

PREDATION PATTERN OF THE ASIATIC LION ON DOMESTIC LIVESTOCK

H.S. SINGH* AND R.D. KAMBOJ **

Introduction

The Lion is a migrant into India from West Asia through Persia and the North-Western passes. It spread South-eastward from its original home in Central Europe and entered into North-West Asia where it ultimately diverged towards Africa and South-West Asia. Records and evidences regarding the distribution of this great cat in Northern and Western India and its total absence in the South of the Narmada River further indicate that India was not its original home. Historically the Lion has been predating on domestic livestock since ages as livestock rearing was the main occupation of the people in the regions where Lion entered and roamed in India. Development of civilization with widespread practice of pastoralism in the subtropical zone overlaps the home range of the Lion. Unlike the Tiger which lives in dense forests, the Lion prefers an open habitat preferably savannah forests which have also been used traditionally as grazing grounds for livestock by the communities inhabiting these areas. This overlapping of Lion's home range with traditional grasslands itself indicates that the Lions must have been hunting the domestic livestock since ages.

Although the Lion tolerated and respected human beings yet man failed to protect the animals as it disappeared from everywhere in Asia outside the Kathiawar

peninsula around 1840. In India too it was relentlessly slaughtered and the last animal surviving in the wild outside Saurashtra was killed in 1884. At present, Gir forest remains the last abode of the Asiatic Lion with 304 lions inhabiting the Gir Sanctuary and National Park and its peripheral forests located in Saurashtra region of Gujarat State in India (Anon., 1995).

The predation ecology of the Lion in Gir forest studied over the years (Joslin, 1973; Sinha, 1987; Chellam, 1993) indicate that predation behaviour of the Lion changed gradually from its dependency on domestic livestock to the wild herbivores. A complete reversal in the predation pattern of Lion has been witnessed in the last 25 years which has been possibly due to increased availability of wild ungulates in the protected area (PA). However, about 15% of the lions residing outside the PA still derive a major portion of their food from domestic livestock.

The analysis presented in this paper primarily focuses on the temporal and spatial variations in domestic livestock predation pattern of the Lion in the sanctuary as well as outside the sanctuary so as to understand its implications from management point of view. The analysis may be very helpful in formulating appropriate wildlife management strategies in future.

* Conservator of Forests, Gandhinagar Circle, Gandhinagar (Gujarat).

** Deputy Conservator of Forests, Gir West Division, Junagarh (Gujarat).

Materials and Methods

The domestic livestock of resident maldharis and inforest settlement farmers are permitted to graze in the sanctuary and compensation as per Govt. rules is paid in the event of killing of such livestock/human beings by the carnivores in the PA. Similarly all types of domestic livestock killed by the carnivores outside the PA are also eligible for compensation. All such incidences of domestic livestock kills are properly investigated and recorded in the prescribed proformas/registers maintained in both, i.e., Gir West and Gir East Divisions. Thus except for few kills of domestic livestock grazing unauthorisedly within the PA most of the cases of lions predation on domestic livestock are duly registered along with the date and place of kill, predator etc. The information regarding the domestic livestock killed by Lion was collected from both the divisions for the past ten years and computed in Table 1. Similarly the data about monthwise domestic livestock killed by lions were averaged and given in Table 2.

The abundance, temporal and spatial

distribution and size of the prey, all influence the predation by large cats. In order to assess the impact of all these factors on domestic livestock consumption pattern of Lion, the necessary data regarding availability of wild ungulates and resident domestic livestock, which constitute the major prey base of the apex predator, were collected from the recent census results (Anon., 1995) and computed in Table 3 so as to compare the predation pattern of Lion in different parts of the PA.

Results and Discussions

Large scale predation of Lions on domestic livestock was reported between 1901 to 1904 after great famine of 1899 when majority of wild ungulates and bulk of the domestic livestock in Gir forest perished for want of water and food which in turn resulted into increased man-animal conflicts. Herbivores population picked up and herds of buffaloes in Gir forest had established in good number by 1911 which subsided menace to human life. Probably, Lion predation on livestock depended on the habitat condition and herbivores

Table 1

Number of domestic livestock killed by Carnivores

Year	Within the PA		Outside the PA		Total kills		Total kills
	Lions	Leopards	Lions	Leopards	Lions	Leopards	
85-86	260	-	839	14	1099	14	1113
86-87	473	-	657	03	1130	03	1133
87-88	340	-	389	05	729	05	734
88-89	349	-	1111	09	1460	09	1469
89-90	271	-	1343	04	1614	04	1618
90-91	445	1	1595	10	2040	11	2051
91-92	492	-	1586	14	2078	14	2092
92-93	477	-	1386	18	1863	18	1881
93-94	418	-	1195	13	1613	13	1626
94-95	512	-	1384	14	1896	14	1910
	4037	1	11485	104	15522	105	15627

Table 2

Monthwise average domestic livestock kills by the Lion

Month	Inside Sanctuary			Outside Sanctuary			Total		
	Gir (E)	(Gir (W)	Total	Gir (E)	(Gir (W)	Total	Gir (E)	(Gir (W)	Total
January	30	2	32	51	46	97	81	48	129
February	36	10	46	56	62	118	92	72	164
March	33	11	44	53	71	124	86	82	168
April	31	9	40	54	61	115	85	70	155
May	30	12	42	52	46	98	82	58	140
June	30	12	42	51	75	126	81	87	168
July	30	6	36	52	91	143	82	97	179
August	29	6	35	53	68	121	82	74	156
September	30	7	37	54	54	108	84	61	145
October	29	8	37	53	58	111	82	66	148
November	30	8	38	52	71	123	82	79	161
December	31	9	40	52	110	162	83	119	202
Total	369	100	469	633	813	1446	1002	913	1915

Note :- Above figures do not include the kills in Girnar forests.

Table 3

Comparison of livestock predation by Lion in Gir (E) and Gir (W)

	Number of lions (adult & subadult)	Domestic livestock population within PA	Wild ungulate population	Number of livestock killed by lions	Average number of livestock killed/lion
Gir(E)	83	9339	7405	998	12.0
Gir(W)	137	4714	31410	912	6.7
Total	220	14053	38815	1910	8.6

population density (Rashid and David, 1992).

The most important human component of the Gir ecosystem has been the resident maldharis (professional cattle owner) and their domestic livestock which have been an integral part of Gir for over 125 years. Based on 1971 census, 845 maldhari families and 556 forest settlement households were living in the PA (Anon., 1972). Approximately 44,000 domestic livestock including illegal entrant and 5,600 wild ungulates lived or grazed within the

sanctuary. Analysis of Lion scats collected in 1971-72 throughout the sanctuary showed that about 75% of the Lion's diet was domestic livestock, reflecting its great availability and shortage of wild ungulates (Joslin, 1973).

Based on the recommendations of the research and study projects, the Gir Sanctuary Project was launched in 1971. Out of 845 maldhari families, about 2/3 have been settled outside in 29 different Settlements. The sanctuary was fenced by the rubble wall/barricades and protection

level was enhanced which resulted into recovery of habitat, drastic reduction in domestic livestock and increase in wild ungulate population from 9,800 in 1974 to over 38,000 in 1995. Although Lion population increased from 180 in 1974 to 304 in 1995 but its predation pattern shifted gradually from domestic livestock to wild ungulates due to increase in their population. The last 25 years have witnessed a complete reversal in the predation pattern of Lions in Gir and Lion's dependency on domestic livestock within the PA has reduced. Sinha (1987) reported that 52% of the scats he analysed contained wild prey. As per Ravi Chellam's study (Feb., 1987 to May, 1989) the composition of lions diet was 60 to 65% wild ungulates and 35 to 40% domestic livestock. The shift in the predation pattern is due to change in the availability of prey species within the Sanctuary and National Park. However, about 15% lions staying outside the PA still derive major share of their food from domestic livestock (Singh and Kamboj, 1995).

About 1,900 to 2,000 kills of domestic livestock by lions have been recorded annually in Gir during recent past. Yearwise kills of livestock by carnivores inside and outside the sanctuary in Gir (E) and Gir (W) division are given in Table 1.

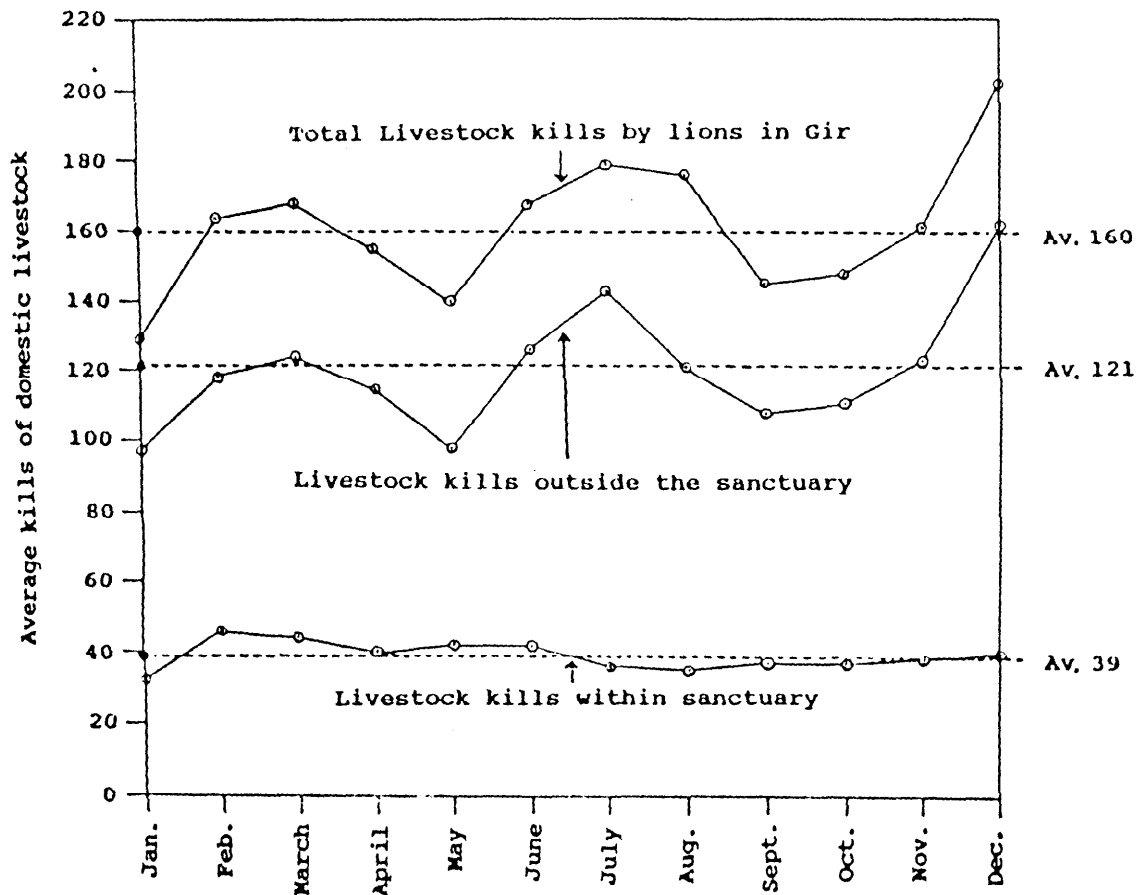
As is evident from Table 1, domestic livestock killed by the carnivores recorded during severe drought of 1987-88 was lowest despite the fact that thousands of domestic livestock were grazing illegally in the sanctuary and peripheral forests. Due to the abundant availability of domestic livestock, the Lions preyed extensively on them they constituted an easy prey for these carnivores. People could not claim compensation for such illegal grazing. However, it resulted into escalation of

predation of Lion on domestic livestock in subsequent years as the lions persistently killed livestock by intruding into the peripheral villages. Consequently, the incidences of Lion-human encounters increased leading to death of many people (Anon., 1995). It is noticed that Leopards do not kill livestock within PA probably because they are not able to kill bigger livestock such as buffaloes and cows found in the PA. However they kill small livestock such as goats, sheep etc. found outside the PA.

Seasonal variations in Lion's predation pattern on domestic livestock have been shown in Fig. 1. Interesting conclusions can be derived from these informations after correlation Lion's migration pattern, social grouping, herbivores population density and availability of livestock with the predation pattern.

The average number of livestock kills within the PA remains constant at about 40/month with slight variations in February-March and during rainy season from July to October. It is very difficult to explain these seasonal variations due to limitation of our knowledge about the requirement of food by the Lion in different seasons which may depend upon the metabolism of the animal. It is, in turn, observed from Table 2 that there is 15% increase in livestock kills within the PA during February-March which incidentally happens to be the peak littering season of Lion in Gir. Obviously, during parturition and post-parturition period movement of lioness and other females of the pride remains confined within the PA. The seasonal variation in metabolism of the animal and/or peak littering season may be the reason for escalation in magnitude of domestic livestock predation by Lion within the PA during February-March. ✓

Fig. 1



Seasonal variation in predation on domestic livestock by the Lion in Gir

Maximum predation of Lion on livestock belonging to peripheral villages around Gir has been noticed during the beginning of rainy season i.e. in the months of June and July. Also the extent of predation by Lion on domestic livestock outside the PA was remarkably higher in the Gir (W) Division. This may be due to the fact that during rain season the lions prefer to live in the periphery of the sanctuary to avoid the pestering flies and insects in the sanctuary. Also there is maximum activity and movement of human being and domestic

livestock in the agricultural fields during monsoon. Therefore, the probability of Lion-human and Lion-livestock encounters increases during this season resulting in enhanced killing of livestock in the peripheral villages. This is also corroborated from the Fig. 1 which indicates that domestic livestock kills inside the PA get reduced by over 10% whereas it increases by about 20% outside the PA. Further analysis from the Fig. 1 depicts an increase in the livestock predation during the first half of winter season (November and December) which

reduces in the month of January. This phenomenon can be explained only after studying the predation ecology of the Lion.

The extent of seasonal variations in predation of domestic livestock by Lion has been observed to be around 36%. Curiously enough, the extent of seasonal variation in livestock predation was more pronounced outside the PA indicating the occasional or irregular visits of lions outside the PA. As discussed earlier factors such as metabolism of the Lion, its seasonal migration and grouping pattern, seasonal variations in distribution and density of domestic livestock and wild ungulate population etc. may decide the predation behavior of the Lion.

Predation Scenario in Gir East and Gir West

A careful analysis of the information computed in Table 3 reveals that livestock predation pattern of Lion varies remarkably in different parts of the sanctuary. It is obvious that the lions are more dependent on livestock hunting in Gir (E) due to high density of resident domestic livestock and low density of wild ungulate population.

Although area of Gir (E) is almost half of the area of Gir (W) yet the resident domestic livestock population is almost double. As the Lion population in Gir (E) is only 37% of the total the availability of domestic livestock per Lion is almost four times that of Gir (W). On the other hand, population of wild ungulates in Gir (E) is far lower than that of Gir (W). Availability of livestock population/Lion in GIR (E) is four times greater than Gir (W). Great variation in population densities caused major change in predation pattern of Lion. Lions predation

on livestock in Gir (E) is twice of Gir (W). Another interesting observation which emerges from Table 3 is that a Lion in Gir, on an average, kills 8 to 9 livestock mainly buffaloes and cows annually which ascertain the fact that 30% to 40% of Lions' food in Gir is still derived from livestock kills.

Expert field staff have observed that some lions in peripheral forests are almost fully dependent on the livestock kills. A pair of adult lions in Devalia Block used to kill domestic livestock in neighbouring villages. One of them was brought in the Gir Interpretation Zone for minor treatment and subsequently released in the park having an area of over 400 ha with adequate number of wild ungulates. The animal was not provided with any food to observe the hunting behaviour. The Lion remained without food for 15 days, although wild ungulates were observed browsing very close to the animal. When a buffalo was brought near the Lion, it killed the same without any delay. Second time also the Lion remained without any food for 12 days till it killed another buffalo calf. This indicates that some animals in peripheral forests and satellitic zones have habit of killing domestic livestock.

Predation behaviour of Lion in the National Park is different as cattle are stranger to the animal. Once a bait was provided to adult Lion in the National Park and the Lion passed from near the buffalo calf and looked at the same but did not kill it. After some distance it killed an adult Sambar. Many such observations made by the Sikaris (expert in Lion trekking) ascertain that interaction of Lion with domestic livestock brings about a major change in predation behaviour of the great cat.

Conclusions

The domestic livestock predation by Lion has been observed to be influenced by various factors such as abundance, temporal and spatial distribution and size of prey population. Seasonal variations inside and outside the PA have been observed in the predation behaviour of the lions in both the forest division. Further, factors pertaining to habitat such as availability and distribution of ambush cover, climatic conditions, terrain and the availability and distribution of water also play major role in predation ecology of the great cat. Excessive grazing pressure of domestic livestock, water scarcity and lack of ambush cover in Gir (E) lead to more livestock predation by Lion in

that region. The population density of wild ungulates is very low in Dalkania and Khambha ranges of Gir (E) which is also a zone of higher livestock predation by Lion. The National Park is rich in wild ungulate population and free form grazing by domestic livestock. In this zone, lions almost exclusively predate upon wild ungulates and exhibit different hunting instincts. In order to alter the predation pattern of Lion in favour of wild ungulates in Gir (E) region, it is essential to improve and upgrade the habitat conditions by ensuring adequate availability and proper distribution of water holes and reducing the grazing pressure of domestic livestock. The vegetation cover also needs to be improved in favour of wild ungulates in Gir (E).

SUMMARY

The predation pattern of Lion on domestic livestock in different seasons and regions of Gir Sanctuary have been studied. About 1,900 to 2,000 domestic livestock were killed by lions annually during recent past. Seasonal variations in the predation pattern has been recorded in which the maximum predation of domestic livestock by Lion in peripheral area has been noticed during the beginning of rainy season. It is observed that lions are more dependent on livestock hunting in Gir (E) as compared to Gir (W). High population density of domestic livestock creates negative impact on wild population of herbivores which also affect the predation pattern of the great cat. A Lion in Gir, on an average, kills 8 to 9 livestock mainly buffaloes and cows annually ascertaining the fact that 1/3 of the Lions' food is still constituted by the domestic livestock. Management prescriptions have been suggested to improve the habitat in some part of Gir in the benefits of herbivores to alter the livestock predation pattern of Lion in favour of wild ungulates.

पालतू पशुओं पर एशियाई सिंह की शिकार करने की रूप-सज्जा

एच०एस० सिंह व आर०डी० कम्बोज

सारांश

गीर अभयारण्य में पालतू पशुओं पर विभिन्न मौसमों और विभिन्न क्षेत्रों में सिंह द्वारा उनका शिकार करने की रूप-सज्जा का अध्ययन किया गया। विगत अतीत में लगभग 1900 से 2000 पालतू पशु प्रतिवर्ष सिंहों ने मारे हैं। शिकार करने की सज्जा की मौसमी विभिन्नता का अभिलेखन किया गया है। जिसमें सिंह द्वारा पालतू पशुओं का अधिकतम शिकार चौगिर्द वाले क्षेत्र में वरसात में होता देखा गया है। यह भी देखा गया है कि सिंह गीर (पश्चिम) की तुलना में गीर (पूर्व) में पशुओं का शिकार करने पर ज्यादा निर्भर है। पालतू पशुओं का अधिक संख्या घनत्व जंगली शाकभोजी पशुओं की संख्या पर नाकारात्मक प्रभाव डालता है और इस महा विडाल की शिकार करने की सज्जा पर उसका भी प्रभाव है। गीर में एक सिंह औसतन 8 से 9 पशु मुख्यतः गैस और गाय मारता है जिससे यह पता लगता है कि सिंह के भोजन का एक तिहाई भाग अब भी पालतू पशुओं से मिल रहा है। गीर के कुछ भागों में प्राकृतावास को शाकभोजी पशुओं के लाभार्थ सुधारने के लिए ताकि सिंह की पालतू पशुओं को मारने की सज्जा बदलकर जंगली शकीयों को मारने की बन जाए कुछ प्रवन्धोपाय भी सुझाए गए हैं।

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