

Eaton RL. 1969. Beautiful and efficient predator: the cheetah. *Africana*.

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Abstract: For this definitive study Randall Eaton an American biologist of the University of Washington, USA, spent many months observing in Nairobi National Park. In this article he writes about the territoriality, social behavior and hunting behavior of the cheetah.

Beautiful and  
efficient predator:

# THE CHEETAH

CHEETAH prefer certain habitat-types in Nairobi National Park and consequently spend more time in some areas. The preferred habitat is acacia-grassland, which is more abundant in the eastern and northern parts of the Park.

In these areas, the grass is not extremely short and small *Acacia drepanolobium* are relatively plentiful. The game is usually adjacent patches of grassland, if not in the acacia-grassland.

This habitat is preferred, because it is the best in which to hunt. The acacia-grassland is never dense enough to offer the best stalking conditions; but it is not so dense as to hinder the cheetah's running attack. Hunt success by single cheetah is decidedly greater in acacia-grassland than in the more open grass plains.

The vegetation type does not appear to be as limiting to social groups during hunting. The disadvantage of less cover in open areas is outweighed by the advantage of several cheetah hunting together.

The seasons affect areas where cheetah are found, in that both vegetation and the concentration of game are functions of the odds of rainfall and drought.

The distribution of females with cubs is affected by the distribution of predators. In Nairobi Park, there are few hyaenas or hunting lions, but lions are common.

Cheetah behave as if they greatly fear lions whenever they see or hear them. Lions have been seen chasing cheetah on several occasions,

but it is not known whether or not they actually killed them.

Cheetah are susceptible to predation because of their diurnal habits. At night, they stay in one place and may be attacked by all of the other major predators — all of which are nocturnal. In Amboseli Game Reserve, a leopard (*Panthera pardus* Linnaeus) killed a young cheetah and, in the Serengeti, where hyaena are the major predator, young cheetah have been chased by hyaena.

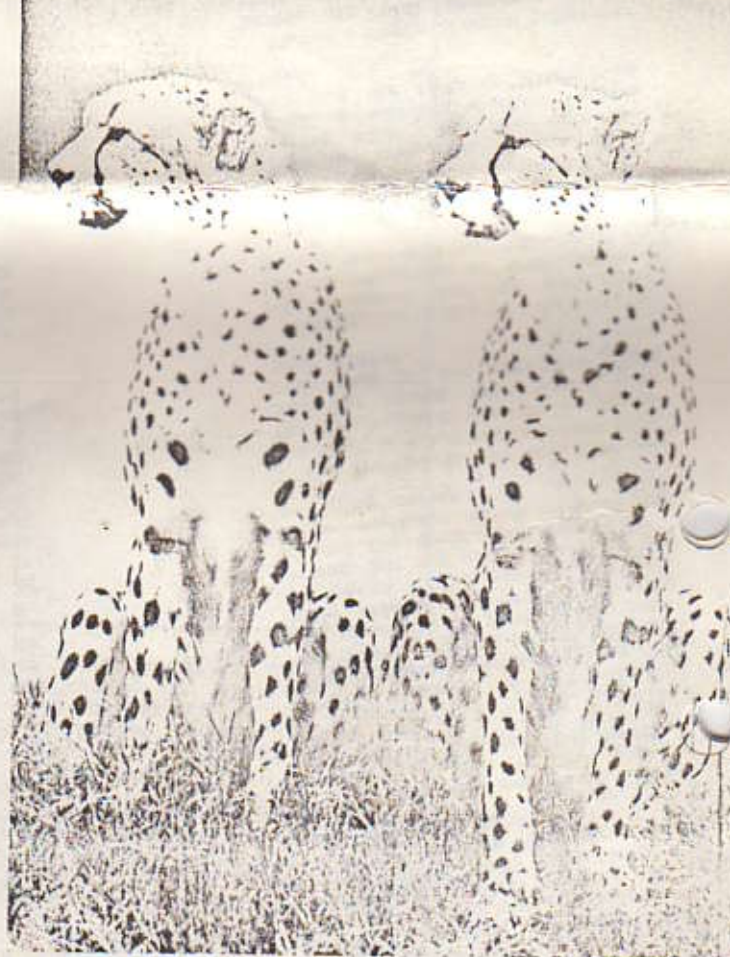
## TERRITORIALITY

A territory is defined as an area actively defended against members of the same species. By this definition, cheetah are not territorial animals. Aggressive behaviour between cheetah has been observed only once (Cheetah Survey, 1965). Any indication of antagonistic behaviour by the cheetah of Nairobi Park has not been observed.

It appears that there are loosely-defined boundaries to a home range. In a two-day period, 13 cheetah of three groups used the same area, indicating how the home ranges overlap.

A female with cubs uses a smaller and more distinct home

(Contd. overleaf)



SLEEK AND FAST, a cheetah family posed for this photograph by Harshad Patel.

For this definitive  
study

RANDALL EATON

an American biologist

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# CHEETAH

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range than do other groups. Her home range is about six square miles with relatively constant boundaries.

On an "average day", one female with four cubs moves a straight-line distance of 2,250 yards from bed to bed. The actual ground distance covered is 8,500 yards for the female and 5,700 yards for the young. The female moves more due to the fact that she leaves the cubs for short periods while hunting.

A female with cubs uses a section of her home range for 2-3 days, covering the whole area in about 10 days. While in one section of her home range, she beds down in practically the same place each night. In fact, she and her cubs will walk hundreds of yards through what appears to be suitable habitat to bed down in one of these preferred spots.

Groups of cheetah have been seen passing by and aware of each other on several occasions. Where the groups were adults (of both sexes), there was no response other than simply glancing at each other.

A female with cubs, however, exhibits a definite negative response. An example is given by the occasion when three adult cheetah, two males and one female, were settling down for the evening about 250 yards from a female with four cubs.

The female and cubs had already situated themselves for the night. The female kept a close eye on the males and soon got up, called her cubs and they all moved directly away from the three cheetah.

All the while they were moving, the female kept looking back at the other cheetah. This, and the fact that other cheetah do not assist in the raising of young, implies that adult cheetah may be prone to attack young cheetah.

Urination is used as a means of marking territorial boundaries in many animals and it is frequent behaviour in male cheetah. Groups of cheetah on the move mark the same trees that they have on prior days. This marking of the same object implies that there is a boundary of sorts; however, the marking may have functions related to sexual behaviour.

When cheetah come across a marking, they spend several minutes smelling the marked area before they mark it themselves. Both sexes have been seen doing this.

Unlike lions, cheetah have no territorial system to space themselves and thereby control their own numbers; indeed, it is not known how their population size is limited.

## SOCIAL BEHAVIOUR

CHEETAH social behaviour is intermediate between leopard and lion. Lion social groups — prides — include all age and sex classes and exhibit extreme sociality. The leopard is more typical of the cat family, in that it is solitary except for a brief time during mating and while the female raises young.

Cheetah, unlike lions, do not

have such an inclusive social structure. They move together in two or three social groups; either the members are adult males, with adults of either sex, or they are family composed of a female and young.

Lions have "babysitters" — one lioness will hunt while the other watches both litters (Schaller, 1966). Cheetah females do not socialize with other adult cheetah while raising young and, in consequence, have greater problems raising their cubs. A female cheetah stays very close to her cubs while hunting by herself.

The female, when starting a stalk or waiting for game to pass within attacking distance, emits a short, low-pitched sound. The cubs respond immediately by grouping very closely together, usually sitting and watching their mother. If the female leaves the cubs for a distant stalk, the cubs remain active but attentive of the direction the female was last seen.

This alertness is in anticipation of the call given by the female when she has made a kill. The call is staccato and high-pitched and heard by the cubs as far away as 400 yards. As soon as the call is heard, the cubs dash in the female's direction.

The female teaches her cubs how to hunt. One case in particular exemplifies this point. The female and her four six-month old cubs were walking together when the female saw three warthogs (*Phacochoerus aethiopicus* Pallas) rooting on a small mound. They were facing the opposite direction from the cheetah and were 100 yards away.

The female immediately began stalking; for the first time she did not call to the cubs, but let them follow her.

At a distance of 50 yards, the female cheetah broke into a full-speed run followed by the cubs and got to within 20 yards of the warthogs before they started running. It looked like a sure kill on the young, but she passed them up and chased the adult. The cubs chased little warthogs which ran in big sweeping circles.

The female cheetah kept between the adult warthog and her own cubs, for the warthog kept trying to rejoin her young, who would have been safe if not separated from their mother.

Finally, the cub's mother left the job of sentry and followed along behind her cubs as they pursued one of the small warthogs.

The adult cheetah could have easily captured a young warthog, but instead acted as a supervisor whilst her cubs tried their skill at hunting. After a few close calls the squealing warthog ducked into a hole and the training lesson was ended.

Play is a common social behaviour among the cubs; sometimes the female joins in. Rough-housing with mother is not reprimanded; she simply avoids it by running away and lying down. Adult cheetah also show play behaviour. Most play involves chasing, and mock-fights.

In social species, group cohesion is maintained in various ways; cleaning and vocalizing are two examples. Cheetah use face-licking far too often for it to have simply

a grooming function. All cheetah exhibit face-licking towards each other, often for 15 minute periods.

A dominance order is present in adult members of a social group. Since aggression is not observed between cheetah, it is not known how certain individuals establish themselves as the leader of a group.

The leader has a big effect on the activity of other cheetah in the group. Three adults (two males and one female) had been hunting all morning without success and were lying in the shade of a *Balanites* tree during the mid-day heat.

One male spotted a female warthog with two young at a distance of 200 yards and started towards them, breaking into a slow, running gait. When the male was 50 yards from his companions in the shade, he stopped and looked back. The other male was watching, but did not see the warthogs and seemed quite uninterested in joining his male companion.

The female got up and, as she started towards the hunting male, hesitated, looking back at the shade-lying male, (whom we will call A).

She then ran towards the hunting male but, before reaching him, stopped again to look back at the male under the tree. Now, the hunting male walked back to the female and together they returned to the side of the other male, giving up their chase.

A few minutes later, male A got up and left the shade, followed by the other two cheetah. As the three moved across an open high-grass meadow, they stumbled on the same warthog family. Male A moved ahead, the other two cheetah spread out to flank him on each side and the chase began. In all cases when this same group was followed throughout the day, male A led the other two.

BY MOONLIGHT, the cheetah watches opportunities for the kill. (Photo: Harshad Patel).

Other groups of cheetah were observed to have male leaders. The leader takes on certain responsibilities for the group as a whole. He determines the game which is to be stalked, decides where the group goes and when they move. He also acts as a sentry for the others. He spends much more time, for instance, just sitting up and watching the surrounding area, while the other cheetah relax.

In many ways, the leader shows concern for his subordinates, in the same way as does a female for her cubs.

Mating behaviour has been observed only once in the Park. A female will copulate with several males and there was no aggression between three males which all copulated with the same female.

It raises the question that, if there is no breeding advantage to a dominant male, what advantages lie in being a leader?

### HUNTING BEHAVIOUR

WHY DON'T - populations of cheetah overeat their prey and die of starvation?

To answer this question it is helpful to keep in mind what Klopfer (1964) said: "The race between the adaptations of the predators for capturing prey and those of the prey for escaping a predator may be viewed as a race whose finish line is constantly moved ahead of the contestants".

The cheetah is considered the fastest land mammal, reaching clocked speeds of 70 mph. Yet a cheetah may make as many as 15 unsuccessful hunts in a two-day period. The factors influencing the success of a hunt are very complex.

When conditions are favourable, a cheetah can make a kill in one of three general ways: 1) stalking; 2) waiting for game to pass closely; and, 3) "stumbling" accidentally on to unwary prey.

Stalking, as well as running, is quite important to the cheetah's success as a predator. The most important aid to a successful stalk is the cheetah's vision.

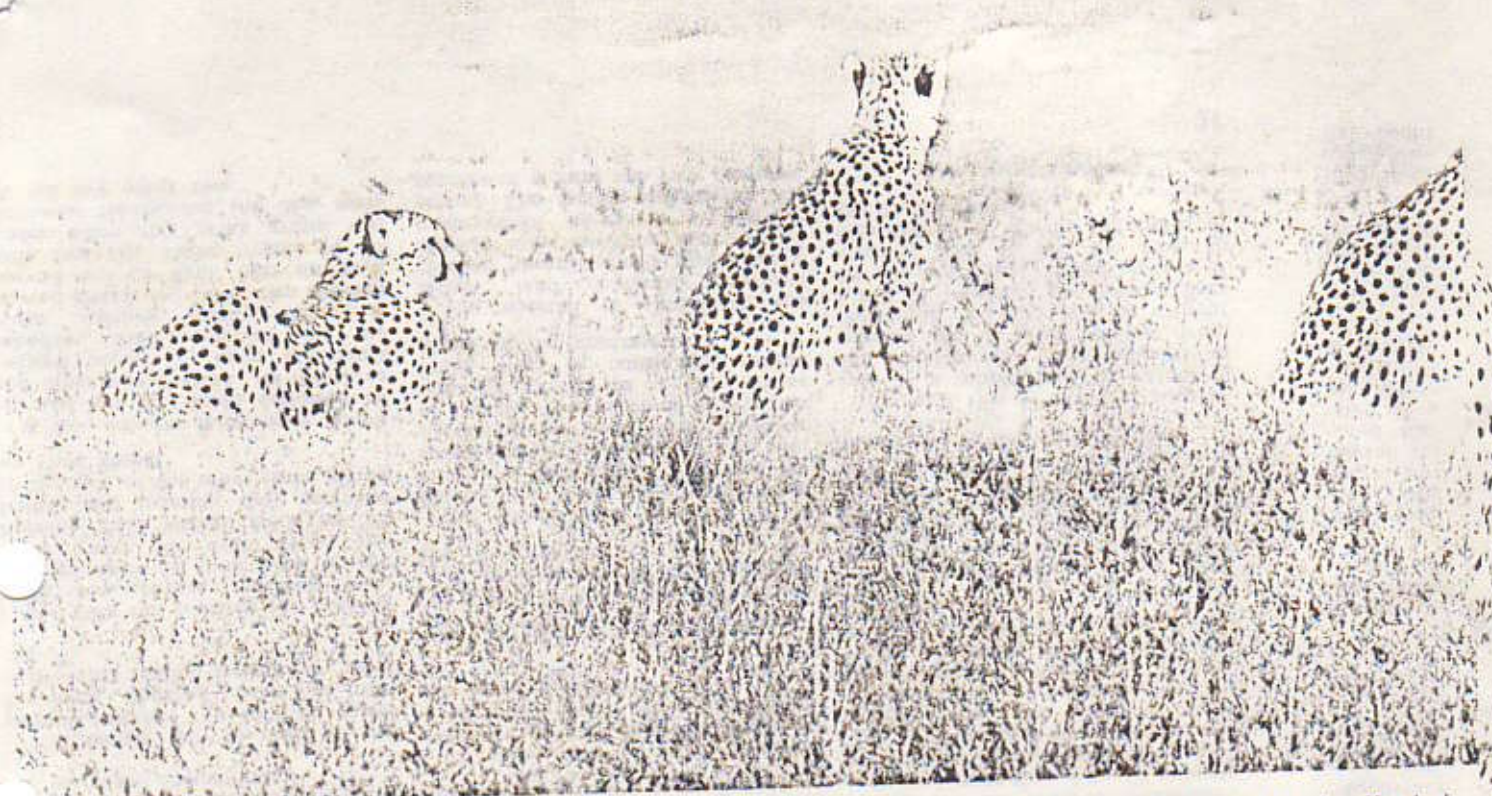
A cheetah lying flat on its belly while stalking will keep its head up so that it can watch the game closely. The cheetah's stalking success depends greatly on its ability to "judge" the game's alertness. This habit of watching the game may appear to be a hindrance, in that it makes the cheetah more visible; but, in fact, the prey do not often see the cheetah's head.

In spite of this, the cheetah is a master at playing a waiting game. If the cheetah remains motionless, it is no longer than 8 to 10 minutes before the game returns to feeding. The very moment that all eyes are turned away, the cheetah moves forward at a low-crouched pace — slow enough to allow the cheetah to stop suddenly if an animal looks up, and, if need be, play the waiting game again.

The cheetah may select a single animal in a herd for attack, on the basis of its sex, age, or condition. In cases where impala herds were stalked, cheetah have been seen to pass closely by some animals in pursuit of a particular animal.

Actually this is not too surprising. If a whole herd is attacked, the cheetah may have difficulty in picking out a single animal from the group and may end up without a kill. If, however, the cheetah fixes on an individual animal before it attacks, then it will not have to face indecision during the chaos of the herd's reaction.

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It is something similar to the terrier who shoots at the end of a flock and gets nothing but, by king off from the flock one bird at a time, has better luck.

A cheetah will pursue a group of animals at a sub-maximum speed until, when one animal separates from the herd, the cheetah chases it.

A female cheetah was stalking a mixed herd of Thomson's gazelle (*Gazella thomsoni* Gunther), zebra (*Equus burchelli* Gray), and kongoni (*Alelaphus buselaphus cokii* Gunther) when she was spotted.

Alarm calls were quickly given by all three species as each individual in the herd watched the cheetah. The cheetah, once discovered, ceased her stalk and began running slowly towards the herd which turned and sped away. When a lone Thomson's gazelle broke away from the herd, the cheetah actively chased it, giving up after 100 yards.

The attempt to separate animals from the herd is functional in that more susceptible prey animals, frequent females, diseased, weak, young, or old, may tend to break away from the herd, or cannot keep up with it. This is certainly the case with families of warthogs.

In November and December, newly-born warthogs are plentiful and cheetahs frequently attack them. The East African Wild Life Society's Cheetah Survey (1965) listed adult warthogs as prey taken by cheetah, but I am sceptical of these reports.

Attacks by as many as three adult cheetah on warthogs were observed to be successful only when the female warthog was separated from her young. Once three adult cheetah "stumbled" on to a female warthog with two young. The warthogs were surrounded and the cheetah closed in; but if a cheetah got too close, the adult warthog

*ALERT and speedy, this cheetah family — unusually large in this photograph by Harshad Patel — watches the plains as hunger grows and the chase must begin*

## CHEETAH in NAIROBI NATIONAL PARK

charged, causing the cheetah to retreat to a safer distance. The young warthogs remained underneath their mother's stomach and this saved them from predation.

Adult warthogs were never seen to be attacked by cheetah and it seems that cheetah have a rather high respect for these formidable little beasts.

An example of how a cheetah kills by "stumbling" on to game also shows the importance of how the attacked animals respond to the attacker. A large male cheetah got up casually from the shade and walked slowly towards a small thicket. About 30 yards from the thicket, the cheetah saw two young warthogs in a clearing.

He ran towards them slowly and, when 15 yards from the thicket, the small warthogs ran out of the thicket. The mother warthog was feeding 10 yards from her young and she ran in the opposite direction out of the thicket. When she observed that her young had not followed her and that they were being chased by the cheetah, she wheeled around and followed the cheetah.

After a 100-yard chase, the cheetah caught one of the young and the adult actually charged the cheetah to within 2-3 feet before rejoining its surviving offspring. If the young warthogs when surprised had run towards their parent, then it is likely that the cheetah would have had no meal.

One of the more obvious ways in which the hoofed animals cope with the constant threat of predation is the herd itself. By herding with other animals of the same or other species, each individual is better off in that he has the safety and cooperation of more eyes, alert for danger.

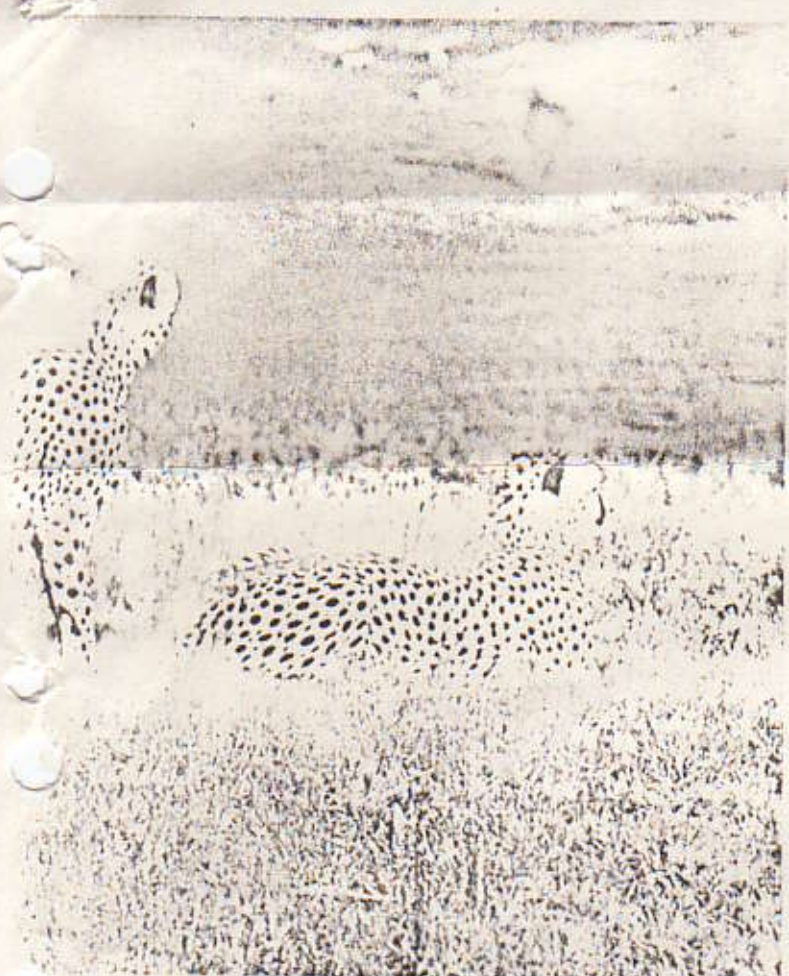
However, if the entire herd is surprised, then herding behaviour is no help, for the predator is there before the herd can get organized and escape in the right direction. Individuals, especially those which heard the alarm, but did not see where the danger was — scatter in all directions.

In several instances, the end result of a careful stalk to within close distance of a herd paid off for a cheetah.

In heavy cover, a cheetah was stalking a herd of impala 60 yards away. A female impala kept watching the cheetah and the cheetah remained motionless, or moved forward, taking one 6-inch step at a time. Five minutes passed before the impala lost interest at which time the cheetah moved nimbly towards the herd.

Since the vegetation was very dense, the cheetah could only trot for 30 yards, then ran half-speed. The herd saw the cheetah at 20 yards and scattered.

Most of the impala eventually grouped up and ran through the dense vegetation where they could



manoeuvre a cheetah. A few of the impala ran into a clearing surrounded by a mat of dense woody vegetation which virtually formed an impassable barrier. The cheetah followed the latter group and killed a young, 18-lb impala which had separated from its mother.

Standing around the cheetah and to kill were four adult female impalas, unable to see the cheetah because of high grass. The cheetah crouched at one of the impalas, only a few feet away; but without having the speed, the cheetah was helpless at such close quarters.

When cheetah start hunting, usually in the early morning, they often utilize high areas as lookouts. Groups of cheetah will spend 3-4 hours looking around an area from a high mound. They seem to prefer artificial mounds used for building in the Park, for they are higher than natural mounds and offer better visibility.

Cheetah use these mounds for hunting. From a 20 feet high mound, a female saw a reedbuck (*Redunca tuncia* Pallas) which would not have been visible in the high grass from ground level. The cheetah ran from the mound and killed the reedbuck 25 yards from where it had been lying.

The mounds are also used by cheetah when they wait for a herd to graze within striking distance. The game do not seem to look for predators above eye-level height or the horizon and consequently the earth mounds offer excellent hiding places for cheetah.

Hunting parties of cheetah also employ small natural mounds in looking for game and will climb it way up trees.

A hunting cheetah evaluates the available cover through which to stalk prey. They use depressions,

mounds, gulleys, river beds, roadsides and other objects that serve as blinds. The stalk is critical because the cheetah is good for running fast over short distances only. Most chases measured in the field are seldom more than 200 yards in length.

Predators have greater learning capacities than their prey and they learn more from experience. For this reason, predators can become specialists by learning to prey on certain species more efficiently than others. This is the case with the four-male group and kongoni. Today two of the four-male group still hunt together and kill adult kongoni successfully.

As lone hunters, cheetah try to kill young, but not adult kongoni. An attack by a female cheetah on a young kongoni accompanied by two adults was halted suddenly when the adults charged the oncoming cheetah. There is a good chance that the four males learned to take advantage of the kongoni's attempt at turning the cheetah away.

The kill records show a preponderance of impala for certain cheetah; but observations disclose that this is not a specialization. When cheetah are followed for several days, it is found that as many as seven species are attacked, but only impala are killed. If the

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cheetah were a true specialist, then it would not have bothered with hunting other species.

From the data on kills, it can be concluded that the young and the old animals are taken more often than animals in their prime by single hunting cheetah. This supports the view that the cheetah, like most predators, acts as a natural means of cutting game herds. This cropping of the less-fit animals maintains more healthy wild populations.

It is widely thought that cheetah are wasteful and that they kill whenever they feed leaving the carcass uneaten. In almost all cases observed, the carcass has no edible portions, only some of the bones, head, skin and entrails remaining.

A female with cubs fed on an adult female Grant's gazelle in the morning, and, after covering it with grass, returned later to eat the rest of the animal (Dennis Kearney, then warden, Nairobi National Park; in a personal communication).

There is a good possibility that an observer forces the cheetah off a kill and, by scaring it, prevents it from returning. The observer then accuses the cheetah of needless wastage. In Nature, competition is such that wastage is kept at a minimum and it is doubtful that the cheetah is an exception.

Hunting groups of cheetah kill larger game than do single cheetah. The largest animal killed by a single cheetah was an adult male impala, whereas the group of four males, before splitting up, killed adult zebra and wildebeeste (*Connochaetes taurinus* Burchell). Their most common prey was the smaller kongoni.

A zebra weighs, on average, some 600 lbs, wildebeeste 500 lbs, kongoni 300 lbs and impala 120 lbs. The average adult female cheetah weighs about 80 pounds, the male 100.

A cheetah requires about 1.3 pounds of meat per 10 pounds body weight per day. It may be higher for a single cheetah, which must expend more energy in hunting, or for a female which must kill more frequently to feed her cubs.

Applying these figures to Nairobi National Park, we have about 1500 lbs of cheetah, requiring 195 pounds of meat per day. Assuming that 70 per cent of a kill can be eaten and that there is little wastage, then 278 lbs of live animal must be brought down each day — that is, 102,200 lbs each year.

In one year in Nairobi Park, cheetah kill 2,271 pounds of live game per square mile. It has been estimated by Bourliere (1963) that, over a year, the average poundage of wild ungulates supported by each square mile in Nairobi National Park = 71,000 lbs.

It can be seen then that even where cheetah have their most dense population, Nairobi National Park, they still crop only a small part of the game.