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Evaluation of Mortality Rate of Three Captive Pheasant Species at Dhodial Pheasantry, Mansehra, Pakistan

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Abstract
The present study was aimed to evaluate the mortality rate of three captive pheasant species, viz. Himalayan Monal *Lophophorus impejanus*, Cheer Pheasant *Catreus wallichii* and Kalij Pheasant *Lophura leucomelanos* at Dhodial Pheasantry, Mansehra, Pakistan. Four years (2011–2014) retrospective data about mortality and survival rates of these three pheasant species were obtained from the Dhodial Pheasantry and were statistically analyzed. The overall mortality rate of the adult Himalayan Monal, Kalij and Cheer Pheasants were found to be 75.6%, 62.6% and 37.4%, respectively. The results showed statistically significant difference in mortality rates (P<0.01) of these three captive pheasant species (P<0.05). The year-wise mortality rates of the Himalayan Monal and Kalij Pheasant showed significantly higher difference (P<0.05), however, the mortality rate of the Cheer Pheasant remained consistent across the four years of the study period.

1. Introduction

Pheasants belong to the order Galliformes (Delacour 1977). There are 49 species of pheasants and peafowls worldwide (Howman 1993; McGowan & Garson 1995). All pheasants are native to Asia, except Congo Peafowl which is endemic to the Democratic Republic of Congo (Crowe *et al*. 1986; Howman 1993; IUCN 1994). Nonetheless, some pheasant species have been introduced in Europe and America as game birds by human beings (Bump 1941; Pokorny & Pikula 1987; Hill & Robertson 1988). Pheasants always remained as a source of attraction for human beings due to their beautiful plumage and protein-rich meat (IUCN 1998). More than one third (1/3) of all pheasant species are listed as endangered in the IUCN (Red Data Book), mainly due to their habitat destruction (Howman 1993; IUCN 2006). The life history of pheasants is characterized by a short lifespan of about 1–3 years and have high reproductive rate (Hill & Robertson 1988; Giudice & Ratti 2001).

Pakistan is native to six pheasant species that comprises Cheer Pheasant *Catreus wallichii*, Tragopan *Tragopan blythii*, Himalayan Monal *Lophophorus impejanus*, Kalij Pheasant *Lophura leucomelanos*, Koklass Pheasant *Pucrasia macrolopha* and Indian Peafowl *Pavo cristatus* (Malik & Shah 1990; KP 2000; Mehmood *et al*. 2014). The Cheer Pheasant is a medium-sized mountain pheasant which is abundant throughout Siran and Kaghan valleys of District Mansehra, Margalla Hills, Swat and Kohistan Districts but now extirpated from Pakistan (Severinghaus *et al*. 1979; KP 2000). The Himalayan Monal is a large sexually dimorphic mountain pheasant mainly restricted to the Himalayan Mountains (Gaston *et al*. 1981; Ridley 1986). The Kalij Pheasant is found in forests, especially in the Himalayan foothills,

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from the Himalayas of Nepal to western Thailand (Roberts 1991).

Pheasantries are places where birds are kept primarily for ex-situ conservation, reintroduction and restocking purposes. In addition, pheasantries also play a major role as a source of education, research and recreation (Malik & Shah 1990). Pheasantries are especially important for endangered and/or threatened bird species, and for those species facing critical problems for their survival due to habitat destruction (Roberts 1991).

The present study primarily focused on the mortality and survival rates of three captive pheasant species (Cheer Pheasant, Kalij Pheasant and Himalayan Monal) in Khyber Pakhtunkhwa province of Pakistan.

2. Material and Methods

2.1. Study area

The present study was conducted at Dhodial Pheasantry which is located at district Mansehra of Khyber Pakhtunkhwa (KP) province in Pakistan. It was established in 1984 and covers an area of 8.49 ha. The Dhodial Pheasantry, the largest Pheasantry in Asia, has attained an international reputation as there are 32 species of pheasants (of 49 species worldwide). Presently, there are 40 cages to house more than 400 birds. Prominent pheasant species in the Pheasantry include Koklass, Kalij Pheasant, Himalayan Monal, Cheer Pheasant, Tragopan, Golden Pheasant, Lady Amherst and Reeves Pheasant.

2.2. Methods

Four years retrospective data about survival and mortality rates of these three captive pheasant species (Cheer Pheasant, Kalij Pheasant and Himalayan Monal) were collected from the registers (record) of the Pheasantry and direct observation of the bird nests from the cages. Total number of birds and eggs were recorded on daily basis. Hatching success, mortality and survival rates were calculated. Hatching success was calculated by dividing the number of hatchlings to the total number of eggs. Data were presented in mean numbers and percentages. Number of mortalities of the three captive species were checked and analyzed through the One-way analysis of variance (ANOVA). Data obtained during this research were analyzed using SPSS 16 and expressed in percentages.

3. Results

Data regarding the clutch size, and hatching, mortality and survival rates were analyzed across the four years of the study period and are shown in Table 1. The mean number of total number of eggs of the Himalayan Monal, Cheer and Kalij Pheasants was found to be 25.0±5.1, 454.8±80.7 and 129.8±35.3, respectively. The mean hatching success of three captive pheasant species were calculated from the obtained eggs, spoiled eggs and hatchlings that showed, 10.3±2.6, 223.8±59.8 and 58.8±32.7 for the Himalayan Monal, Cheer Pheasant and Kalij Pheasant, respectively. Likewise, the mean number of adult mortalities of the Himalayan Monal, Cheer and Kalij Pheasant was observed to be 7.8±4.1, 83.8±19.9 and 36.8±17.3, respectively. The mean number of survivals of the Himalayan Monal, Cheer and Kalij pheasants was calculated 2.5±1.7, 140.0±43.0 and 22.0±18.1, respectively (Table 1).

The percentage of the mortality rate of the Himalayan Monal, Kalij Pheasant and Cheer Pheasant was found to be 75.6%, 62.6% and 37.4%, respectively which showed significantly higher difference (P<0.01) during the study period (Fig. 1). Individually, the year-wise mortality rate of the Himalayan Monal and Kalij Pheasant showed significantly higher difference (P<0.05), however, the mortality rate of the Cheer Pheasant revealed no significant difference (P>0.05) across the four-year study period (Table 1).

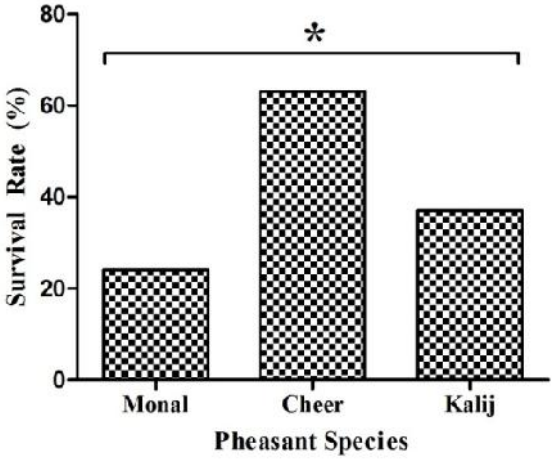

Fig. 1. Percentage of survival rate of three selected pheasants at Dhodial pheasantry.
*significant difference.

Table 1. Breeding parameters of selected pheasants at Dhodial Pheasantry.

Species	Years	No. of adults	No. of cages	Eggs	Spoiled	Chicks	Mortality	Survival	*P*-value
Himalayan Monal *Lophophorus impejanus*	2011	8	4	25	15 (60.0%)	10 (40.0%)	8 (80.0%)	2 (20.0%)	
	2012	8	4	23	14 (60.9%)	9 (39.1%)	7 (77.8%)	2 (22.2%)	
	2013	10	5	32	18 (56.3%)	14 (43.8%)	13 (92.9%)	1 (7.1%)	0.0338*
	2014	8	4	20	12 (60.0%)	8 (40.0%)	3 (37.5%)	5 (62.5%)	
	Mean±SD			**25±5.1**	**14.8±2.5**	**10.3±2.6**	**7.8±4.1 (75.6%)**	**2.5±1.7 (24.4%)**	
Cheer Pheasant *Catreus wallichii*	2011	24	10	380	200 (52.6%)	180 (47.4%)	60 (33.3%)	120 (66.7%)	
	2012	28	10	415	250 (60.2%)	165 (39.8%)	75 (45.5%)	90 (54.5%)	
	2013	36	10	566	284 (50.2%)	282 (49.8%)	97 (34.4%)	185 (65.6%)	0.0703
	2014	33	10	458	190 (41.5%)	268 (58.5%)	103 (38.4%)	165 (61.6%)	
	Mean±SD			**454.8±80.7**	**231.0±44.0**	**223.8±59.8**	**83.8±19.9 (37.4%)**	**140.0±43.0 (62.6%)**	
Kalij Pheasant *Lophura leucomelanos*	2011	22	8	84	50 (59.5%)	34 (40.5%)	20 (58.8%)	14 (41.2%)	
	2012	24	8	120	80 (66.7%)	40 (33.3%)	25 (62.5%)	15 (37.5%)	
	2013	31	8	155	100 (64.5%)	55 (35.5%)	45 (81.8%)	10 (18.2%)	0.0061*
	2014	33	8	160	54 (33.8%)	106 (66.3%)	57 (53.8%)	49 (46.2%)	
	Mean±SD			**129.8±35.3**	**71.0±23.5**	**58.8±32.7**	**36.8±17.3 (62.6%)**	**22.0±18.1 (37.4%)**	
Combined				**2438.0**	**1267.0**	**1171.0**	**513.0**	**658.0**	<0.0001*

4. Discussion

According to Petersen *et al*. (1988), an annual survival rate of <30% is insufficient to maintain a pheasant population whereas an annual survival rate of 30–35% is necessary for a self-sustaining population and >40% is indicative of a growing population. In this context, our findings suggest a growing population of the Cheer Pheasant with an annual survival rate of 62.6% while the Kalij Pheasant is representing a self-sustaining population with an annual survival rate of 37.4%. However, the population of the Himalayan Monal with an annual survival rate of 24.4% in the captivity is an indicative of rapid population decline, facing risk of extinction here. The survival of the Himalayan Monal and Kalij Pheasant revealed higher mortality rates in the present study which is not in conformity with Usturoi's (2008) finding.

Keeping in mind the above-mentioned Peterson's hypothesis, it would be reasonable to argue that, if reintroduced in the wild, the Cheer and Kalij Pheasants could possibly sustain their populations effectively. This was also supported by an earlier report by Robertson (1988) who argued that the survival rate of captive pheasants could increase population of this species by reintroducing into the wild. According to his findings, the survival rate of pheasants increased from 61% to 74% in Meridian and from 57% to 79% in Nicolaus when introduced from captive to the wild.

Moreover, the conservation status of the Himalayan Monal and Kalij Pheasant is threatened in Khyber Pakhtunkhwa province of Pakistan (KP 2000). Interestingly, we have found that the population of Kalij Pheasant is self-sustaining in the pheasantry because the pheasantry is located in the natural habitat of this pheasant. Thus, its proper management and reintroduction to the wild would mitigate its conservation risk. On the contrary, the Himalayan Monal with an annual survival rate of 24.4% is reflective of insufficient population to sustain (Petersen *et al*. 1988). Thus, extensive breeding programmes and management activities are necessary for the conservation of the Himalayan Monal.

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