

Breeding Potential of Pakistan's National Bird Chukar Partridge: Captivity vs Natural Habitat

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ABSTRACT

Background: Chukar partridge (*Alectoris chukar*), the national bird of Pakistan, is present in the Himalayan ranges of Balochistan, the hillside of Punjab and Sindh provinces.

Objective: The aim of this study was to compare the aspects of breeding biology of Chukar partridge (*Alectoris chukar*) viz nest structure, breeding season, clutch size, hatching success, and incubation period in natural habitat and captivity.

Methodology: As study areas, Chinji National Park (for natural habitat) and a private farm (for captive conditions) were selected for this purpose. During breeding season, field observations were taken to record the data.

Results: The breeding season of Chukar partridge extends from mid-February to the end of May in natural habitat while in captive conditions, it extends from February to September. In the natural habitat, all of its nests were located on ground and were formed with rocks, stones and straws of dry vegetation. In captivity, eggs were laid on ground in pens especially made according to the comfort of the birds as in natural conditions. Egg laying period for birds is extended in captivity (from mid of March till September) compared to natural habitat (from mid of March to the start of April). The clutch size of Chukar partridge was observed to be greater in captivity (12.4 ± 1.932) than in the natural habitat (9.33 ± 1.59). However, mean incubation period was the same for both in natural conditions and captivity i.e., 20.5 ± 0.70 days (range 18-23 days). The hatching rate of eggs per clutch was greater in captivity (10.7 ± 1.70) compared to natural habitat (7.3 ± 1.88).

Conclusion: In conclusion, Chukar partridge has a greater breeding potential in captive conditions compared to natural environment, which supports its healthy population.

Keywords

Breeding potential, Captivity, Chukar, Clutch size, Egg laying, Natural habitat.

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INTRODUCTION

Pakistan has some of the world's rarest animals and plants due to its diverse topography and geographic location i.e., between three zoogeographical regions: the Palearctic, Oriental and the Ethiopian. Pakistan has a variety of ecosystems and has diverse avian fauna¹. Five partridge species are found in Pakistan; the Chukar Partridge

(*Alectoris chukar*), See-See Partridge (*Ammoperdix griseogularis*), Snow Partridge (*Lerwa lerwa*), Black Partridge (*Francolinus francolinus*) and Grey Partridge (*Francolinus pondicerianus*)². The Chukar partridge is a game bird placed in the order Galliformes, in the family Phasianidae. The genus *Alectoris* consists of seven

species and 24 subspecies worldwide, including 16 subspecies of *Alectoris chukar*³.

Alectoris chukar is the national bird of Pakistan. Here, it is adaptable to various environments like rocky, arid, hilly, arid hillside and Himalayan ranges. It prefers to live in open, dry, rocky mountain slopes, and hillsides^{4,5}. It is also found on barren plateaus and deserts with sparse vegetation^{4,6}. It is distributed in Punjab, Baluchistan, Sindh, Kohistan, Chitral, Salt range, Swat, Gilgit^{4,7,8} and AJK⁹. In natural, breeding behavior of this bird change according to altitude and latitude. In alpine pastures it does not start nesting till late June. However, at low altitude, it start breeding earlier. The main breeding season is from April to May, with a normal clutch size of 6 to 9 eggs, but in areas with high rainfall, the clutch size can vary between 15 and 19 eggs. Most nests in Balochistan were found in late April-July². As the environmental conditions get unfavorable, only a few pairs breed. The male chakoor takes away his female bird and defend her from other male attraction. The couple begins to make calls and practices of stepping on the ground and poking various small things. Initially the calls were slow from both partners, then transformed into more louder that was easy to hear even from a distance².

So far, only a few research studies has been conducted about the distribution, population, presence and habitat

utilization on the *Alectoris chukar* in Pakistan¹⁰⁻¹⁴. The present study is a step forward in this connection and also explores the breeding potential of *A. chukar* in captive conditions. The study is aimed to compare the breeding potential of *A. chukar* in natural and captive habitats.

MATERIALS AND METHODS

Study Area

The study was conducted at Chinji National Park (natural habitat; 33°0'36.87"N, 72°29'30.98"E; 6076ha) and a private farm (for captive conditions) during the breeding season Jan-Oct, 2020. The park is a protected area of International Union for Conservation of Nature category II (National Park) established in 1987, located in Tehsil Talagang, District Chakwal, Punjab, Pakistan. Average annual rain in this area is 537mm, out of which 308mm is during the monsoon season (July-Sep). Usually in this area, 27°C is the maximum temperature (in June) and 2.2°C is the minimum temperature (in January). The relative humidity during monsoon is up to 80%. The eroded land of Chinji National Park contains igneous rocks, sandstones and rock salt³ (Fig. 1).

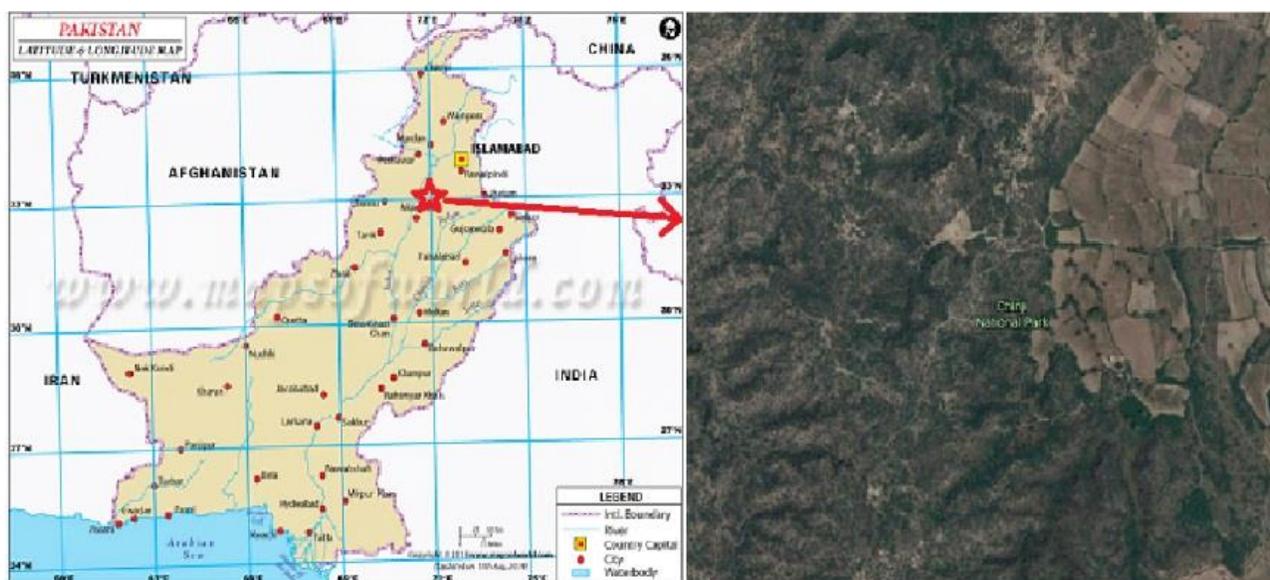


Figure 1. Study area map of Chinji National Park: A natural habitat of *Alectoris chukar*.

Study Design

A reconnaissance survey was used to select different study sites. The study surveys were conducted for ten months (January 2020–October 2020). Field observations were taken twice a week, during breeding season, to record the data on breeding aspects of *Alectoris chukar* including the onset of breeding season, clutch size, nest structure, hatching success and incubation period in the natural and captive conditions. For data collection of these breeding aspects, line transect surveys were conducted before the commencement of breeding season of *Alectoris chukar*.

Chukar nests were traced by following the bird carrying food and nesting material, or by viewing the behavior cues. Standard protocols were followed during monitoring to reduce disturbance¹⁵. When an active site was located it was marked and allotted a specific number by GPS navigator. Marked and numbered nests were regularly visited and data sheets were used to record information from egg laying till fledging from January 2020–October 2020. In captivity, the nest was tagged and visited regularly.

Statistical Analysis

Before data analysis, the normality of the data was tested by using the Shapiro-Wilk test¹⁶. As the data was not normally distributed, a logarithm transformation $\log(x+1)$ was used. T-test was used to compare the clutch size, incubation period, and hatching success of *A. Chukar* in natural habitat and captivity ($\alpha=0.05$).

RESULTS

The data on the comparison of the egg-laying period in natural and captive conditions is shown in Table 1. In the

natural habitat, the egg laying period was from mid of March to the start of April; while in captivity, it extended from mid of March till September. Similarly, in the natural habitat, nests were formed with rocks, stones and straws of dry vegetation, while in captivity, eggs were laid on the ground in pens.

The data on the comparison of clutch size, hatching success, and incubation period in natural and captive conditions are shown in Fig. 2, 3 and 4, respectively. The clutch size in captive conditions (12.4 ± 1.932 eggs per nest) was greater ($p < 0.05$) compared to natural habitat (9.33 ± 1.59 eggs per nest). The incubation period remained the same ($p > 0.05$) for both natural habitat and captive conditions (20.53 ± 1.76 days). However, the hatching rate was higher ($p < 0.05$) in captive conditions (10.2 ± 1.79 eggs per clutch) compared to natural habitat (8.42 ± 0.97 eggs per clutch).

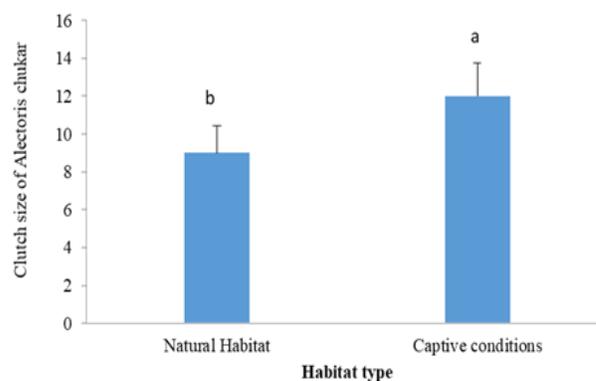


Figure 2. Comparison of clutch size of *Alectoris chukar* in natural habitat and captive conditions. Bars with different letters differ significantly ($p < 0.05$).

Table 1. Comparison of Egg Laying Period of *Alectoris chukar* in Natural Habitat and Captive Conditions.

Types of Habitat	Egg Laying Period	
	Starting period	Ending period
Natural conditions	Mid of March	Start of April
Captive conditions	Mid of March	End of September

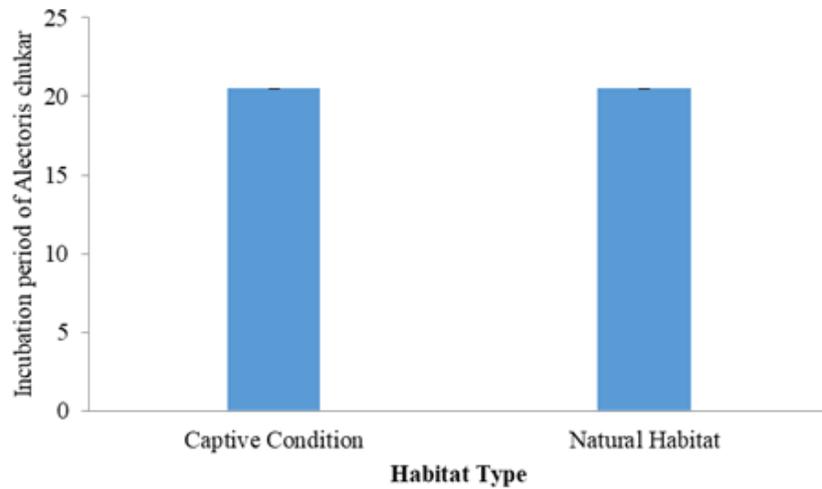


Figure 3. Comparison of incubation period of *Alectoris chukar* in natural habitat and captive conditions.

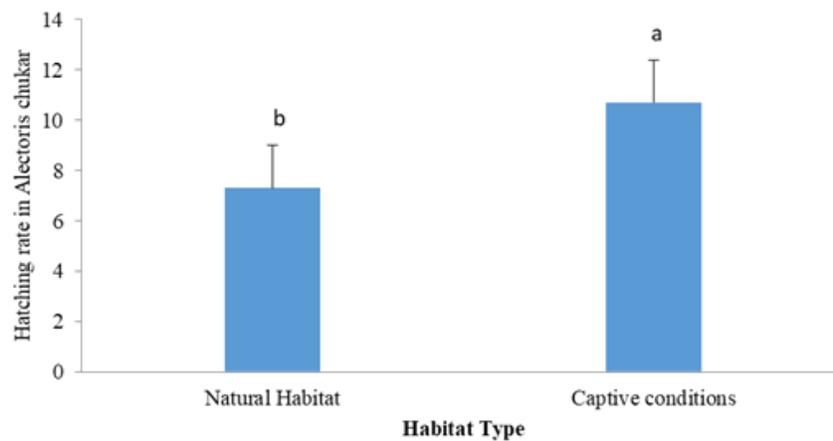


Figure 4. Comparison of hatching rate of *Alectoris chukar* in natural habitat and captive conditions. Bars with different letters differ significantly ($p < 0.05$).



Figure 5. Showing captive photograph of *Alectoris chukar*.

DISCUSSION

Alectoris chukar, commonly known as Chukar, is a game bird that belongs to the family Phasianidae. Chukar is a chunky bird with 32-35cm body length with an amazing color scheme like grey breast, brown back, and sandy-colored belly with red legs and white face. The different populations have different shades of colors. Chukar has rufous-streaked flanks, red legs, and coral red bill, and its face is white with a black gorget. The female is slightly smaller in size and lacks the spur^{3,4} (Fig. 5).

As herbivores, the main source of food of chukar is annual and perennial grasses⁴. A few other sources of food incorporate seeds of weeds, wild natural products, leaves, and bulbs, which they are able to burrow up with their bills. Since these birds live in drier situations, they have to have a satisfactory water supply accessible at all times, particularly in the summer months. The diet of chukar is different in the form of breeders. It primarily consists of soybean meal, yellow corn, limestone, wheat bran fat, and salt⁴.

Nesting habitat is also dry, having rocky slopes with open, brushy cover. In the present study, nests were found which were formed with rocks, stones, and straws of dry vegetation.

The results of the present study suggested that the pairs are set in mid-March when a male performs a courtship display including a head tilt and a showing of his barred flanks^{5, 14}. Both start to call and take part in a "tidbit ting display" (pecking at various objects). In captivity, nests are laid on the ground in pens that are well-prepared to keep in mind the preference of material that is comfortable for birds and mostly similar to that of natural habitat. In captivity, the nests are also equipped with all needs required by birds i.e. food and water. Egg laying occurs mainly in the months of mid of March and the start of April in the natural habitat, while in captivity it extends till September. This extension of the egg laying period is mainly because of the intensive care that is provided in captive conditions. Moreover, in natural habitats, there is fear of predators i.e. snake, squirrel, mongooses, etc.

Furthermore, a pronounced increase in clutch size in captive conditions compared to natural habitat is also because of extra care that is provided in captive conditions.

The incubation period is the same for both the habitats i.e. 18-23 days. In the present study, the hatching rate is increased in captive conditions compared to natural habitats. The probable reason for the increased hatching rate in captivity might be the availability of food, water, and human care to hatchlings especially the temperature of farms where hatching is well-adjusted. The protection from the predator in captive conditions is also the main reason for improved hatching success in captive conditions.

The major threats to avian fauna include habitat destruction due to rapid forest cutting, use of land for agriculture, use of land for construction, land sliding, and disturbance by expanding human population¹⁷. Major threats like egg poaching, illegal hunting, bird trapping, and habitat destruction particularly for Chukar partridge are reported in Pakistan¹⁴. More effective law enforcement, monitoring, and strong prosecution of lawbreakers should be undertaken on a serious note by authorities to restore our national bird population in its wild habitat. Within the current political and socioeconomic situation, one cannot rely solely on the national conservation authorities to prevent the population decrease of this game bird from wild. A devoted, good-financed, and fully command body comprising of authorities, local governments, international and local NGOs, and commercial breeders also needs to be established. Captive breeding and reintroduction will inevitably have to play a vital role in the future of Chukar partridge in the wild.

CONCLUSION

The present study concludes that Chukar partridge has a greater breeding potential in captive conditions compared to the natural environment. It is further recommended that coordinated reintroduction programs after captive breeding should be launched. This reintroduction will not only sustain the Chukar population in the wild but also a good revenue could be generated with control permitted hunting of this game bird.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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None.

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LIST OF ABBREVIATIONS

IUCN International Union for Conservation of Nature
NGOs Non-governmental organizations

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