sun-dried mango kernel meal on the serum biochemical parameters of laying Japanese quails. One hundred and forty four Japanese quails (Coturnix coturnix japonica) were randomly allotted to three dietary treatments (i –iii) of forty eight quails per treatment. Each treatment was replicated thrice with 16 quails per replicate. In each of the three diets, mqngo kernel meal (Mangifera indica) was used to replace maize at 0%, 25% and 50% respectively The result of serum biochemical composition showed that, ALT, serum sodium ($Na^+$), serum bicarbonate ($HCO_3^-$) and creatinine were within normal range. However, AST, Total bilirubin and uric acid were below lower limit across the treatments. The Serum potassium ($K^+$) of quails fed treatments. 1 and 111 were within normal range but Serum $K^+$ of quails fed 25% SMKM was slightly above the upper limit. It was also observed that, serum chloride ($CL^-$)was within normal range for quails fed 50% SMKM but was slightly above the upper limit for quails fed 0% and 25% SMKM. It is concluded that, SMKM did not influence the results of serum electrolytes as the deviations observed did not follow a regular pattern. More so, one of the determinant of liver function; ALT showed no significant (P>0.05) difference across treatments. Treatments could not have been responsible for the abnormalities observed in AST and Total bilirubin. SMKM can therefore replace maize in laying quails diets without adverse effect on the serum biochemical parameters.*

**KEYWORDS**: Serum Biochemistry, Sun-Dried Mango Kernel Meal, Maize, Laying Japanese Quails.

## INTRODUCTION

The short supply of high biological valued protein, especially those of animal origin is limited in supply, particularly in developing countries like Nigeria, and man's protein need has to be met to an extent of about 30 to 50 percent by food of animal origin (Thomson, 1960). An average Nigerian consumes about 9g of animal protein as against the minimum requirement of about 28g per day. (Njoku, 1998). This has resulted in malnutrition and poor health conditions of some Nigerians. Emphasis must be laid on animal production by livestock industry in Nigeria under a good economic condition. One of the major problems of the livestock industry in Nigeria as regards animal production has been the unavailability and consequently high cost of feed. It is therefore necessary to look for unconventional feedstuffs which are available, cheap, safe and nutritionally adequate to substitute for maize in livestock (poultry) feeding.

Mango (*Mangifera indica* L) kernel, a by-product of mango pulp is reported to be a good source of starch (Saadany *et al.*, 1980), Which makes it a rich source of carbohydrate, protein, fat, fibre, mineral, calcium and phosphorus depending on the variety. Research in the past have indicated the suitability of mango seed kernel in livestock feeding but the level of inclusion in



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poultry diets has been low because of the presence of tannins which have been reported to reduce chick growth (Jansman *et al.*, 1995; Teguia, 1995).

Japanese quails are hardy birds that thrive in small cages. It is this attribute of hardiness, ability to withstand diversified agro-climatic conditions and inexpensive to keep that makes it viable commercial poultry enterprises. Japanese quail mature in about 6 weeks and are usually into full egg production by 50 days of age. With proper care, hens should lay 200 eggs in their first year of lay. Life expectancy is only 2 to 2½ years. (Maurice et al, 2008). These attributes makes it an ideal experimental bird for the provision of supplemental income and protein. Therefore the objective of this study is to access the effect of sun dried mango kernel meal (SMKM) on serum biochemical composition of laying Japanese quail (*Coturnix coturnix japonica*).

## MATERIALS AND METHODS

A total of one hundred and forty four (144) three weeks old unsexed Japanese quails with average body weight of about 28g were studied over a period of nine weeks. The birds were raised in the poultry unit of animal science teaching and research farm of the Federal University of Agriculture Makurdi, Benue State. Quails were randomly allotted to three dietary treatments (I –III) of forty eight quails each. Each treatment was replicated thrice with sixteen quails per replicate. In each of the three diets, sun-dried mango kernel meal (SMKM) replaced maize at 0%, 25% and 50% as treatments I, II and III respectively. The experimental birds were managed intensively in cages of three tiers. Each tier was separated by wood. And wire mesh was used for the walls and doors to allow adequate ventilation and lighting. The dimension of each tier was $0.75m^2$ X $0.38m^2$. Litter materials (wood shavings) were used on the wooden floors. Each tier was equipped with adequate drinkers and feeding troughs. A floor space of 0.007m to 0.009m per quail was provided. Artificial lighting was provided by means of a 200 watts bulb in each tier to ensure adequate feed intake. Feeds were weighed with a micro scale balance of 2kg before serving to ensure a uniform amount across treatments. Quails were served 200g of feed per replicate for the first week at about 8:00am on a daily basis; the quantity was increased by 50g on weekly basis. Fresh water was supplied daily *ad-libitum*. Drinkers and feeders were washed and disinfected with izal when appropriate. At the end of the experiment ($9^{th}$ week), two (2) laying quails per treatment were randomly selected and weighed. Quails were slaughtered by cutting of the jugular vein with sharp knife. The blood samples were collected at slaughter into sterile vacutainers and the serum was separated by centrifuge at 750(fu/g) for 15 minutes and stored in a deep freezer until used for serum biochemical analysis. Serum biochemical indices were carried out using routine standard clinical chemistry procedures (Olorede et al, 1996).


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**Table 1: composition of diet with sun-dried mango (*Mangifera spp*) kernel meal (SMKM) for laying Japanese quails (*coturnix coturrnix japonica*)**

| Ingredients | Control (T1) | T2 (25%) | T3 (50%) |
|---|---|---|---|
| Maize | 53.20 | 39.90 | 26.60 |
| SMKM | - | 13.30 | 26.60 |
| Full-fat soybean | 26.67 | 25.85 | 25.35 |
| Fish meal | 5.20 | 6.00 | 6.50 |
| Wheat offal | 6.93 | 6.93 | 6.93 |
| Bone meal | 7.00 | 7.00 | 7.00 |
| Salt | 0.5 | 0.5 | 0.5 |
| Vitamin premix | 0.5 | 0.5 | 0.5 |
| Total | 100.00 | 100.00 | 100.00 |
| **Calculated nutrients:** | | | |
| Crude protein (%) | 21.87 | 21.63 | 21.34 |
| M.E (kcal/kg) | 2836.47 | 2846.12 | 2846.39 |
| **Analysed nutrients:** | | | |
| Crude protein (%) | 22.02 | 21.75 | 21.70 |
| M.E (kcal/kg) | 2845.01 | 2900 | 2950 |

## RESULTS AND DISCUSSION

The results of serum biochemical composition are presented in table 2. The results showed that serum sodium ($Na^+$) of quails was within normal range across the treatment (Scholtz, et al., 2009). This report was in contrast with that of Obi (2010) who observed hyponatremia in quails fed fermented taro cocoyam across treatments. This could be attributed to the variations in treatments and processing method applied. Serum potassium ($K^+$) of quails fed 0% and 50% inclusion levels of SMKM was within normal range (Scholtz, et al., 2009). However, the serum potassium of quails fed 25% level inclusion of SMKM was slightly above the upper limit. This report was not in agreement with that of Obi (2010) who observed hyperkalemia across treatments for quails fed varying levels of fermented taro cocoyam. The serum chloride ($Cl^-$) of quails fed 50% SMKM were within normal range (Scholtz, et al., 2009).while quails fed 0% and 25% inclusion level of SMKM were slightly above the upper limit. This result was in contrast with that of Obi, (2010) who reported that, serum chloride ($Cl^-$) of quails fed fermented taro cocoyam was within normal range across the treatments. While serum bicarbonate ($HC0_3^-$) was within normal range (Scholtz, et al., 2009). This result was similar to that of Obi (2010) who observed that serum bicarbonate of quails fed fermented taro cocoyam was within normal range across the treatments. However, the abnormalities observed in the serum electrolyte did not follow a regular pattern thereby pointing that, SMKM did not influence these results.

The liver function test showed that Alanine aminotransferase (ALT) value of this study was within the normal range (Robin 2013) across the treatments, this implies that SMKM had no adverse effect on the liver as higher values of ALT implies liver damage. This result was similar to the report of Sobayo, et al. (2013) and Obi (2010) who reported similar normal range values from broilers fed graded levels of bitter kola and quails fed fermented taro cocoyam respectively. Aspartate aminotrasnferase (AST) of quails fed SMKM in their diets were not within normal range. This study showed that AST was below the lower limit (Scholtz, et al.


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(2010). Similar low values were recorded by Sobayo, et al. (2013) (42.2 – 60.6) for broilers fed graded levels of bitter kola. Which in this study could be attributed to fluctuations in tropical temperatures which have effects on blood parameters and production, Ogundu,. et al. (2010) More so, the low AST value could be as a result of age effect, as AST value depends on age of the bird (Hochleithner, et al., 1994). Total bilirubin and uric acid were lower than the lower limit of the normal range as observed by Scholtz, et al., (2009) for all treatments, high values of bilirubin signifies liver diseases such as hepatitis, blockage of the bile duct or diagnose conditions that causes increased destruction of red blood cells (Robin, 2013). Bilirubin is produced in the liver, when old red blood cells are broken down. This low value across treatments shows that the treatments did not affect the result of this parameter, simply because there were no enough old red blood cells to be broken down by the liver as at the time of blood collection. It therefore implies that SMKM must be a rich source of iron ($Fe^{2+}$) and folic acid which help in the building up of blood. Creatinine was within the normal range (Scholtz, et al., 2009). This was in disagreement with Sobayo, et al., (2013) who observed that broilers fed bitter kola had creatinine levels below normal range across all treatments.

**TABLE 2**: Serum biochemical composition of laying quails fed varying levels of sun-dried mango (*mangifera spp*) kernel meal (SMKM)

| Sample ID | AST U/L | ALT U/L | Creatinine Mg/dl | Total bilirubin Mg/dl | Uric acid Mg/dl | $NA^+$ Mmol/l | $K^+$ Mmol/l | $CL^-$ Mmol/l | $HCO_3^-$ Mmol/l |
|---|---|---|---|---|---|---|---|---|---|
| **T1** | 19 | 26 | 3.1 | 0.47 | 6.6 | 151 | 3.9 | 110 | 27 |
| **T2** | 30 | 17 | 2.7 | 0.25 | 4.8 | 142 | 5.4 | 126 | 30 |
| **T3** | 37 | 22 | 2.4 | 0.36 | 5.2 | 148 | 4.7 | 106 | 28 |

## CONCLUSION

This study revealed that, SMKM did not influence the results of the serum electrolytes as the deviations observed did not follow a regular pattern (values of quails fed control diet were equally not within the normal range). Most importantly, one of the determinant of a proper liver function; ALT has proven that the liver is normal and healthy across the treatments, invariably, treatments could not have been responsible for the abnormalities observed in AST and Total bilirubin. SMKM can therefore replace maize in laying quails diets without adverse effects on serum biochemical composition.

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