

Changes in Total Serum Calcium Level and Shell Calcium Content in Bank Myna, *Acridotheres ginginianus* (Latham) During Breeding Season

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ABSTRACT

Bank Myna is a wild *Passerine* seasonal breeder of North India. Higher values of serum Ca had been documented in early breeding season which gradually reduced in late breeding season. Eggshell Ca content closely correspond the rise and fall in serum Ca level. Highest serum Ca level of 15.13 ± 0.146 mg/dl and eggshell Ca content of 357.25 ± 0.310 mg/g were recorded in first week of June.

Keywords: Serum Calcium, Eggshell Calcium, Bank Myna, Seasonal breeder, Photoperiod

INTRODUCTION

Avian seasonal breeders remain reproductively active mostly for a shorter duration. During the period high calcium kinetics occurs in laying birds to supply the material to eggshell (Dacke, 2000; Sugiyama & Kushuhara, 2001). Gonadal steroids are known to affect largely the serum calcium (Ca) level in birds (El-Ghalid, 2009). In seasonal breeders, increasing photoperiod is an important cue for onset of breeding (Williams et. al., 1987; Beebe et. al., 2005). This adaptation enables the animals to ensure their offspring are born when climate is moderate and food is abundant (Atsumi et. al., 2016).

The Bank Myna (*Acridotheres ginginianus*) is a commonest and abundantly present wild *Passerine* seasonal breeder of Northern and Central Indian plain. The bird is seen near human habitation, found to feed upon kitchen scrap (Ali & Ripley, 2007; Bose & Das, 2012) and behave as if tamed. Breeding female lay egg in clutch of 3 eggs mostly, however during breeding peak, the clutch size increases, 3-5 (Bose & Das, 2012). Except few reports (Bose & Das, 2012; Bose & Das, 2015), seasonal changes in total serum calcium in accordance with reproductive activity of wild birds of Indian Sub-continent have been grossly neglected. The

objective of present study was to record changes in total serum calcium level of wild Bank Myna and its relationship with eggshell content during entire breeding period.

MATERIAL AND METHOD

Observations were initiated in early breeding season from May first week and continued till the end of August. Every week 5 adult Bank Myna (Weight 55-65 gms) were locally captured in urban Sultanpur (Awadh), well before dawn, from weep holes (commonest site of their nesting) with the help of a bird catcher. 0.5ml of blood sample was collected from a wing vein of each bird, under ether anesthesia, using sterilized disposable PVC syringes 30G 5/16 (0.30X 8 mm) needles. The syringes with blood samples were kept vertically up for 4h that allowed the coagulated part to settle down,

while serum separated above it. Apical part of syringe was then cut with a sterilized sharp blade and serum was taken up for estimation by micropipette. Total serum calcium (Ca) was estimated by the method described by Moorehead and Biggs (1974) on Erba Chem-5 plus V2 semi Automatic Photometer using Erba Ca kits. The birds were freed before dusk near their habitat.

Eggs are collected from weep-hole nests on weekly basis from May last week to August first week. In all 5-eggs were taken in account every week. Care has been taken to collect only

OBERVATION

Table-1

Month	Week	Total Serum Ca mg/dl	Shell Ca content mg/g
May	1st	13.76±0.251	NA
	2nd	14.50±0.369	NA
	3rd	14.85±0.137	322.53±0.153
	4th	14.83±0.283	338.37±0.235
June	1st	15.13±0.146	357.25±0.310
	2nd	14.86±0.193	324.43±0.136
	3rd	14.78±0.259	310.38±0.275
	4th	14.52±0.315	307.29±0.252
July	1st	13.86±0.297	295.39±0.176
	2nd	13.23±0.284	285.73±0.268
	3rd	12.76±0.258	276.47±0.184
	4th	11.52±0.196	268.54±0.264
August	1st	10.95±0.261	260.29±0.193
	2nd	10.27±0.293	NA
	3rd	9.68±0.243	NA
	4th	8.95±0.273	NA

Values are mean ± SD of 5 observations

NA= Eggs were not laid during the period

one egg from one nest. Eggshells were removed and membranes separated carefully. Shells were rinsed with distilled water several times followed by drying in hot air oven at 100°C for 24h and crushed. 1gm of crushed shell is ashed by adding 2ml of Nitric acid solution (60-61%v/v) and then kept under 100°C for 24h. Dry samples were oxidized by 2ml of hydrogen

peroxide (30-31% v/v) followed by drying at 100°C for 6h. The dry sample was dissolved in 2.0ml of 0.05 M HCl solution (Ogawa et. al., 2004). Amount of Calcium was determined by using atomic absorption spectrometer (280 FS-AA, Swati Safesecure Equipments Pvt. Ltd.) according to the method of Gimblet et. al. (1967).

DISCUSSION

During the entire breeding period, Bank Myna serum total Ca level remained high. A gradual rise from 13.76 ± 0.251 mg/dl (in first week of May) to 15.13 ± 0.146 mg/dl (in first week of June) had been documented. Increasing photoperiod promote onset of breeding in avian seasonal breeders (William et. al., 1987; Beebe et. al., 2005). Dawson et. al. (2001) suggested that seasonal breeding in birds involve photoperiodic control in accordance with endogenous circannual rhythmicity. Increased sexual activity of female birds accompanies increased circulating estrogen level (Whitehead and Fleming, 2000). El-Ghalid (2009) mentioned that gonadal steroids largely affect the serum calcium level in birds. However, good degree of reduction in serum total calcium had been recorded during late breeding season. Bose and Das (2012) reported no further gonadal recrudescence in Bank Myna during June with constant long photoperiod caused photorefractoriness. Bank Myna serum total calcium value of 8.95 ± 0.273 mg/dl in last week of August is in consonance with 8.16 ± 0.12 mg/dl of adult Sudanese Geese (Bakhiet et. al., 2006).

The calcium content of Bank Myna eggshell range between 260.29 ± 0.193 to

357.25 ± 0.310 mg/g of shell weight. However, higher values (368-415 mg/g) of calcium as component of eggshell have been reported by Schaafsma et. al. (2000) in commercially available Slovakian chicken eggshell. Higher eggshell calcium content was evident in early breeding season with respect to late season. The value gradually reduced towards the end of breeding season and it closely correspond the reduction in serum total calcium. Moreover, less number of eggs per clutch in late breeding season had also been reported (Bose and Das, 2012). During the laying period, high calcium kinetics occur in birds to supply the material to eggshell (Dacke, 2000; Sugiyama & Kushuhara, 2001). Dhande et. al. (2006) recorded 17.66 ± 0.38 mg/dl of serum calcium in breeding Grey Quail. However, a maximum of 15.13 ± 0.146 mg/dl had been recorded in breeding Bank Myna. Dhodt and Hochachka (2001) documented that *Passerines* acquire calcium shortly before and during laying, thus eat extraneous calcium from the surrounding. Ahmed et. al. (2013) mentioned that in layer hens (Bovan) the source of dietary calcium had no significant effect on eggshell thickness, weight and ash.

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