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Abstract: The Kalahari Gemsbok National Park, an area of almost 960'000 hectares, is situated in the north-western corner of the Cape Province. Twenty cheetah groups, comprising 43 individuals, were kept under observations for 115 days. They were followed for more than 1200 kilometers while information on their predator-prey relationship, territoriality and related ecology factors, was collected. It was found that not only did the sizes of prey species differ in relation to the cheetah's group sizes but so did the kill rates and the frequencies at which each group size would kill. During an experiment which lasted 25 days, 11 cheetahs consumed 51.9 per cent of carcasses offered, averaging a daily consumption of 3.8 kilograms per cheetah. On average, cheetahs travelled 12.3 kilometers every 24 hours, drank water once every 82 kilometers, urinated every 4.3 km and defecated 12 every kilometers travelled. The demarcated boundaries by urinating have been found to exceed 300 square meters in Gemsbok Park.

ASPECTS OF CHEETAH ECOLOGY

IN THE

KALAHARI GEMSBOK NATIONAL PARK

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ASPECTS OF CHEETAH ECOLOGY IN THE KALAHARI GEMSBOK NATIONAL PARK

The Kalahari Gemsbok National Park, an area of almost 960 000 hectare, is situated in the north-western corner of the Cape Province. It is a sparsely vegetated, arid wasteland with no permanent waterholes. It is characterized by its undulating sand-dunes with temperatures ranging from sub-zero conditions in winter to more than 40°C in mid-summer. The animals of the Kalahari are subjected to semi-desert conditions.

Cheetahs, lions, leopards and spotted hyaenas are the principal predators of the Gemsbok Park, together preying on animals varying from the size of small rodents to the eland, the largest of all antelope.

Twenty cheetah groups, comprising 43 individuals, were kept under observation for 115 days. They were followed for more than 1 200 kilometres while information on their predator-prey relationship, territoriality and related ecological factors, was collected.

Cheetahs hunted 10 identified species of which seven were successfully taken. They displayed diurnal and nocturnal activities and prey were consequently hunted and killed during the night as well as day. They had a kill-rate of 33,71 per cent.

An analysis of 59 kills and 116 unsuccessful attempts indicates that the predator-prey relationship of solitary cheetahs and cheetah groups differs markedly from each other.

While larger prey like springbok contributed to more than 60 per cent of kills by cheetah groups, it was relatively insignificant in the diet of solitary cheetahs. The diet of solitary cheetahs consisted largely of hares and springhares representing almost 60 per cent of their kills while such prey contributed to less than 3 per cent of the kills by cheetah groups.

Cheetahs tend to an asocial mode of living. From the available information on the predator-prey relationship it is, therefore, concluded that smaller prey play a far more significant role in the diet of the cheetah population of the Kalahari than what may have been anticipated.

Other than the selection of prey in relation to the size of the cheetah group, no obvious prey preference was observed. There seemed to have been a marginal preference for male prey animals but no indication that cheetahs deliberately selected physically weak or sick animals.

The specific method employed to study the predator-prey relationship allowed for the calculation of true hunt and true kill frequencies. In terms of averages the cheetahs of the Gemsbok Park hunted once every 10,2 kilometres and were successful once only every 30,7 kilometres, or in terms of time once every 59 hours.

It was furthermore found that not only did the sizes of prey species differ in relation to the cheetah group sizes but so did the kill rates and the frequencies at which each cheetah group size would kill. In comparison, solitary cheetahs preyed largely on small game, had a better kill rate and a higher kill frequency than cheetah groups. It is, therefore, important to separate the kill frequency of solitary cheetahs from cheetah groups. An analysis of the results reveals that solitary cheetahs killed 9 750 prey animals a year while cheetah groups accounted for 5 840 kills.

Because the relative frequency of the various prey species was known, it was now possible to convert the projected number of kills to actual prey species. From this figure it was calculated that the 15 590 animals killed by the cheetah population had a mass of approximately 574 510 kilograms. This means that each square kilometre of the Gemsbok Park has to yield 60 kilograms of prey a year in order to support the cheetah population of 150 animals. This figure incidentally is substantially less than the suggested 400 kilograms per square metre of the Nairobi National Park.

Even with the limited information available it is my considered opinion that the cheetah population, like the other predators of that region, plays a minor role in the regulation of the prey population of the Gemsbok Park.

Often coupled with the study of predator-prey relationship is the determination of intake or waste by a predator as well as an investigation of the ecological separation of species.

The degree of wastefulness is of importance as this may not only directly influence the kill frequency of a predator, but it may also influence to some degree the habits of the scavenger population of that particular area. It has always been assumed that scavengers support themselves to some extent on the remains of kills left behind by larger predators; but it is also known that most of these so-called scavengers can, with no apparent difficulty, exercise true predatory habits in the absence of sufficient remains. It is, therefore, important not to express wastefulness as a derogatory characteristic of a predator but rather as a means of contributing towards supporting a local scavenger population.

The fact that cheetahs very seldom, if ever, return to a kill, but also avoid decaying matter, has always been a fundamental reason for their being described as wasteful feeders. It has already been shown that solitary cheetahs feed to a large extent on hares and springhares and in most instances will consume such prey almost entirely. It is, therefore, felt that the degree of wastefulness should be related to the size of the particular cheetah group and not to generalize, which can easily lead to incorrect conclusions.

During an experiment which lasted 25 days, 11 cheetahs consumed 51,9 per cent of carcasses offered, averaging a daily consumption of 3,8 kilograms per cheetah. Under natural conditions when cheetahs may go for three to four days without food they have been found to consume as much as 10 kilograms at a single sitting. This is equivalent to 20 per cent of their own body mass. This compares favourably with the intake of lions which can consume the equivalent of 25 per cent of their own body mass.

The nervousness so often displayed by cheetahs at a kill is atypical of these carnivores. The reason for this behaviour can probably be related to the inability of cheetahs to successfully defend their kills against virtually any attacker. Cases where lions, leopards, spotted and brown hyaenas, jackals and even vultures deprived cheetahs of their kills are numerous. Although this behaviour may not necessarily lead to starvation, it does allow the opportunity of questioning the efficiency or even the credibility of the so-called ecological separation of species.

Most authors are in agreement that the interspecific competition between various predatory species in any given location is relieved by the utilization of different habitats, the utilization of different prey, or where the same prey are utilized by applying different hunting techniques or to perform kills at different times. Indications are that the situation in the Gemsbok Park differs vastly from the fundamental principles of an efficient ecological separation of species.

The cheetahs of the Gemsbok Park displayed an active lifestyle as is illustrated by the average of 12,3 kilometres travelled every 24 hours. The maximum distance travelled in one day was 26 kilometres. When it is realised that cheetahs travel at a walking speed of approximately 4 kilometres per hour, it means that a cheetah will require a minimum of between six to seven hours to travel a distance of 26 kilometres.

With ground surface temperatures reaching 70°C it is imperative that the animals of the Kalahari adapt to a lifestyle where they are exposed to a minimum and exert themselves as little as possible. This is successfully achieved by frequent resting points, well illustrated by the fact that cheetahs sat or lay down once every 800 metres. In addition, the activities of cheetahs between 10h00 and 16h00 are limited to only the essential. During this time they normally shade themselves by retiring to the protection of shrubs or low growing branches of trees.

In order to perform the functions which are necessary for survival within the limited time available, this type of life style has forced the cheetahs of the Kalahari to adapt to a much more nocturnal behaviour pattern than is generally accepted to be the case for the species.

An ability to survive any length of time without water is equally essential to adapt to a life in the desert.

The movements of cheetahs were seldom, if ever, influenced by their water requirements. On average, cheetahs drank water once every 82 kilometres travelled. On one occasion cheetahs travelled for 12 days covering 127 kilometres without drinking water. During this period cheetahs often passed within a few metres of waterholes totally ignoring the waterholes.

As a substitute for water, cheetahs have been observed to puncture the bladder of their prey and drink the urine. In the same fashion they will drink amniotic fluid or blood which may collect in the body cavity of the victim. They will also eat tsama-melons, a fruit bearing plant widely distributed throughout the Gemsbok Park. The tsama-melon is similar in shape to the gem-squash and has a water content of 95 per cent.

It remains to be investigated in what way cheetahs can store water or minimize the loss of their own body fluids. In this regard it is important to point out that on average cheetahs urinated once every 4,3 kilometres and defecated once every 12,0 kilometres travelled.

Other than its biological and physiological functions, urination and defecation also play a major role in the intraspecific co-existence of cheetahs.

This co-existence is determined by the ability of cheetahs to demarcate territorial boundaries by urinating on or against trees or similar objects - and to respect such boundaries.

These demarcated boundaries have been found to exceed 300 square metres in the Gemsbok Park. It is obvious that areas as large as these will result in overlapping with movements of other cheetahs. The function of such a system, which is characterized on the one hand by the continuous overlap of movements and on the other hand by the continuous demarcation of boundaries, now remains to be determined. On average, cheetahs inspected and/or urinated against trees once every 1,6 kilometres.

The advantages of a territorial system for a species have never been disputed. The orderly distribution of a population within a given area is the most important of these advantages. It is in fact accepted that territoriality plays a much more important role in the regulation of populations, than do predators.

Some authors have justified the co-existence of cheetahs within a given area by suggesting the function of a so-called "time-plan territory". Evidence of such a system could not be found in the Gemsbok Park. On the contrary, on occasion, cheetahs displayed active aggressiveness which can only be related to territorial behaviour. On other occasions, however, cheetahs left each other alone when they were at a reasonable distance from each other.

In conclusion, whether aggressive or tolerant, it appears as if cheetahs, unlike most other species, do not rely on the function of a territorial system to regulate their populations.