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The Journal of Animal & Plant Sciences, 25(3 Supp. 2) 2015 Special Issue Page: 433-440
ISSN: 1018-7081

DISTRIBUTION RANGE AND POPULATION STATUS OF INDIAN GREY WOLF (*CANIS LUPUS PALLIPES*) AND ASIATIC JACKAL (*CANIS AUREUS*) IN LEHRI NATURE PARK, DISTRICT JHELUM, PAKISTAN

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ABSTRACT

Presentstudy on distribution range and population status ofIndian grey wolf (*Canis lupus pallipes*) and Asiatic jackal (*Canisaureus*) was conducted in Lehri Nature Park district Jhelum from August 2008 to May 2009. The data was collected using direct observations and indirect signs in the field. Interviews were also conducted with the eye witnesses and victims' families of wolf attacks on their livestock in various hamlets of the study area. The line transect method was used for population density by collectingindirect signs by stratified random sampling.Vegetation analysis on plant community structure and cover of particular species was calculated bytaking sample plots. Based on the data acquired, current population of Indian grey wolf was estimated to be 6 individuals while Asiatic jackal was 28 inthe study area. The most preferred habitat of both the species was scrub forest. It is concluded that major threats to both the *Canis*species were low availability of natural prey and habitat destruction due to anthropogenic pressure.The information gathered will be functional for conservation and management of theendangered grey wolfand Asiatic jackal near threatened speciesper IUCN status the salt range, Pothowar region as well in Pakistan.

Key words: Population status, Indian grey wolf, Asiatic jackal, Lehri Nature Park, Pakistan

INTRODUCTION

Grey wolf (*Canis lupus)* is the largest member of family Canidae, with head and body length of 100-150 cm, shoulder height 66-81 cm and weight 16-60 kg (Roberts, 1997). Twosub-species of wolf occur in Pakistan including Indian grey wolf (*Canis lupus pallipes*) and Tibetan wolf (*Canis lupus chanco*).Indian grey wolf is distributed in various protected areas i.e.KirtharNational Park, ChumbiSurla Wildlife Sanctuary, HazarganjiChiltan National Park, Hingol National Park,Cholistan and LalSohanra National Park (IUCN, 2003).The Indian grey wolf is the vast roamer occurring almost in all habitats but mainly confined to remote tracks of arid hilly regions and wide-ranging desert (Roberts, 1997). The grey wolf also inhabits open plains (semi-arid grasslands, scrublands, grazing land, etc.) (Shahi, 1982). Their territories range between 150 and 300 square kilometer that are a function of prey availability and denning sites in habitat (Jhala, 2003; Habib and Kumar, 2007). In mountain areas they occupy natural caves (Roberts, 1997).

They use various strategies during hunting like stalking and rushing or chasing (Jhala, 2003).The grey wolves are the predators oflarge ungulates in arid and semi-arid areas. The grey wolf also subsists on small size livestock, primarily goats, sheep and even on other small species like hare and rodents(Singh and Kumara, 2006).In addition, wolves also depend upon insects, birds and fruits of some plants, i.e.*Ziziphus*species. TheIndian grey wolf has also been recorded to prey on donkeys and camel calves (Jhala, 1993). They also frequently kill domestic dogs and even show a preference for this form of cannibalism on the outskirts of mountain villages. Wolves are persecuted by shooting, poisoning and smoking den sitesin retaliation of depredation on goats and sheep decreasingtheir populations in Pakistan(Roberts, 1997).The habitat destruction occurs due to high human population, expansion of agriculture practices, urbanization, grazing pressure, forest clearing and poor wild prey availability (Jhala, 2003). The wolves have a strong developed social system.They form groups known as packs, which is normally a family unit which comprises dominant male pair "alpha pair".Their off springsinclude up to 30 individuals, but smaller sizes of 8-12 individuals are more common (Mech, 1970). Territorial defense is done by scent marking, howling and by actual strife between neighboring pack (Mech, 1970). Prey density and prey size regulate pack size and territory size (Jhala, 2003).

The Asiatic jackal (*Canisaureus)* is the second member of family Canidae found in Pakistan. It resembles with wolf in general appearance with relatively shorter legs and slimmer muzzle; adult male stands 38-43

cm at shoulder and head and body length of 60-75cm (Roberts, 1997).Average weight ranges from 7-9 kg in the plains and up to 12.2 kg in the northern Himalayan regions (Duckworth, 1998). In Pakistan, Jackals are widely distributed throughout the country inplains of Baluchistan and Khyber Pakhtunkhwaand found in all types of habitats (IUCN, 2003). It is an adaptable animal found in mountainous areas, forest plantations and riverine thickets (Giannatos *et al.* 2005). It is well adapted to dry, open areas and numerous in irrigated forest plantations (Prater, 2005).They do not penetrate into higher mountain regions but may be found in most of the broader Himalayan valleys(Jaeger *et al.* 2007). They are common in the southern part of district Chitral and are relatively scarce in extensive desert tracts such as Thal or Cholistan (Roberts, 1997).

Presently, the grey wolf has been declaredEndangered whereas; the Asiatic jackal has been declaredNear Threatened in Pakistan (Sheikh and Molur, 2005). Scientific data on the distribution range and population status of both the species is lacking in Pakistan that is pertinent for theirconservation and management in their natural habitat.

MATERIALS AND METHODS

Study area: This study was conducted in the Lehri Nature Park, district Jhelum, Pakistan. Lehri Nature Park was notified as reserve forest in 1987 for the protection and conservation of natural flora and fauna of the park. Geographically, the nature park is situated on latitude 32°41' N and longitude 72° 32' E. It covers an area of 8836 ha; elevation ranges from 250 m to 1,025 m and located in east of the Salt Range. The northern edge touches the Mangla Reservoir, while west boundaries are close to the Mangla cantonment and Lehri village. The Grand Trunk (GT) Road from Lahore to Rawalpindi serves as southern boundary of the park (Awan, 1998). The study area has two major divisions; the Lehri Reserve Forest and Jandi Reserve Forest. The Lehri reserve forest contains 41 compartments with total area of 6672 ha. Jandi Reserve Forest covers an area of 2,164 ha having 16 compartments and is located in the north of the Lehri Nature Park. An area of 388 ha was transferred to the Pakistan army in 2007 and named as Lehri firing range. Hence the total area of the Lehri Nature Park is 8448 ha at present. The Punjab Park and Wildlife Departmentmanages the park.

Climatic conditions: The climate of the study area is sub-humid type. There are two distinct rainy seasons: monsoon rains (July-September) and winter rains (January-March).The average rainfall varies from 33.8 to 273.3mm per annum.During rainy season the water flows from North to the river Jhelum causing floodresulting in damage to the crops, bridges, roads, houses and even cause soil erosion in the study area. The mean monthly temperature ranges from5 to 42 ºC, January being the coldest and June the hottest month of the year (Awan, 1998).

Topography and geology: Lehri Nature Park is part of Pothowar plateau (latitude 32º 10' to 34º 9' N and longitude 71º 10' to 73º 55' E) which covers an area of more than one million hectares (Awan, 1998). The topography ofstudy area is generally flat and undulating surface, broken by gullies and low hill ranges. High intensity rain fallmainly causes erosion in the area, which isintact due to dense vegetation cover of scrub forest In addition, the geology of the study areaconsists of rocks, composed of limestone and sandstone.

Flora and fauna: The study area falls undersemi-evergreen scrub forest. The dominant plant species include; *Acacia modesta, Oleaferrugieneia, Salvadoraoleioides, Ziziphusnummularia, Dodonaeaviscosa, Prosopisglandulosa, Calotropisprocera, etc.* Shrubs are sparse with scattered *Ziziphusnummularia,* except in some ravines and on the high ridges where *Dodonaeaviscosa* is prominent. Grasses of the park include *Cymbopogonjwarancusa, Eleusinecompressa, Heteropogoncontortus, Aristidascensionis and Cynodondactylon* (Awan, 1998). The scrub forest of the area supports great diversity of wildlife.Major wildlife species of the park included Fox (*Vulpesvulpes),*DesertHare (*Lepus nigricolis),* Hedgehog (*Hemiechinuscollaris),* Striped Hyena (*Hyena hyena),* Common Mongoose (*Herpestesedwardsi),* Little Indian Mouse (*Musbooduga),* Pangolin (*Maniscrassicaudata),* Wild boar (*Susscrofa),*Indian Porcupine (*Hystrixindica)* and Punjab Urial (*Ovisvigneipunjabiensis)* (Awan, 1998). Major game bird species are Chukar partridge, See-See partridge, black and grey partridge. Partridges were in plenty due to topography and nature of the vegetation of the study area (Awan, 1998).

Data collection: A questionnaire based survey along withfield observations were conducted to find out the status and potential habitat of both the *Canis* species. The potential habitat of *Canis* species was divided into four major zones.Stratified random sampling technique was used for population estimation. Sample plots were randomly selected inpotential zones and were separately sampled for the populations of *Canis* spp. Each transect was sampled by walking during the morning and evening times to observe the signs of the *Canis* species. The distance was calculated by using global position system (GPS). Similarly, to get information on livestock depredation by wolf, interviews and questionnaire survey was conducted in five selected villages namely as; Dart, Lehri, (Rawtra, Potha) Buden, Bakhra and Goffa located as follow:

a. Lehri.; N 33.153031, E 73.560843

b. Dart: N 33.13282, E 73. 563291
c. Buden; N 33.179078 , E 73.563648
d. Bakhra; N 33.174021, E 73.576236
e. GoffaN 33.129544, E 73.562344.

The interviews were taken from the local residents, nomads, hunters, and field staff and especially from the victims of the livestock depredation. The data was collected on the type and number of livestock killed by the wolf per month/season. Total number of livestock owned by them and time, date and place of depredation was also noted.

Population density: Data regarding population density of both the *Canis* species were collected by direct and indirect observations using line transect method. Each transect was 500 m in length and 10 m in width with appropriate intervals. Population density was calculated by dividing the number of signs observed by the total area survey. The total population was estimated by multiplying the density with the potential habitat area. Population of the species was calculated by multiplying population in the samples with the total study area. In addition to direct observations, any indices such as pug marks, prey consumed, etc. werealso noted.

Surveys: The pug marks survey was conducted under the principle of line transect method. The pug marks were keenly observed while walking on transect and also on suitable places such as near water reservoirs, river and stream beds, dusty and damp ground and dry nullah beds. The pug marks were also observed near the depredation site on livestock in the study area. The pug marks were identified from size and shape (Fig. 1and 2).

The den surveys of both the *Canis* species were carried out in the selected sites of the study area. Water availability, remoteness from human disturbance, visual cover and shade were the critical parameter for the denning sites.The denning sites occurred near the rock crevices which were observed for the collection of any indirect evidences of the *Canis* species.

The data of depredation on goats, sheep and donkeys was separately noted along with the time, number of livestock killed and number of wolves involved. Eight villages were selected out of which five were those where depredation occurred frequently. The depredation survey was conducted in these villages by interviews and meeting with the locals and nomadic shepherds. Total numbers of respondents was 70. The informationwas confirmed by the members of the victim family and observed the remains of the prey killed by the grey wolf and photographs taken.

Végétation analysis: Vegetation analysis was carried out with random sampling methods in all representative sites of the Park. The quadrates method was used for obtaining the data on frequency and cover of particular species in a sample plot. A 10 m x 10 m plot size was usedfor tree layer: 4 m x 4m for all woody undergrowth up to 3m in height, and 1 m x 1m for the herb layer (Schemnitz, 1980). Importance value(IV) for each species werecalculated by sum of three parameters i.e. density, frequency and cover (Hosetti, 2000).

Importance Value Index = relative density + relative frequency + relative cover

RESULTS AND DISCUSSION

Distribution and habitat: During the present study both the species Grey wolf and Asiatic jackal, were observed in the north and southern part of the study areabetween altitudes of 330 m to 515 m (Jhala, 1991) where there was dense vegetation. These parts have dense vegetation cover (figure 3a and3b)and compartment no. 26, 27and 28 in the southern part which is near the human settlement. Dominant tree species in the preferred habitat of both the *Canis* species were *Acacia modesta*, *Ziziphusnummularia* and *Prosopisjuliflora*. The shrubs are probably more important in providing cover to the *Canis* spp. Dominant shrub species in the study area included *Dodonaeaviscosa*, *Calotropisprocera* and *Adhatodazeyalinica.* In these areas natural caves and cavities in the rocks were also present which provide shelter to species.

Population estimation: The estimated population density of grey wolf was 0.1 animals per km^2 and total population was estimated 6 individuals in the study area (Table 1). The depredation data of the wolves is also an evidence of the presence of wolves in the study area. A high density wolf population up to 5 wolves per 100 km^2 has been reported in some habitat pockets and reserves (Jhala, 1991). Population density of the Asiatic jackal was estimated as 0.42 per km^2 and total population estimated in the study area was 28 individuals (Table 2).Surveys of denning sites of Grey wolf and Asiatic jackal were also conducted in the study area. A total of 08 dens were located in plains, less disturbed and remote areas. Out of these eight, three dens were found active, four(4) km away from the nearest villagethat were identified by their pug marks.The active den was found through the howling of jackals at night. The den was covered by thick vegetation of *Prosopisjuli flora* near watering point. The culverts and water pipelines were also used by the Asiatic jackal as denning sites.

Population trend: Secondary information gathered through a questionnaire survey revealed that during the past 25 years, both Grey wolf and Asiatic jackal have been the permanent residents of the study area. These species have caused a lot of damage to the livestock in the area at various occasions in the past; the wolves have killed 1-2 goats daily in different localities.The density of natural prey of both the species was rich in the past, but due to illegal hunting, shooting, poaching and military

exercises in the study area, density of the natural prey has massively decreased. Hence, this is probably one of the reasons that decrease in natural prey population have resulted in the decline of grey wolf population in the area and shifted from their potential habitat to the surrounding areas. The wolves depend upon the livestock of locals and nomadic shepherds in and around the study area. The rate of depredation on the nomadic livestock has enhanced by wolves due to their presences in the study area; however, it decreasedwhen they moved from the area. Therefore, it could be concluded that the population trends of both the species fluctuate in study area due to less availability of natural prey species, habitat degradation and also movements of the nomadic shepherds from the study area is a cause of decline of both the species.

Depredation of livestock by grey wolf: During the study period, highest killing of livestock was recorded in the Lehri village which is 19, followed by Drat (11), Bakhara (8) and Buden (13) (Table 3). Goats formed major portion of wolf attacks with 27 (66%) individuals killed in all the four villages. Sheep followed with 11 (27%) killings and donkey only 3 (7%) killings.Result of depredation indicated that the goats and sheep were the major prey species of wolves in study area (Fig. 4). Attacks on donkeys by the grey wolf were only reported in the villages of Drat and Bakhara. Majority of the killing was done during the night and at dusk (Fig 5).The interviews were taken of local and nomadic shepherds who were the eye witness of attacks on livestock by wolves which was further confirmed through discussion and by using the pictures of grey wolf. Nomadic shepherds hold a large numbers of livestock as compared to locals, so were severely affected by depredation as compared to local people.The local people reported that majority of the livestock were killedoutside during grazing but in some of the cases the attacks also took place inside the enclosure.Survey revealed that 100% of the respondents aware about the grey wolf while Asiatic jackal was 28%.Among them some of respondents had themselves seen both the species. Attack on human beings was not reported by any of the respondent in the study area. The measures taken by the nomadic communities to protect their livestock from the wolf predation included maintaining guard dogs, fencing by thorny bushes and bringing the stock back to the village each night. .

Threats: The major threats to grey wolf and Asiatic jackal population in the Lehri Nature Park included loss of habitat, biotic pressure by human i.e. grazing, fuel wood collection and human- wolf conflict due to depredation on their livestock. The part of the potential habitat of grey wolf and Asiatic jackals was disturbed by military exercises i.e. firing which has resulted in shifting of many wildlife species particularly Punjab Urial from the study area. Presently, wolf mainly relieson goats and sheep for food. However, wolves face more persecution from local shepherds as compared to nomadic shepherds. The grey wolf was persecuted by shooting, smokingin their dens and diggingout dens to kill the pups (Jhala, 2003).

Figure 1. Pug marks of grey wolf in Lehri village

Figure 2. Pug mark of grey wolf in Burden village

Fig 3 (a and b). Potential habitat of Grey wolf in north of the study area near Mangla dam.

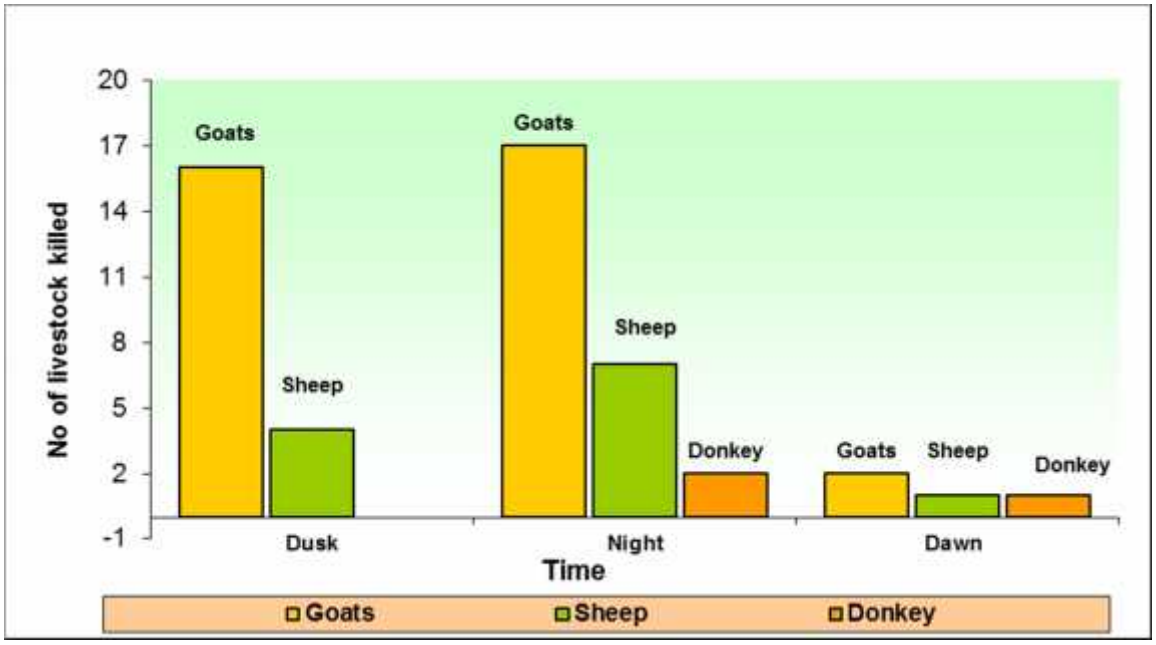

Figure 4. Depredation of livestock during night, dusk and dawn

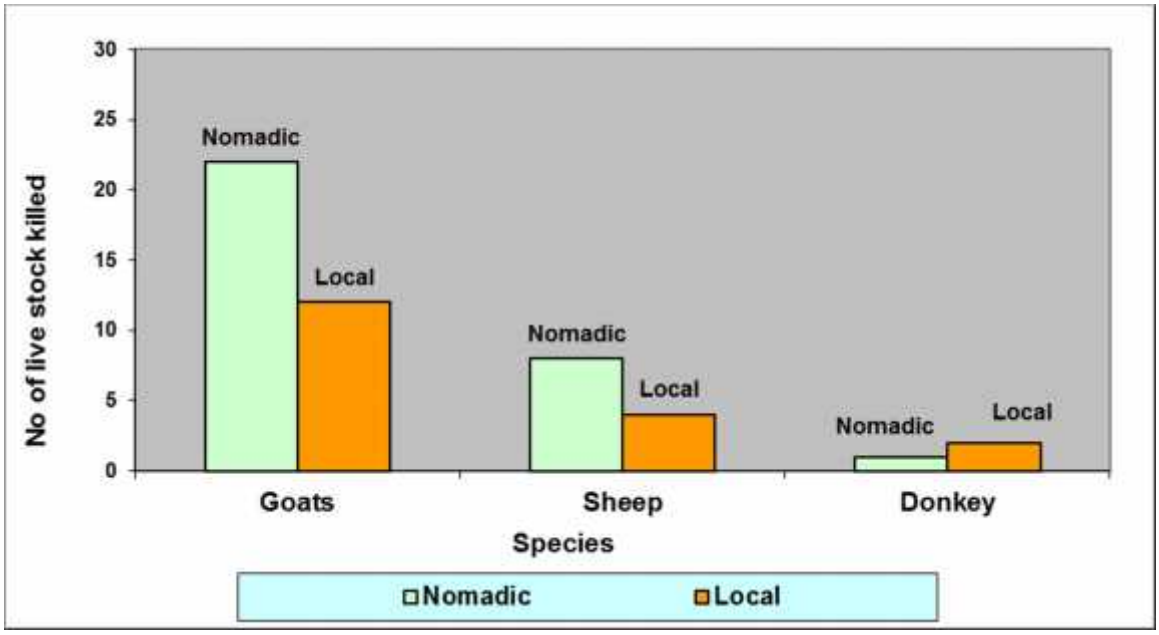

Figure 5. Depredation of livestock of nomadic and local people by the wolves

Table 1. Population estimation of Indian grey wolf in Lehri Nature Park

S. No.	Zones	Area covered (km^2)	No. of Pug marks	Population Density/ km^2	Total population of wolves
	A	15	2	0.13	
2	B	12	-	-	
3	C	10	1	0.1	
4	D	13	2	0.15	
Total		**50**	**5**	**0.1***	**6**

*Weighted mean

Table 2. Population estimation of Asiatic jackal in Lehri Nature Park

S. No.	Zones	Area covered (km^2)	No. of Pug marks	Population Density/ km^2	Total population of Jackals
1	A	15	7	0.47	
2	B	12	5	0.42	
3	C	10	3	0.3	
4	D	13	6	0.46	
Total		**50**	**21**	**0.42***	**28**

***Weighted mean**

Table3. Depredation of livestock by Wolves in different Villages of the study area

S. No	Place	Goats	Sheep	Donkeys	Total killed
1	Lehri	13	6	0	19
2	Buden	3	0	0	3
3	Bakhra	3	3	2	8
4	Drat	8	2	1	11
Total		27 (66%)	11(27%)	3 (7%)	41

Conclusions: Present study was conducted to estimate distribution range, population status, and threats to grey wolf and Asiatic jackal in Lehri Nature Park from August 2008 to May 2009. The data on distribution range and population status was collected by using indirect signs in the field. The line transect method was used for population density by using stratified random sampling techniques. Data on plant community structure and cover of particular species was also obtained by using line transect method. The population of grey wolf and Asiatic jackal were diffused into compartment of the study area and its surroundings. The population of grey wolf was estimated to be 06 individuals and that of Asiatic jackal was 28 individuals in the study area. It was also noted that scrub forest is the preferred habitat of both the species but due to biotic pressure the forest is under stern risk. Both the species preferred the undulating surface broken by gullies and low hill ranges having gentle slopes. Punjab Urial is the natural prey species in the study area, but due to their low population the main dependence of the wolves was on the livestock i.e., goats and sheep. The individual contact and interviews were conducted including Mr. Bashir, Mr. Jamil, Mr. Qasim and Mr. Khawaja as eye witnesses of attacks who told that their livestock were killed by a pack of 4-5 wolves. Presence of nomadic shepherds and depredation rate has some relation with the shifting of the wolves. The population of the Grey Wolf and Asiatic jackal has declined in study area due to less availability of the prey species and habitat destruction.

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