



EFFECT OF SEASONS ON FORAGING BEHAVIOR OF WHITE CRESTED KALIJ PHEASANT (*Lophura leucomelanos hemiltoni*) IN EX- SITU CONDITION

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AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration among all authors. Author RP designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Authors HCSB and TAP managed the analyses of the study and literature searches. All authors read and approved the final manuscript.

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ABSTRACT

This observational study was carried out during 2017 – 2019 at G.B. Pant, High Altitude Zoo, Nainital, Uttarakhand at an elevation of 2100meters, to know the pattern of feeding and foraging behavior and impact of various seasons on all captive specimen of White crested Kalij Pheasant. This study also depicted the difference in foraging behavior among the male, female and newly hatched offsprings. It was also evaluated the foraging behavior shown by all individuals at the time of pre-breeding, breeding (courtship and mating) and post-breeding (including parental care). This study on foraging behavior of White crested Kalij Pheasant in Ex-SITU condition is very innovative and helpful to know the requirement of feed supplements and its survival rate. By knowing fundamental knowledge about the individual's habit, habitat and impact of various environmental conditions, this research work helps to enhancement in survival rate and reintroduce the pheasant species in its natural surroundings or in In- SITU conservation condition.

Keywords: Aggressive; breeding season; conservation; foraging behavior; habitation; supplements.

1. INTRODUCTION

White crested Kalij Pheasant (*Lophura leucomelanos hemiltoni*) is one of most visited game bird of Uttarakhand State in Indian subcontinent which is in the lap of Great Himalaya. Including White crested

Kalij Pheasant, there are nine subspecies distributed in various countries in worldwide along with feral (wild) as well as captive conservation [1-5]. This pheasant is native to Asia whose distribution extends from the Indus river of Pakistan in the valleys of Western Himalayas, eastward through Northern India, Nepal,

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Bhutan and South through Burma to Western Thailand (Delacour 1949). White crested Kalij Pheasant was introduced as a game bird in the only island state Hawaii of the United States of America (Ali and Ripley 1969). It is one of the most adaptable gallopheasant species found in various types of habitats from dense undergrowth forest cover (including Sal, Oak, Spruce, Rhododendron and with other evergreen and deciduous trees, shrubs, herbs etc.) to human habitation (S. Sattyakumar et.al. 1993). In free range or forested areas, this Pheasant mainly exhibits in small groups and in pairs at the time of courtship and breeding season [6-10]. White crested Kalij Pheasant (*Lophura leucomelanos hemiltoni*) is heavy bodied, glossy colored, ground dweller which exhibits greater sexual dimorphism or difference in body size as well as in coloration of plumage. By means of conservation point of view, this gallopheasant is safe and Least Concern as per IUCN Pheasant Group and Indian Wildlife (Protection) Act, 1972 but its population is declining in nature (In-SITU) [11-17]. According to Indian Wildlife (Protection) Act, 1972, White crested Kalij Pheasant comes under the Schedule I (Part III) and population is declining owing to ongoing habitat destruction and sustainable levels of hunting (del Hoyo et al. 1924). Maximum time of the day spent by Wild jungle fowls in foraging was found out by Marian Stamp Dawkins in 1989 [18-24].

White crested Kalij Pheasant (*Lophura leucomelanos hemiltoni*) is very shy in nature and escape from the foraging area at lightest alarm or hint. It is a ground dweller and come out for foraging at the time of dusk and dawn and roost at night into the tree branches at height [25-29]. It is very curious about its surrounding environment and known as ecological indicator for prey and predator relationship into the related domain or area [30-33].

In In- SITU (natural habitat), this pheasant is generally known to be omnivorous in nature and feed on various plant species, seeds, ferns, wild berries, acorn as well as on animal feed such as invertebrates (snails, earthworms, slugs, bugs etc.) which are frequently seen on rotten fruits or on decaying substrates. Variety of larvae and adults of Phylum Arthropod and small bird eggs are also fed by White crested Kalij Pheasant. In wild, White crested Kalij Pheasant is guided for the foraging by its inherent and instinct characters which helps it to survive in adverse conditions [34,35]. In captive conditions, it does not exhibit the natural environment and habitat due to which pheasant shows stereotypic behavior towards its captive habitat and enrichment done inside it (Watson et.al 1984). In captivity, this pheasant exhibits various types of behavior for its

environmental enrichment and provided supplemented food items. Behavior of this gallopheasant changes or varies with the climatic conditions such as different seasons (Summer, Winter, Monsoon) and daily weather fluctuations regarding humidity, temperature, moisture, rainfall etc. In forest cover areas or In-SITU environment, pheasant lives in social gathering with juvenile, sub- adults and adult one (male and female), dominant male leads the family group [36-38]. Basically, it comes out from its nesting site or hiding places to forage at the time of dusk and dawn in natural habitation (wild). Social organization or family structure is also shown in Ex- SITU conservation condition by this gallopheasant same as in In-SITU condition or in free ranging surroundings (RD Taber 1949). Due to adequate and proper availability of feed supplements, this pheasant thatch on provided feed throughout the day and rest at night on enriched nest housed or on dry thickets [39-41]. Survivability of pheasant and healthy progeny can be get through doing the action of enrichment and enhancement into the feed and confined territorial area in captive condition.

2. MATERIALS AND METHODS

2.1 Experimental Site

This observational study and collection of data was conducted at G.B. Pant High Altitude Zoo, Nainital (Uttarakhand), which is located on the hill of Sher ka Danda at an altitude of 2100 meters above mean sea level. G.B. Pant High Altitude Zoo, Nainital covers about 4.592 hectares of area with enriched associated forest cover with dominant Oak species, Rhododendron, Spruce, Devdara, Mapel and other variety of shrubs and herbs. Only 2.592 hectare is open for exhibition and display of Zoo inmates (Birds and Mammals) whereas 2 hectare of Zoo area is densely covered with forest of Oak species. The average temperature ranged from 17.0°C to 30.5°C in day time and rainfall was about 2000mm has been recorded during the period of this focal observation study. This focal observation study was done with 10 pairs of specimen i.e. White crested Kalij Pheasant (*Lophura leucomelanos hemiltoni*) in captive management.

2.2 Housing Design and Management

During the period of observational study, all Pheasants were kept in pairs to meet moral principles, standards and guidelines suggested by the Central Zoo Authority, New Delhi. However, this focal observation was done on feeding behavior shown by individuals of White crested Kalij Pheasant in concern to different climatic conditions and provided food

items. All individuals of Pheasant were fed on a conventional diet which comprises grain mixture fortified with minerals and vitamins, green vegetables, spices and boiled eggs with shell cover to get their required nutrients (NRC, 1994). Grain mixture is prepared by mixing of wheat, bajra, soyabean meal and commercial layer mash (Agrovet India Private Limited, Mumbai, India). All vegetables and spices are cut into pieces and manually blended with grain mixture that was fed once a day at 08:00 A.M. with the help of animal keeper.

During the conducted study period, the Pheasants were housed in pairs in their artificially enriched enclosures which were designed and built as per the guidelines and standards of Central Zoo Authority, India (CZA, 2012) with inner compartment for individuals to avoid the disturbance and hiding place if they are not comfortable or frightened by unfavorable climatic conditions or aggressiveness of breeding partner at the time of courtship. Enclosures of the Pheasant are excessive heat or sunlight, bulky snow or frost and heavy rain protected. Clean and fresh drinking water available for all individuals at all times. All procedures for study were followed which is approved by "Wild Animal Health Advisory Committee, IVRI, Izatnagar, Bareilly, India, Wildlife Warden, Department of Forest, Dehradun, Uttarakhand, Central Zoo Authority, Delhi, India.

2.3 Observations and Analysis

This non invasive or focal observational observation study was started with 10 pairs or twenty individuals

of White crested Kalij Pheasant from the year 2017 to year 2019. During these two years, the time duration of the foraging activities was recorded within individuals 15minutes sequences per hour taken throughout the day. This observational study was done at the time of pre- breeding, breeding or courtship and post- breeding period throughout the year with various climatic conditions. Statistical analysis of the foraging behavior of White crested Kalij Pheasant (male and female) was done with the help of t- test (D. Zepletal, 2011).

3. RESULTS & DISCUSSION

At the time of focal monitoring on behavior of foraging activities on White crested Kalij Pheasant that most of the day period, all individuals spent their time in foraging or digging in search of invertebrates inside the mud or rotten logs. This observational study has been done at the time of pre- breeding, breeding or courtship and post- breeding period throughout the year with various climatic conditions. It was noticeable that male search for feed supplements and water intake more than female and sub-adults due to its behavior of solitary nature. Findings also suggested that intake of feed and water also depends on climatic conditions which varies with different seasons, abiotic factors i.e. temperature, humidity, moisture, rainfall and biotic factors with planted herbs, shrubs and invertebrates found inside the enclosures. Breeding and non breeding season also affects the foraging in White crested Kalij Pheasant by means of intake of feed and water. At the time of courtship or mating in

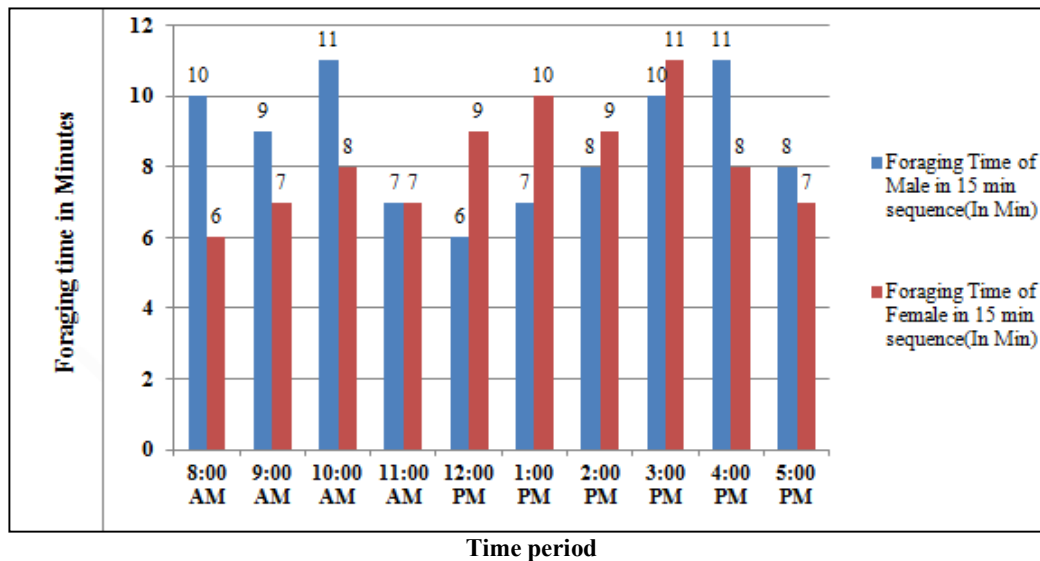


Fig. 1. Graphical representation shows that foraging time period and food seeking activity throughout the day is more in male pheasant than female

breeding season, individual take up more feed items as well as quantity in compare to non breeding season. Parenting mother also need much more energy for incubate and hatching its off springs, so parenting female mother quite remains on larger quantity and quality of feed with various additive feed supplements. Fig. no. 01 defines the different foraging behavior in male and female throughout the day period.

Here the focal monitoring shows that daily requirement for foraging by White crested Kali Pheasant is variably dependent on climatic conditions. In winters, individuals frequently fed on protein rich and spicy diet such as provided meshed eggs with shell cover, garlic, onion and sometimes on invertebrate species from their surroundings whereas in summer or in monsoon, they mostly go for light food items like leafy vegetables, grains etc. In winters, Pheasant basically remains on high protein diet and prepare itself for the upcoming breeding season. In 15 minutes of individual hour shows that curiosity for seeking of feed items is slightly high in male pheasant comparatively in female. It also give an idea about active foraging is varying in both male and female to avoid the infighting and aggressiveness. Foraging behavior vary with individuals of pheasant among the aversive environmental or climatic conditions.

4. CONCLUSION

Like all living organisms on the earth i.e. plant and other animal species including all birds and pheasants, White crested Kalij Pheasant also play an important role in ecological system at high altitude zone such as "the great Himalaya". In this forest cover area this precious wild pheasant indicate the pray and predator relationship and its surrounding area. The study by focal monitoring on White crested Kalij Pheasant tells about its feeding and foraging behavior in captive conditions and also concerned with the individual variations in behavior. Information and comprehension about the life history, habit & habitat and behavior can therefore serve as baseline data in the formulation of conservation and sustainable breeding schedules for managing the declining population of White crested Kalij Pheasant in (natural) wild environmental conditions. Foraging and feeding behavior of White crested Kalij Pheasant is directly relevant in conservation context as this trait directly influence the population dynamics. With the increased declining rate of habitat and fragmentation captive populations in zoo can acts as potential reservoir for research or study and further reintroduction in feral or wild situations. Behavioral study on White crested Kalij Pheasant regarding

environmental enrichment, foraging, breeding and non breeding, courtship, mating, parental care and social organization can help in the captive management and benefits the survival and sustainable population in natural environment (In- SITU). This observational research work has conservation girth for captive feeding and management and act as reservoir to provide vast knowledge and prospective for Ex-SITU conservation of White crested Kalij Pheasant.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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