

Thompson SE. 1990. Bringing up baby. Zoo Life 1(2): 57-63.

Keywords: Acinonyx jubatus/bottleneck/breeding/captivity/cheetah/disease/infertility/king cheetah/zoo

Abstract: Breeding in captivity is very difficult with cheetahs. Female cheetahs are very choosy. They won't take just any male. Scientists discovered a connection between infertility in female cheetahs and the exotic feline diet fed to many captive cats. Cheetahs are more susceptible to disease than other cats - this may be one result of an ancient genetic bottleneck. When the king cheetah was first reported in 1926, it was believed to be a cheetah-leopard hybrid. It is distinguished by its blotchy sports and dark broad stripes down its back.

Bringing Up





Baby

BY SHARON ELAINE THOMPSON



CLAYTON FOOTE

FOR CENTURIES cheetahs have been kept by man. The Egyptians may have been the first to capture and tame them. In fact, some reports say that by the Third Dynasty (about 2600 B.C.) the use of cheetahs for hunting was as popular as the use of dogs. The Europeans of the 15th century also imported the “hunting leopard” for the chase. Yet not even the Mogul emperor, Akbar the Great, who was supposed to have kept 1,000 cheetahs, could coax the big cats to breed in captivity.

Modern zoos, too, have often found that breeding cheetahs was a hit-or-miss affair. What worked one time might not work again — even for the same animals. Los Angeles Zoo Director Warren Thomas remembers a pair of cheetahs he kept at the Oklahoma City Zoo. They were perfectly content with each other and bred regularly, only the third such captive pair to do so.



DE WILDT

While breeding cheetahs is often tricky, these parents and offspring seem content. A litter usually consists of two to four young.

But the female kept aborting her cubs. Hoping to improve the situation, Thomas brought in another female. Instead of breeding, however, the newcomer upset the union between the original pair, and then none of them bred.

Only recently have breeders like Ann van Dyk, who runs the Cheetah Research and Breeding Center at De Wildt for the National Zoological Gardens of South Africa, discovered the key to cheetah-breeding behavior. Van Dyk has been breeding cheetahs successfully since 1975, and De Wildt is the only facility to produce the rare, striped king cheetah. (See inset "A Cheetah of a Different Stripe.")

Female cheetahs, it turns out, are very choosy. They won't take just any old male foisted on them. To ensure that a female finds a male she will accept as a mate, van Dyk introduces the cheetah to about six males at a time. But with cheetahs,

nothing is ever as straightforward as it seems.

When she first began working with cheetahs, van Dyk, in hopes of producing good-looking litters, used to pick out the "handsomest" males to introduce to the females. But researchers discovered that 70 percent of the sperm produced by male cheetahs is abnormal. (In other mammals, an abnormal sperm count of 20 percent is enough to cause infertility.) So the veterinarians started testing the males for fertility before they were introduced to the females. Van Dyk was dismayed to find that it was often "the scruffiest-looking males" who turned out to be the best potential breeders.

Because some level of competition stimulates the male cheetahs, infertile males are occasionally allowed access to the females during the mating period. But with the contrariness of male-female relationships, it is sometimes just such an infertile Don Juan that turns the potential mother's head. And once her choice is made, it is often difficult to convince her that another male might be more suitable.

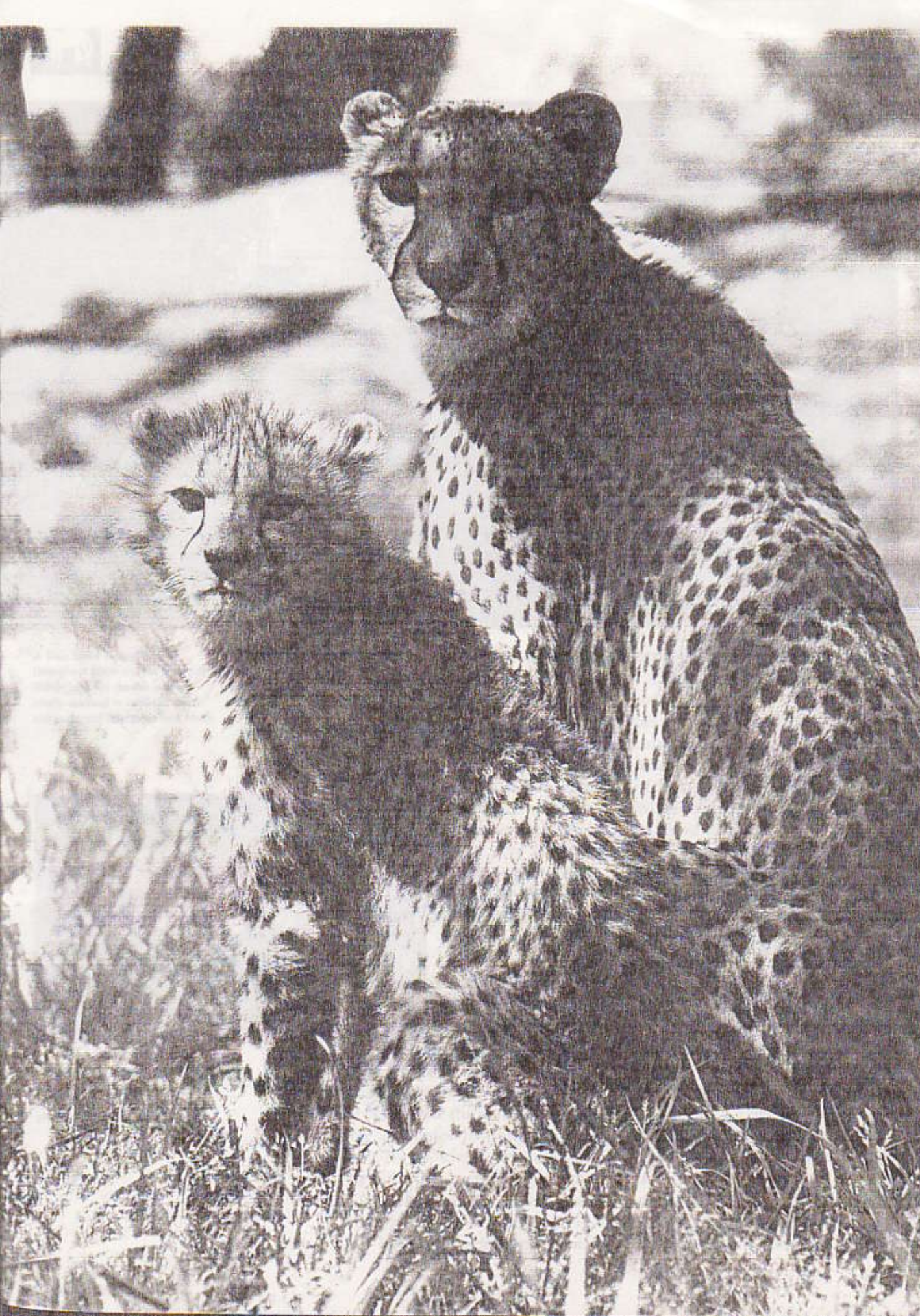
Fertility is not necessarily a constant, either. Willie Labuschagne, director of the National Zoological Gardens of South Africa, explains that the cheetahs there are tested carefully before they are sent to other zoos. Sometimes just the stress of being shipped is enough to turn a fertile male into an infertile one.

But just the opposite can happen, too. Ed Maruska, director of the Cincinnati Zoo, says that "whenever we stir things up," breeding occurs. One pair of cheetahs the zoo received from De Wildt bred within weeks of arrival.

The problem of male infertility is compounded by findings made by Betsy Dresser, director of



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▲ Once found in open country throughout Africa and the Near and Middle East, the cheetah is now mostly confined to southern Africa and parks and reserves in East Africa.

research at the Cincinnati Zoo, and consulting pathologist Sylvie Gosselin. The scientists discovered a connection between infertility in female cheetahs and the exotic feline diet fed to many captive cats. Their research shows that the soy in the cats' commercial diet contains high levels of estrogen, which affects cheetahs in the same way a birth control pill affects humans.



G. ZIEGLER / PETER ARNOULT, INC.

▲ The cheetah's long legs and muscular shoulders are built for speed; over short distances it can run down its prey at up to 60 miles per hour.

Van Dyk is faced with even more complicated concerns

when she wants to produce king cheetahs. The king gene is recessive (like the gene controlling blue eye color in humans), so to produce a king, two common cheetahs that carry the gene must mate. The breeder must find a fertile king gene-carrying male that the king gene-carrying female

approves of.

Once a pair of cheetahs has bred successfully and a litter is born, it becomes a challenge to raise and care for the cubs. Van Dyk has learned a lot since the first group of 23 cubs were born to six of De Wildt's females in 1975. All but 10 of those cubs died, and seven of them had to be hand-raised. Inept first-time mothers and enclosures that were too large (making it difficult for the staff to locate abandoned cubs) contributed to the loss. But in 1988, the situation was almost completely reversed: of 30 cubs born, 24 survived.

When hand-raised, newborn cubs must be bottle-fed every two to three hours. As they grow, their diet must be "first class." According to van Dyk, cheetahs are not as hardy as lions or leopards. Growing cubs may suffer from vitamin and mineral-deficiency diseases such as rickets or "swayback," which is caused by a lack of copper. An insufficient amount of thia-

mine may result in "fits," she says, similar to what humans might experience if they've had too much to drink. Cheetah cubs are also prone to pneumonia.

Even beyond the cub stage, cheetahs are more susceptible to disease than other cats. Stephen O'Brien, chief of the Laboratory of Viral Carcinogenesis at the National Cancer Institute, has studied the peculiarities of cheetah genetics. He thinks this may be one result of an ancient "genetic bottleneck," which results when the number of individuals in a population drops severely (often through catastrophe or disease), and the remaining animals begin to inbreed. What may happen then, he says, is "insidious." Genes begin to homogenize and the animal loses genetic diversity. In fact, according to O'Brien, cheetahs from different parts of Africa are 10 times closer genetically than human races. That lack of diversity in the cheetah is especially crucial in its ability to fight off disease.

Because all cheetahs have virtually identical genetic makeup and immune systems, the population has no second line of defense against a virus that cannot be fought off by one cat's immune system. A single disease can wipe out a significant number of animals. For example, an attack of feline infectious peritonitis (FIP) decimated one U.S. game park's population in 1982. Fifty percent of the cheetahs died. Among domestic cats — which have a high degree of genetic diversity — the number of fatalities from FIP is usually only about 5 percent.

Inbreeding is often used to produce animals with specific traits, such as a faster racehorse or a smaller dog. But, points out O'Brien, when working with limited bloodlines, such as the captive population of king chee-

tahs, there is the risk of "inbreeding depression," when normally hidden recessive genes are expressed in some kind of physiological problems. A case in point, explains L.A. Zoo's Thomas, is the inbreeding of the popular white tiger that resulted in problems such as crossed eyes, cleft palates and "abject stupidity."

But the National Zoological Gardens of South Africa, which oversees De Wildt, is not so anxious to breed kings that it will risk the genetic health of the generations to come. Says Willie Labuschagne, "We're very conscious of [the inbreeding problem]. We're very careful about the breeding."

Ed Maruska also anticipates no problems when the Cincinnati Zoo starts breeding its king cheetah. "We haven't had any problem with white tigers," says Maruska, who estimates approximately 70 white tigers have been born at the Cincinnati Zoo. "Periodically you bring in new blood. Once you get the numbers up, it's really no problem."

Until now, the National Zoo in Pretoria has not bred king cheetah to king cheetah because the animals were too closely related. However, in the summer of 1988, an abandoned king cub was found on a ranch in the Transvaal and is now at De Wildt. The people who found it "could have gotten quite a lot of money for it," says van Dyk. "But they preferred to give it to us. It means quite a lot to us. It is the first new blood."

The majestic cheetah is a pop-

ular denizen of zoo exhibits across the country. It is clear that with declining natural populations, it is irresponsible to take these beautiful cats out of the wild without a well-conceived captive management program. Despite the problems that mating, raising and maintaining cheetahs pose for zoos, however, more and more of them are accepting the challenge to protect and propagate this endangered animal. □

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GERRY ELIS/ELUS WILDFE

As wild populations decline, zoos hope to preserve this majestic species through breeding programs.

A Cheetah Of A Different Stripe

We had come a long way for an audience with the king. As we approached, he paced back and forth in the South African sunlight. Then he stalked away into a clump of scrubby trees and threw himself onto the cool ground. The audience, he seemed to say, was over.

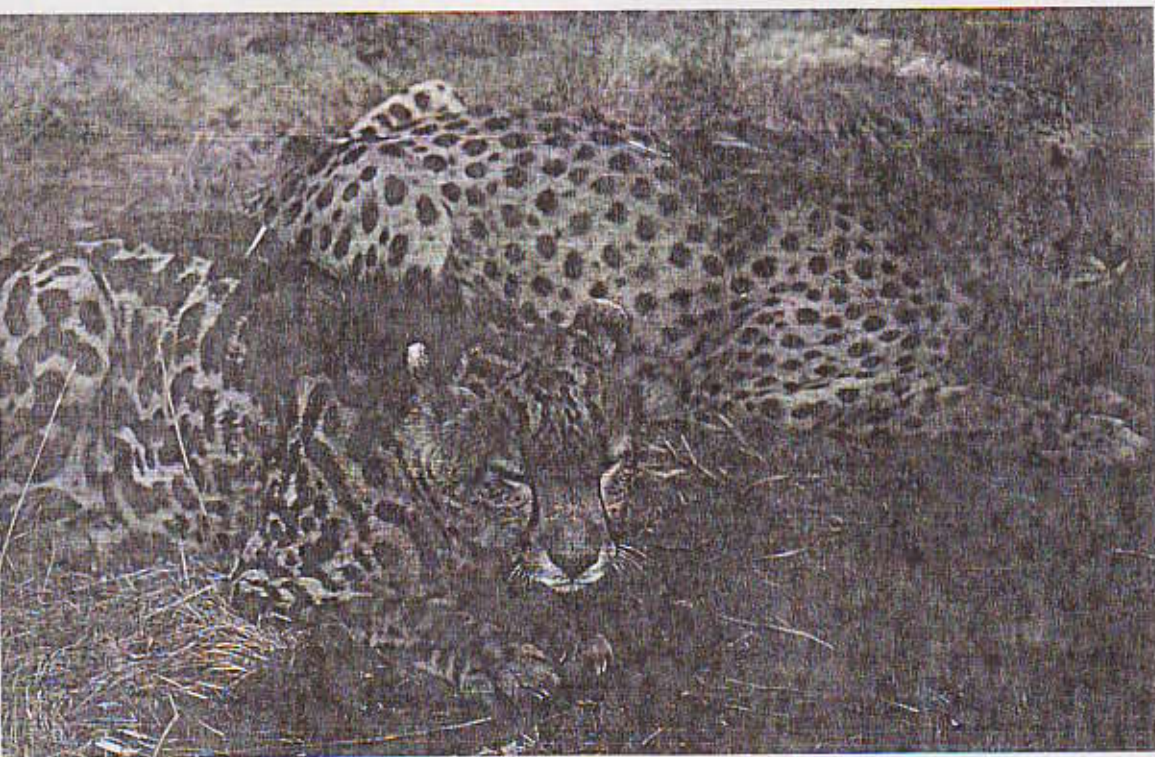
The monarch sprawled in the dust, idly twitching his tail, was a king cheetah. Instead of the familiar, brown-spotted yellow coat of the common cheetah (*Acinonyx jubatus*), the king's much longer, cream-colored coat is marked with three very dark, broad stripes that run from the nape of its neck to the base of its tail. Its sides are covered with large, irregularly shaped splotches.

When the king cheetah was first reported in 1926, it was believed to be a cheetah-leopard hybrid. But Reginald I. Pocock of the British Museum identified it instead as a new species of cheetah. He named the animal *Acinonyx rex*, the king cheetah, and called it "... without

exaggeration ... the handsomest member of the cat tribe." Today researchers agree that the king pattern is simply a color variation, like the black color variation of the spotted leopard.

During the 55 years following its discovery, the king cheetah was more legend than fact. There had been only 11 reputable sightings of the king, and 13 skins were known. So no one at the Cheetah Research and Breeding Center in De Wildt, South Africa, was thinking of kings when one was born there in the spring of 1981.

There had been sporadic reports of kings in Kruger National Park in the Transvaal region, an area that had produced some of the animals at De Wildt. But the birth of the king "was not planned at all," says Ann van Dyk, who runs the facility for the National Zoological Gardens. "It was a complete surprise." Surprise grew two days later when a pregnant female shipped from De Wildt to the zoo in Port Elizabeth, South Africa,



BALENGER/TULEY

The king cheetah (left) was once thought to be a distinct species. It is distinguished by its blotchy spots and dark broad stripes down its back. The common cheetah is seen at right.

the birth to another king. The animal was returned to De Wildt, which now has the largest population of captive king cheetahs in the world. Fourteen have been born there, and, in 1988, one abandoned cub was taken in.

King cheetahs are rare in the wild for several reasons. First, male cheetahs tend to leave their home range, taking their special genes with them. Second, the king coat pattern is based on a recessive gene. That means two animals carrying the gene must mate to produce a king cheetah. Even with a successful mating between king gene-carrying parents, there is still only a 25 percent chance a king cub will be in the litter.

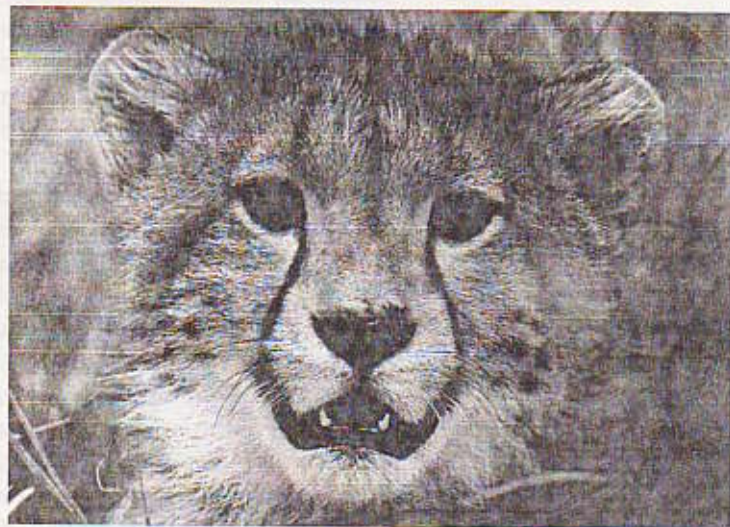
Cubs may become victims of even more unpleasant statistics. According to Willie Labuschagne, director of the National Zoological Gardens of South Africa, up to 50 percent of cheetah cubs are lost to predation in their first four months of life.

If that were not enough to cut down on wild king cheetah numbers, Dr. Tim Caro, who studied cheetahs for 10 years in the Serengeti, believes hunting plays a large part in the king's infrequent appearances. In Zimbabwe, the area known to produce the most kings, hunting, he says, "is about as legal as you can get." In addition to Zimbabwe, wild king cheetahs have been reported only in parts of Botswana and the Transvaal.

In the fall of 1988, the Cincinnati Zoo became the first facility outside of Africa to exhibit the king cheetah. It hopes that breeding will soon take place. The Los Angeles Zoo and San Diego Zoo, too, are slated to receive king cheetahs in the near future.

The dusty king cheetah lying in the South African shade looked calm and confident, as if he knew the fate of his progeny was in good hands. — S.E.T.

PLANNING FOR SURVIVAL



GERRY ELLIS/ELIAS WILDCURE

The American Association of Zoological Parks and Aquariums has set up Species Survival Plans as one way to preserve and propagate endangered animals. Under the SSPs, North American zoos and aquariums participate in the captive management of endangered or threatened species, all coordinated by the AAZPA. Species not necessarily considered endangered, but rare in captivity, or unavailable from the wild, are also covered by SSPs.

Each SSP (currently, there are 53) manages the entire population of captive animals in its care. In the best interests of the species, a committee decides when and where the animals should be moved, regardless of who owns them.

The SSP for cheetahs is managed by Jack Grisham of the Oklahoma City Zoo. Grisham and his committee are responsible for the 206 cheetahs in 38 zoos. The group keeps the breeding records for all the animals in a species studbook. The decision to move an animal, says Grisham, is usually made with breeding opportunities in mind, but SSPs must also consider the specific needs of individual zoos. In addition, SSPs try to find places for aging animals. There are approximately eight North American facilities actively breeding cheetahs, including the Columbus Zoo and San Diego's Wild Animal Park.

The committee also consults with experts from a variety of fields on all the factors that affect captive cheetahs: nutrition, behavior, reproduction, infectious diseases and genetics.

Grisham rates the cheetah as "one of my pets." But as Oklahoma City's general curator, he acknowledges, "I have to balance [my perspective]," while admitting "it's sometimes hard to remember the other areas of the zoo." — S.E.T.