International Journal of Advance Research in Science and Engineering
Volume No.07, Special Issue No.04, March 2018
www.ijarse.com
IJARSE
ISSN: 2319-8354

Diet Assessment of Common Leopard (*Panthera pardus*) By Scat Analysis at Dachigam National Park

Kulsum Ahmad Bhat[1], Ghulam Mustafa Shah[2], Ulfat Jan[3], Muniza Manzoor[4], Naziya Khurshid[5], Toyeeba Hassan[6]

[1](Department of Zoology, University of Kashmir
[2](Department of Zoology, University of Kashmir
[3](Department of Zoology, University of Kashmir
[4](Department of Zoology, University of Kashmir
[5](Department of Zoology, University of Kashmir
[6]Centre of Research for Development, University of Kashmir

ABSTRACT

Leopard is considered as one of the largest obligate terrestrial carnivore which preys on a large range of species. This richness of leopard prey is mainly because of its highly flexible hunting and feeding behaviour. The feeding habits of the common leopard were investigated and this study was carried out to gather information about the diet of Leopard in order to conclude the potential impact on the prey population mainly the Hangul deer, the flagship species of the park. Field surveys were carried out from September 2014 to March 2016, covering all the seasons. A total of 250 Scats were collected. Overall diet composition of leopard across all seasons in Dachigam National Park included ten food items. Langur (Symnapithicus ejacus) contributed maximum to the diet of leopard with a very high percent occurrence of 44.56% followed by the dog and rodents with percent occurrence of 21.04% and 8.46% respectively. Hangul and sheep constituted 6.93% and 6.43% respectively. The other prey items found in leopard diet were cattle and musk deer with a percent occurrence of 3.46% and 3.21% respectively. Birds and serow contributed least to the diet of leopard with a percentage occurrence of 1.48% and 0.49% respectively.

Keywords- ***Flagship, Hangul, Leopard, Percent Frequency, Prey, Scats***

1. INTRODUCTION

Although carnivores have been a major research topic in the world, they have received a little attention in Jammu and Kashmir. Diet analysis is one of the components of animal ecology and is required to acquire information on prey base and prey preferences of carnivores. As far as diet assessment of carnivores in general and Leopard in particular is concerned, very little work has been done in Dachigam National Park. The information on various aspects of leopard is necessary for its long-term conservation. It is a prerequisite for understanding prey preferences, diet overlap and resource partitioning and hence is central to many ecological studies. One of the basic question in ecology, which has directed the attention of the researchers, is the nature of trophic interactions. Dietary studies provide key information for the proper understanding of animal ecology, conservation and management [1]. Leopards usually prefer those places that have thick forest cover, relating it to the fact that they are nocturnal and secretive in behavior. Therefore, it becomes very difficult to access the

feeding behavior of leopard through direct observation inside Dachigam National Park. The best method to avoid these problems is scat analysis and it is the basic method to study feeding ecology of carnivores [2],[3]. The basic objective of studying feeding behavior of leopard through scats is that the scats can provide valuable information regarding the prey consumed. It has many advantages, as it does not involve investigation of gut or direct check on the foraging behavior of animal. Moreover, it is very easy to obtain scat samples.

2. Study Area

Dachigam National park lies in the hills of Zabarwan Range of western Himalayas. Its altitude varies from 5500 feet to 14000 feet above sea level. It occupies a huge area of 141 sq.km and as a result, the park is demarcated into an unsymmetrical region. Land profile of Dachigam ranges from large meadows and grasslands to huge rocky cliffs.

3. Materials and Methods

3.1 Collection of scats

The scat samples were collected technically along trails and dirt roads in the Dachigam National Park. This sampling method was effective because carnivores mainly travel along forest roads where they defecate as a means of social communication mechanism. Scat of the leopard differs from other sympatric carnivores based on morphology and the associated signs [4]. The location, date, approximate age (fresh and old) and associated marks were recorded for each scat. The altitudinal location was recorded using handheld Global Positioning System receiver.

3.1.1 Scat analysis

The scats were air-dried in the wildlife laboratory and all the scats were soaked overnight. Each scat was then washed through 1-2 mm mesh and the remains such as hairs, feathers, bones, claws etc. were separated for later analysis [5]. Scats were soaked in warm water and ethanol for 30 minutes. 40-50 hairs were sampled from each basin and then the collected hairs were placed in the petridish with 70% ethanol for about 60 minutes and then air-dried. At least 20-25 hairs were taken from each sample and hair slides were prepared which were then observed under microscope. The hair left will be stored in polybags for future use

3.1.2 Mounting of hair

The hair slides were placed under microscope and characterized by comparing it with reference slides to the available literature. Hairs were also examined on the basis of colour, thickness, medullary and cuticular pattern. [5],[6]. Rodents and birds were not identified to the species level. The prey items were categorised in the following:

Langur	Dog	Hangul	Sheep	Goat
Cattle	Serow	Musk deer	Rodents	Birds

Unidentified

3.1.3 Reference hair collection

Hairs were plucked along with their roots from animals usually at kill site at Dachigam National Park. Hairs of different animals were also provided by the library of Dachigam National Park. These hairs were permanently mounted on slides and labelled as reference slides

3.1.4 Occurrence of prey

The results of scat analysis, regarding the feeding behavior of carnivores has been based on frequency of occurrence of prey [7],[8].

4. Results and Discussion

Overall diet composition of leopard across all seasons in Dachigam National Park included ten food items from 240 scats in which 171 scats contained the single prey item, 50 and 19 scats had two and three prey items respectively Out of all the prey species, langur (*Symnapithicus ejacus*) supremely contributed in the diet of leopard with a very high percent occurrence of 44.56% followed by the dog and rodents with percent occurrence of 21.04% and 8.46% respectively. Hangul and sheep constituted 6.93% and 6.43% respectively to overall diet of the leopard during the present study. The other prey items found in leopard diet were unknown items, cattle and musk deer with a percent occurrence of 3.71%, 3.46% and 3.21% respectively. Birds and serow contributed least to the diet of leopard. The Birds and rodents were not possible to identify upto species level and these items were therefore grouped as so. In comparison to the most of the dietary studies of leopard in India, which shows the highest consumption of rodents and livestock, results from this study, showed the dominance of langur in the diet of leopard. Leopard utilized broad diet during the study period, langur and dog were the most preferred prey while as livestock and rodents were complementary food items. Richness in prey diversity is because leopard covers a wide area and has opportunistic behaviour and due to this non-specific killing, overall prey items depend on sample size [9],[10]. Majority of the prey species shows non-migratory behavior except Hangul that result in the low seasonal distinction in the diet of leopard throughout the year. Hangul deer migrates from lower to upper Dachigam during summer and back to lower slopes during winter when the upper areas remain completely covered by snow.

Leopards are solitary hunters; therefore choose to hunt those that are average or medium in size. Leopards find it very easy to kill domestic species as they lack anti-predatory behavior but they are not easily accessible as they are watched over at day and fenced at night. Even if the occurrence of attacks on the livestock is common, still livestock constitute only a meager portion in the diet of large felids [11]. Regardless the high presence of sheep and cattle inside Dachigam National Park, they contribute very less to the diet of leopard reason being the livestock remain always guarded. Dogs are important part in the diet as they are frequently available near the border or they came following the other animals like langur inside the park and the dietary importance of dogs has been shown in literature [12]. Analysis of 240 scats and the data so generated revealed that the feeding behavior of leopard was similar throughout the year. The medium sized Langur was dominant (44.46%) in leopard diet in prey abundant areas but in prey deprived areas habitat switched to rodents and livestock. This

prey diversity in the diet indicates that leopards are indeed opportunistic carnivores with highly flexible feeding habits.

Table 1. Total number of scats collected

S. No.	Season	Number of scats collected	Number of scratch marks observed
1.	Spring	54	86
2.	Summer	63	83
3.	Autumn	62	69
4.	Winter	61	73
Total		240	311

Table 2. Overall diet pattern of Leopard in terms of percent of frequency and percent occurrence.

Species	Winter (n= 61) (Dec-Feb)			Spring (n=54) (Mar-May)			Summer (n=63) (Jun-Aug)			Autumn (n=62) (Sep-Nov)			Overall (n=240) (Jan-Dec)		
	(x)	(%f)	(%O)	(x)	(%f)	(%O)	(x)	(%f)	(%O)	(x)	(%f)	(%O)	(x)	(%f)	(%O)
Langur	48	78.68	49.49	35	64.81	42.69	49	77.77	43.37	48	77.41	42.86	180	75	44.56
Dog	20	32.78	20.62	17	31.48	20.73	25	39.68	22.12	23	37.09	20.53	85	35.41	21.04
Hangul	12	19.67	12.37	06	11.11	7.3	05	7.93	4.42	05	8.06	4.46	28	11.66	6.92
Sheep	08	13.11	8.24	03	5.55	3.65	07	11.11	6.19	08	12.90	7.14	26	10.83	6.43
Goat	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cattle	-	-	-	05	9.25	6.09	06	9.25	5.30	03	4.83	2.67	14	5.83	3.46
Musk deer	02	3.27	2.05	04	7.40	4.87	01	1.58	0.88	06	9.67	5.35	13	5.41	3.21
Serow	-	-	-	-	-	-	02	3.17	1.76	-	-	-	02	0.83	0.49
Goral	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rodents	07	11.46	7.2	08	14.81	9.75	08	12.69	7.07	12	19.34	10.7	35	14.57	8.46
Birds	-	-	-	-	-	-	04	6.34	3.53	02	3.22	1.78	06	2.5	1.48
Unknown	-	-	-	04	7.40	4.87	06	9.52	5.30	05	8.06	4.46	15	6.25	3.71

n = Number of scats, %f = Percent frequency, %O = Percent occurrence

Figure 1. Prey preference of Leopard in Dachigam National Park.

International Journal of Advance Research in Science and Engineering
Volume No.07, Special Issue No.04, March 2018
www.ijarse.com
IJARSE
ISSN: 2319-8354

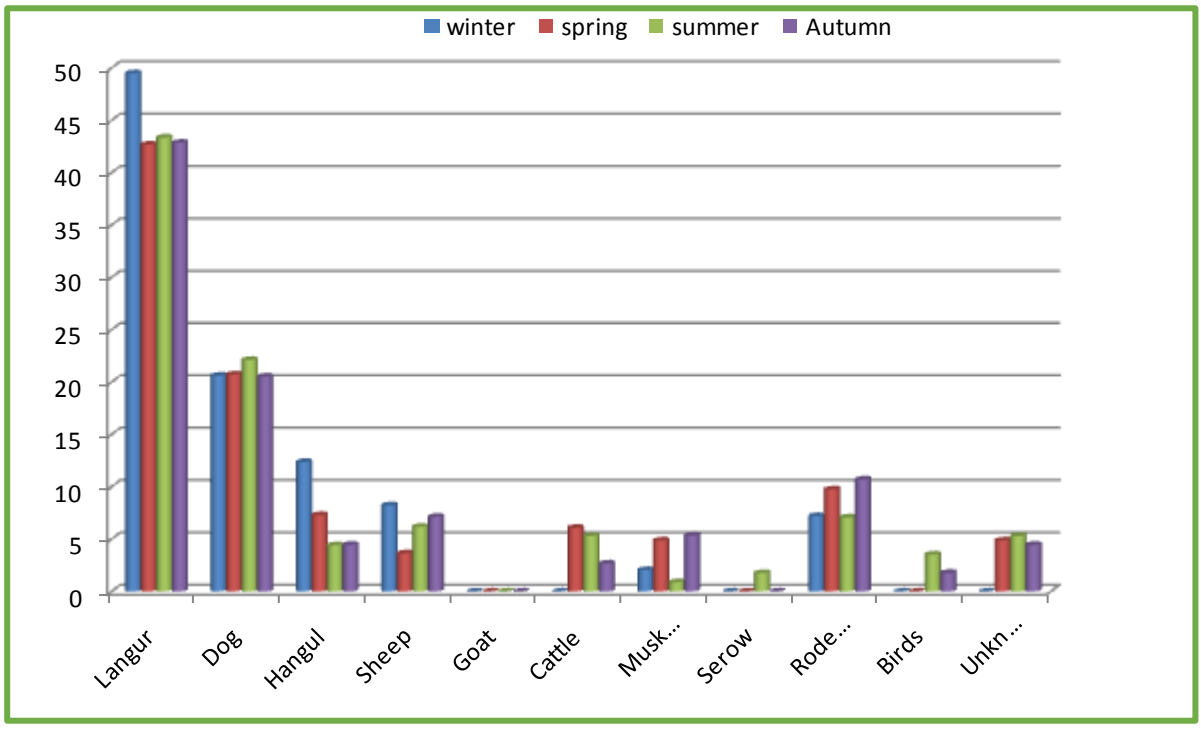
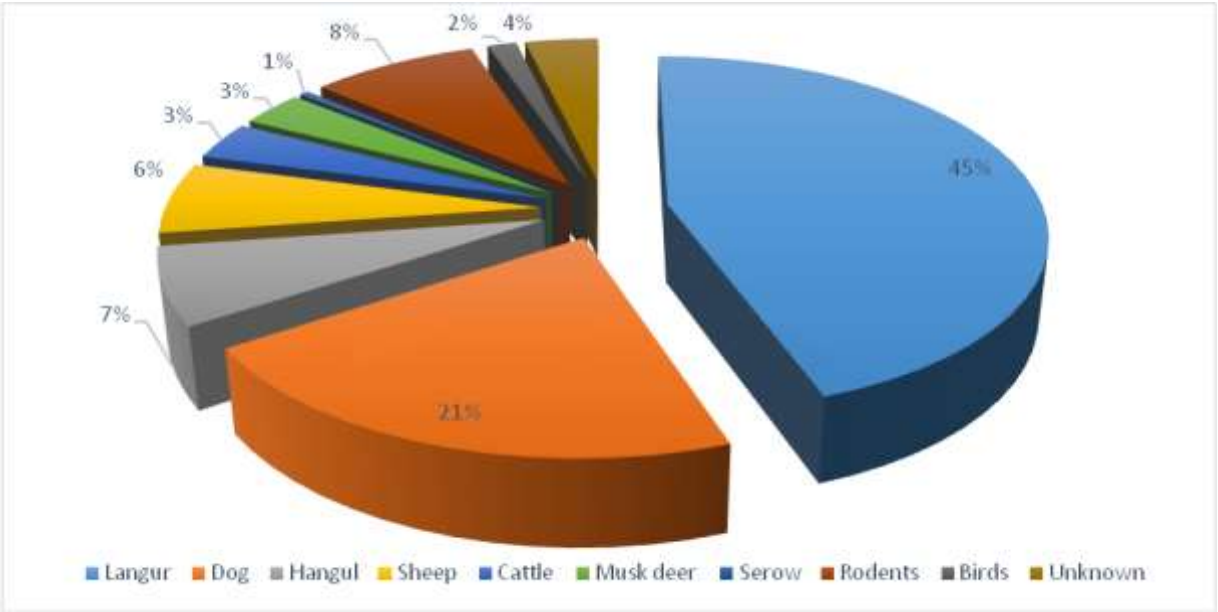


Figure 2. Prey preference of Leopard in Dachigam National Park.



5. Conclusion

Dachigam National Park calls for comprehensive, consistent and systematic prey monitoring that entails complete understanding of the forces that govern population diversity and availability of prey, which my study has provided and thus can be used in framing a monitoring program. The long-lasting leopard monitoring by collaring and using camera traps in and around Dachigam National Park is required to evaluate leopard movement, enlistment and existence. In addition to the existence and movement of leopards, camera trap data can be executed to evaluate the area inhabited by leopard and interaction with other predators. The main objective of the study was to comprehend the predation pressure on Hangul. The study shows only 6.92% occurrence of hangul in the diet of leopard, and hence has minimum affect on the last viable population. This in turn reflects the other side of decreasing number of hangul and increasing population of grey langur and therefore it is important to take immediate step for the conservation of hangul (*Cervus hanglu hanglu*).

REFERENCES

[1] W.O.C. Symondson, Molecular identification of prey in predator diets, Molecular Ecology, 11, 2002, 627-641.

[2] M. E Sunquist, and F. C. Sunquist, *Wild cats of the world.* Chicago: The University of Chicago Press. 2002.

[3] T. N. Bailey, The African leopard. New York: Columbia University Press.1993.

[4] A. Edgaonkar, and R. Chellam, Food habit of the leopard, *Panthera pardus*, in the Sanjay Gandhi National Park, Maharashtra, India. *Mammalia*, 66, 2002, 353-360.

[5] S. Mukherjee, S. P. Goyal, and R. Chellam, Standardisation of scat analysis techniques for leopard (*Panthera pardus*) in Gir National Park, Western India. *Mammalia*, 58, 1994, 139-143.

[6] A. M. De Marinis, and A. Asprea, Hair identification key of wild and domestic ungulates from southern Europe. *Wildlife Biology*, 12, 2006, 305-320.

[7] T. J. Floyd, L. D. Mech, and P. A. Jordan, Relating wolf scat content to prey consumed. *Journal of Wildlife Management*, 43, 1978, 528-532.

[8] L. K. Corbett, Assessing the diet of dingoes from feces: a comparison of 3 methods. *The Journal of Wildlife Management*, 53, 1989, 343-346.

[9] T. Bodendorfer, B. Hoppe-Dominik, F. Fischer, and K. E. Linselmair, Prey of the leopard (*Panthera pardus)* and the lion (*Panthera leo*) in the Comoe and Marahoue National Parks, Cote d'Ivoire, West Africa. *Mammalia*, 70, 2006, 231-246.

[11] J. Diamond, (). Evolution, consequences and future of plant and animal domestication. *Nature*, 418, 2002, 700-707.

[12] G. M. Shah, U. Jan, B. A. Bhat, F. Ahmad, and J. Ahmad, Food habits of the leopard *Panthera pardus* in Dachigam National Park, Kashmir, India. *Journal of Threatened Taxa*, 1(3), 2009, 184-185.