

## Calcium and Phosphorus Levels in Nigerian Guinea Fowls

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**Abstract:** The plasma levels of calcium and phosphorus were analyzed for a period of 12 months using 480 adult female guinea fowls. The calcium levels ranged between 2.00 and 12.25 mg/100ml. The highest level, 12.25 mg/100ml, was recorded in the month of August while the lowest level, 2.0 mg/100ml, was in March. The phosphorus levels ranged between 4.5 and 9.6 mg/100ml. Variation in phosphorus levels was not seasonally dependent as was observed with calcium levels. Statistically, the calcium concentration was significantly ( $p < 0.01$ ) related to the weights of the reproductive organs while the phosphorus concentration was not ( $p > 0.05$ ). The calcium level, therefore, has a direct effect on the reproductive performance of the guinea fowl while the phosphorus level does not.

**Key words:** Calcium, phosphorus, guinea fowl

### Introduction

One of the important requirements in the reproduction cycle of the female birds is the calcium element. This requirement has been reported by Gilbert and Wood-Gush (1971); Taylor *et al.* (1962). The plasma level of this element has been well established in the domestic fowl. In the guinea fowl, dietary calcium requirement (2.75%) is said to be higher than that for the domestic fowl (Olomu, 1979). Carew *et al.* (1982) determined the thickness of the eggshell and found it to be 620 $\mu$ . This is about 1.7 times that of the domestic fowl, which is estimated to be 300 to 430 $\mu$ .

The plasma levels of phosphorus in some breeds have been documented. The levels in laying Wyandotte chicken ranged from 3.0 to 7.1 mg/100ml (Common, 1936). That for laying Greenleg chicken was 4.5 mg/100ml (Laskowski, 1933); laying White Leghorn was 8.0 mg/100ml (Urist and Deutsch, 1960); laying turkey ranged from 5.4 to 7.09 mg/100ml (Paulsen *et al.*, 1950) and the level for female pigeons was 4.3 mg/100ml (McDonald *et al.*, 1945).

Such basic but fundamental information on the biology of the guinea fowls is yet to be documented. Guinea fowl is of increasing commercial importance to Nigerians and research into its biology is growing. The author thus, decided to embark on this aspect of study.

### Materials and Methods

Four hundred and eighty mature female guinea fowls were used for the study, which lasted from January to December. These adult birds were obtained from the open market around Zaria and housed in a place that was protected adequately from the direct effects of the sun and rain. They were fed ad libitum on commercially compounded poultry feed for the period they were housed.

A set of 10 birds were bought at a time, fed and housed for about a week within the Faculty of Veterinary Medicine premises and collectively slaughtered at the end of each week. The sera obtained from the blood samples collected were stored at 20°C until subsequently analyzed for calcium and phosphorus. The ovaries and oviducts were dissected out and the weights and total lengths recorded.

### Results and Discussion

Laying period for the guinea fowl in Nigeria is during the rainy season, which occurs from mid-May to mid-October while non-laying period is in the dry season, which occurs from mid-October to mid-May.

The plasma calcium levels of the guinea fowls in this study, during the rainy season, ranged from 8.6 to 12.25 mg/100ml (Table 1) with a mean of 9.72 mg/100ml while the range, during the dry season, was from 2.0 to 5.88 mg/100ml (Table 1) with a mean of 4.25 mg/100ml. This mean level (9.72 mg/100ml) of the laying guinea fowl is much lower than the mean value of 25 mg/100ml for some breeds of chicken reported by Urist and Deutsch (1960).

Fig. 1 shows the significant ( $p < 0.01$ ) relationship between plasma calcium levels and the reproductive organs. Higher levels of plasma calcium are required during the laying period (rainy season) when the reproductive organs are known to weigh heavier. It has also been shown that the levels of plasma calcium are related to the number of eggs laid by different species of birds (Kosin, 1972).

The plasma phosphorus levels ranged from 4.85 to 9.6 mg/100ml during the rainy season with a mean value of 6.59 mg/100ml while the range, during the dry season, was 4.5 to 6.6 mg/100ml with a mean of 5.82 mg/100ml. The mean values during the two seasons are not very different from one another.

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Table 1: Monthly mean Calcium level, Phosphorus level, weight of oviducts and weight of ovaries

	Calcium mg/100ml	Phosphorus mg/100ml	weight of oviducts (gm)	weight of ovaries (gm)
2004				
August	12.25	5.90	16.02	13.88
September	11.03	7.53	12.05	7.44
October	5.42	8.33	3.69	1.08
November	4.50	4.90	1.00	0.52
December	5.50	6.80	1.06	0.47
2005				
January	4.50	4.50	0.25	0.37
February	3.00	6.60	0.12	0.40
March	2.00	5.90	1.59	1.25
April	5.50	6.20	1.47	1.17
May	5.88	5.12	1.93	0.96
June	9.00	4.85	11.27	11.00
July	8.60	9.60	5.91	2.74
August	10.65	6.38	19.10	14.93
September	11.00	5.40	10.73	8.60
October	8.66	7.75	6.83	2.37
November	10.38	5.55	2.69	1.3

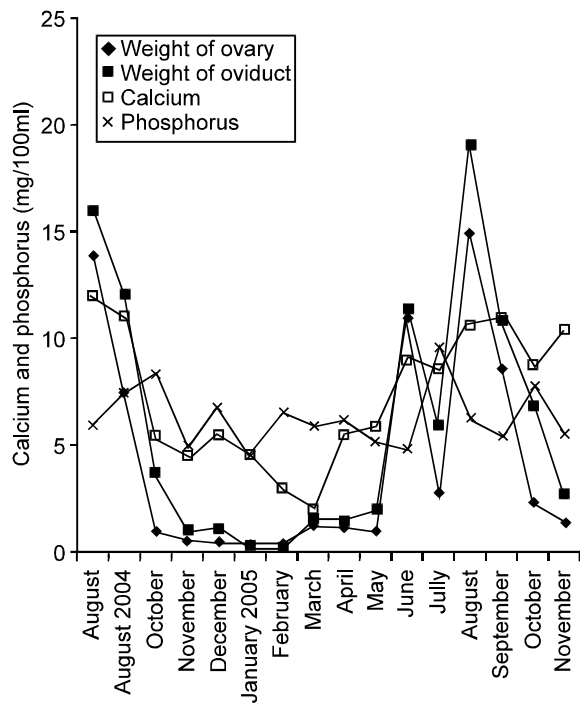


Fig. 1: Calcium and phosphorus plasma levels and their relationship to weights of ovaries and oviducts

Fig. 1 also shows that there is no significant ( $p > 0.05$ ) relationship between plasma phosphorus levels and the weights of reproductive organs. Absolute values within the months (Table 1) also indicate no parallel correlation with the weights of the reproductive organs.

Some species and breeds of birds show close similarities in their plasma phosphorus levels (Common, 1936; Laskowski, 1933; Paulsen *et al.*, 1950; McDonald *et al.*, 1945) but despite these similarities, the number of eggs laid per year varies considerably. This gives the indication that the amount of eggs laid by a bird does not necessarily depend on the total quantity of plasma phosphorus.

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