Asian J. Exp. Sci., Vol. 22, No. 3, 2008; 405-410 **Short Communication**

Execution of Breeding and Nidification Behaviour in Pigeon (*Columba livia*) and Dove (*Streptopelia chinensis*)

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Abstract : In the present study Pigeon (*Columba livia*) and Dove (*Streptopelia chinensis*) were studied for their breeding and nidification behavior, as these are closely associated to humans. These bird breed throughout the year, although Pigeon breeds preferably during January to May while Dove breeds during January to August. In Pigeon, the male shows courtship behavior by tail fanning, songs, chasing, billing etc. whereas in Dove the male shows courtship behavior by songs, display flights, spooning etc. Females respond by emitting a mating call. Both the partners mutually select a territory for a nesting site. They both share the labor in preparing a nest. In both the birds, clutch size is of two eggs and is incubated by both parents. Eggs hatch into nidicolous chicks in about 18 days in Pigeon and about 14 days n Dove. The chicks are altricial and are protected by the parents till they develop their own plumage completely (3-5 weeks) and become good fliers.

Key words : Breeding, Nidification, Spooning, Billing, Nidicolous, Altricial

Introduction

Birds are considered to be not only intelligent animals, but animals possessing many of the more commendable human traits and emotions. Behavior in birds, as in all animals is directed towards self and racial survival. The internally directed system of activities strives to maintain the physiological stability of the body and this system guarantees the continuation of the species, through reproductive behavior.

The activities involved in this pattern of behavior are- acquiring a mate, successful courtship, acquiring of a nesting area, building a safe and protected nest (Clark and Shulter, 1999), laying of the clutch, taking care of the young hatched, feeding them, protecting them (Krebs, 1987) till they become self supporting individuals strong enough to carry on their life cycle to the next generation., sometimes at the cost of its life.

All the metabolic processes of the body operate at a high speed during the breeding season. Under the influence of the sexual drive, the birds develop special capabilities and perform feats which are far removed from their behavior during reproductive quiescence.

A successful courtship is the first requirement to ensure a correct mate of the species. Courtship performs an important function in increasing the confidence of the pair so that they can lead to eventual successful rearing of a brood. The final prelude to copulation is preceded by displays, songs, sexual chases, food collection etc. Nest building is done either in inaccessible places or in concealment.

Breeding and Nesting behavior is an important part of bird biology as it plays a key role in shaping the relationships between adults, young and adults and young. One of the prime interests of an ornithologist is to study the

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nesting ecology, as birds, far more than any other animal besides man, are notable for their tendency to build a home in which they raise their young (Collias, 1997).

All these activities guarantee the continuation of the species and its gene pool. Thus this type of behavior study becomes important regarding ecological and genetic balances.

Material and Method

The study was conducted on pairs of birds bought from the local hawkers and later housed in natural conditions in an open aviary in the Laboratory of Reproductive Biology, D.G. College, Kanpur, Uttar Pradesh, India for close observation in wooden boxes sized 14 inches x 10 inches x 8 inches. The area enjoys mild pleasant climate with a large diurnal range of temperature. The use of nest boxes provided safe nesting site to birds.

The nesting material was available in plenty around the laboratory and this availability was ensured before starting the study. Presence of a human form elicited alarming behavior in the birds. To overcome this and facilitate uninterrupted study a 'hide' (a simple frame big enough to house a person, of about 5ft. x 5ft. x 6ft covered all over by a cloth piece with only two openings small enough for the observer to watch and study). The 'hide' was left near the nest for 2-3 days for the bird pairs to acclimatized to the structure. The entire study was thus carried out in the field conditions.

Observations

The pair of Pigeons and Dove studied here has been observed right from the beginning of the courtship to the behavior of nestlings till they were ready to leave the nest as full-fledged adults thus completing the study of their Breeding and Nidification behavior and also provide a fair basis for comparison.

Breeding Behavior

Habitat

Pigeons habituate areas like markets, fruit gardens, cultivated fields, rice and oil mills etc. They roost in large groups near human habitations but this group starts to thin out during breeding period because birds seek mates and separate out in their territories.

Doves habituate areas like gardens, low bush jungles, open wooded areas, well watered country areas, even bungalows and verandas of human dwellings. They roost in small groups or in pairs on trees but they separate out in their territories during breeding period.

Breeding Season

The breeding season in Pigeon was observed mainly to occur during the months of January- May whereas in Doves, this period was found to be during the months of January-August. A common fact was observed that if conditions are favorable both of these birds can breed throughout the year.

Courtship Behavior

In Pigeons, the male initiates the courtship behavior. The male dances around the female and sings a song which appears as 'gut-ru-goon' trying to please the female. The male chases the female during courting, following her permanently. Females respond to the males by giving short, quickly repeated mating calls. The male is observed to pass food to the female. Occasionally, one member of the pair brings its bill to its mate and gently touches it and sometimes gives it a gentle rub (billing). During courtship the pair is seen to be in search of a proper nesting site.. The pair is observed to stay close to each other, chasing, billing, singing and courtship feeding during the entire courtship period which lasts for a week or a little more.

In Doves the male initiates the courtship behavior, moving about in circles around the female and singing a song which appears as 'ku-kroo-ku' or 'oot-raow-oo' trying to please the female. Females respond by giving short, quickly repeated mating calls. The male is observed to puff up the air sacs and approaches the female in a bowed manner till its beak is a few inches away from the female. The female elongates its neck in the response. The male is observed to regurgitate food (spooning) to feed

the female. The male is also observed to fly straight up in the air and glide down with the wings and tail stiffly spread out. Billing is also observed. During courtship the pair is seen searching for a proper nesting site. The pair is observed to stay quite close to each other, and indulge in bowing, billing, singing and courtship feeding during the entire courtship period which lasts for about a little more than a week.

Number of Mates

Pigeons are monogamous birds. The pair stays together for life. Doves are strictly monogamous birds. The pair stays together till death separates them. It can be assumed that monogamy assures better care for the young.

Copulation

In Pigeons copulation is observed right from the early stage of pair formation, increases in frequency with the nest construction activity and ceases after the commencement of incubation. The Pigeons utter a short note of a soft 'coo-coo-coo' or a high pitched 'kee-kee-kee' which slowly diminishes in the pitch. The cooing of the male continues during the entire copulation. The male follows the female with a pompous demeanor, its tail spread, wings drooping, body elevated and throat swelled. The male is observed to show a dance consisting of ascending flights and aerial glides with the tail expanded laterally. This is followed by the thrashing of wings, cooing and bill rubbing. The female finally settles down in a crouched position to assist in copulation.

In Doves the copulation is observed from the early stage of pair formation and continues till the laying of eggs. The note of Dove call is a soft trisyllable 'coo-coo' or 'oot-raow-oo'. The cooing of the male continues during the entire copulation. The male is observed to flutter, claps its wings, and keeps the tail spread slightly so as to show its white edgings. During copulation the male postures with its beak lowered and pointed at the female, neck, head and rump feathers raised. It shows movements of hopping and running in pursuit of the female accompanied by 'kah' calls. It pecks the female head vigorously. In response the female elongates its neck, shows retreat from the male and before finally settling behind the male. The male continues cooing with its neck inflated, feathers puffed up, and head bobbing up and down. The female crouches down to ensure copulation.

Territory

Individual breeding pairs maintains a territory in the surrounding of their nest which is treated as a special area and intrusion in this area by strangers is prohibited. In Pigeons and Doves the territory is claimed by mutual consent from both the partners only after pair formation.

In Pigeons the male defends a territory by holding its wings aloft, landing on its rival at times, or by clubbing the rivals head with bent wings. In Doves the male as well as the female both defend their territory by chasing the intruders out of their defined space.

Nidification Behavior

Nest Construction and Nesting Material

The nesting birds are not very specific about their nesting sites. In this study the nest were constructed in the wooden nest boxes sized 14 inches x 10 inches x 8 inches supplied by me, placed at suitable positions. Vicinity of water was preferred.

In Pigeons nest building starts before egg laying. Nest is built during early morning up to noon and then in late afternoon on successive days for about 7-17 days. Nest is kept partially concealed for protection. Nest was constructed using twigs and grasses by the female supplied by the male. The male looked over the construction while. The nest is a broad and rounded structure.

In Doves nest building starts during courtship period. Nest is built during early morning up to noon successive days for about 7-20 days. Nest is constructed using twigs as a joint effort of both the parents with equal contribution from both the partners, the female places the twigs in shape by intertwining and plaiting them while the male collects the building material. The nest is a broad, elliptical structure. Vicinity of water was preferred.

Clutch Size

The clutch size in Pigeons was observed to be two eggs. The clutch size in Doves was observed to be strictly two eggs.

Time and Pattern of Egg Laying

In Pigeons both the eggs were laid during afternoon hours between 15:00-16:00 hrs. In Doves too the eggs were laid during afternoon hours between 14:00-16:00 hrs. In both the birds the eggs were laid only after 4-5 days of nest completion.

Eggs were laid on alternate day in both the Pigeons and Doves. The eggs were so arranged so that sitting and easier covering by the bird was ensured.

Egg Characteristics

In Pigeons fine but hard textured, pure white colored eggs are laid. The eggs had a glossy finish. The egg size was 1.45 inches x 1.12 inches on an average. The eggs were oval, rounded or rather variable in shape.

In Doves fine but hard textured, pure white colored eggs are laid, with no glossy finish. The egg size was 1.06 inches*0.82 inches on an average. The eggs were oval in shape.

In general it was observed that the second egg laid was heavier than the first one in both the birds.

Incubation

In Pigeons, incubation starts with the laying of the first egg. Both the sexes share the duty of sitting on the eggs. Day incubation is done by the male and the female while night incubation is done only by the female. Incubation varies for about 17-18 days. In one pair of birds they were observed to desert the eggs after 18 days when they did not hatch.

In Doves, incubation starts with the laying of the first egg with both the sexes sharing the duty. Male sits on the eggs for generally about 6 hours in a day while the female sits for the remaining 18 hours. Day incubation is done by the male and the female while night incubation is done only by the female. Incubation varies for about 13-14 days.

Hatching Pattern

In Pigeons it was observed that the young hatch out one after the other at an interval of 40-46 hours, in the order in which they were laid while in Doves it was observed that the young hatch out one after the other at an interval of 22-26 hours, in the order in which they were laid. Hatching is synchronous in both.

Physical Features of Hatchlings

The hatchlings of Pigeons and Doves are almost similar in physical appearance.

They were fleshy pink in color. The back and claws were soft except lips that were hard. Mouth cavity was reddish in color. Abdominal wall was almost transparent through which remnants of the yolk sac could be observed. The eyes were closed, faint whitish traces of down feathers were observed on dorsal and pelvic feather tracts. The hatchlings were unable to stand or sit on their feet but could raise their necks and gape for food. The young born were nidicolous. The nestlings got fully fledged in about three week's time.

Brood Care and Feeding

In Pigeons and Doves the brooding mother kept the freshly hatched young warm at night. During the day the male and the female both protected them from the hot sun taking turns. Day brooding stopped after 4-6 days of emergence of the first hatchling. Night brooding stops only after the chicks are partly fledged which takes about 14-19 days in Pigeons and 13-14 days in Doves. Parental care for these altricial young was observed. The chicks are never left unguarded, one of the parents is always around, to guard them from predators, hot sun, rain etc. Pigeons feed their young with a regurgitated substance known as 'pigeon milk' (secretion from the crop lining).Doves feed their young by pushing regurgitated food down the gullet of their young after they are 24 hours old.

Food

Pigeons feed mainly on a large number of grains, fruits etc. The young start feeding on semi solid food or half digested grain from

their parent's crop lining. The feeding of the young increases by tenth day of their emergence and the peak is maintained for next 4-8 days. The young start leaving the nest after 2-3 weeks of hatching.

Doves feed mainly on a large number of grains, fruits etc. The young start feeding on semi solid food or half digested grain which their parent's regurgitate and push down the gullet of their young. The feeding of the young increases by eighth day of their emergence and the peak is maintained for next 3-6 days after which the young are big enough to move out. The young start leaving the nest after about 3 weeks of hatching.

Behavior of the Nestlings

The nestlings of Pigeons and Doves both are nidicolous and altricial. They are dependent on their parents for feeding them, for sanitation and for their protection till they can learn to defend themselves. The nestlings cannot open their eyes till they are 4-5 days old. Their eyes open completely after 8-9 days from their emergence from the egg shell. As observed, during early days before their eyes open up they react by raising their head and gaping for food when one of the parent touches their body or the rim of the nest or makes a noise. This continues till 8-9 days when their eyes open up completely. After this they can distinguish between their parents coming with or without food. They demand food from the parents by opening their bill again and again in the presence of their parents. The female cleans their body and feathers during resting time. Fear complex was observed to have developed after one week and early in the second week of emergence.

The nestlings of Doves are similar in behavior to the nestlings of Pigeons in all aspects differing in the fact that they cannot open their eyes till they are 3-4 days old and their eyes open completely after 7-8 days from their emergence from the egg shell. They ask for food in the same fashion as the nestlings of Pigeons.

Nest Sanitation

Pigeons and Doves both keep their nest, nest boxes here in this study clean and tidy in an almost similar fashion.

The eggshells after hatching are eaten away by the parents thus providing both sanitation and concealment. The feaces of the young is enclosed in a delicate feacal sac. The parents wait for the young to eject this feacal sac after each feeding and devour it. Both the parents share the task of nest cleaning. The young also participates in nest sanitation after it is about 16 days of age and continues till its departure.

Discussion

The present study gives a clear insight into the breeding and nesting behaviors of Pigeon and Dove. These birds show courtship behavior by songs, flights and mock displays by the male, which are reciprocated by the female in the form of mating calls (Marler and Doupe, 2000; Sakata, *et.al.*, 2008). Similar behavior in American Avocets has been studied by Sordhl (2001). These birds practice monogamy to assist in parental care. Parental care has also been observed in Western Gulls (Plerotti and Ridly, 1981).Similar relative studies on parental care and mating systems have been conducted by Krebs (1987).

Both Pigeon and Dove maintain a well guarded and a well-distinguished territory to aid the welfare of their young ones. The use of territory has been traced by as early as 1941 by Nice. Studies on nest site selection and use by Ducks have also been conducted (Clark and Shulter, 1999). Territory also aids in concealment as seen in Black throated Blue Warbler (Holway, 1991).

Savannah Sparrows show site selection procedures during nest building (Wheelwright *et.al.*, 1997). Pigeon and Dove construct their nests early in the mornings and late in the afternoons during April. Similar studies on nest building of passerine birds have also been observed (Collias, 1997).

Clutch size of Pigeon and Dove is two generally but some workers have also reported three to five eggs. Detailed work on clutch size of Eastern Phoebes has been elucidated

(Conrad and Robertson, 1993). Pigeon incubate their eggs for 17-18 days and Doves incubate their eggs for 13-14 days where both the sexes share the duty. Studies of incubation behavior have been done as early as 1965 on Pheasants (Breitenbach *et.al.,* 1965), but in later studies done on incubation, hormonal effects and changes were also observed in Pied Fly Catchers (Silverin and Goldsmith, 1983). Eggs laid by Pigeon and Dove hatch synchronously in the order in which they were laid i.e. on alternate days, similar to the rhythm of egg laying and hatching in mountain White Crowned Sparrows (Zerba and Morton, 1983).

The young hatchlings of Pigeon and Dove are fleshy pink in color. They are nidicolous and require parents for protection from predators and environmental extremes. Sibling competition and behavior of siblings in Swiftlets and Bee-eaters has been similarly observed (Bryant and Tatner, 1990). Behavior of adults and young of Acadian Flycatcher have also been detailed by researchers (Whitehead and Taylor, 2001). Pigeon and Dove have been observed to show brood care till the nestlings do not become self-supportive. Brood care in Pheasants and related studies has been done (Breitenbach *et.al.,* 1965; Wesolowski, 1994). Pigeon and Dove take care of nest sanitation too, which has been observed to be instinctive in birds (Smith, 1993).

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