

STATUS OF THE BLACK-FOOTED FERRET AND THE EFFECTS
OF CANINE DISTEMPER ON THE RECOVERY PROGRAM

Kathleen A. Fagerstone, Denver Wildlife Research Center, Bldg. 16, Denver
Federal Center, Denver, CO 80225-0226 303-236-7815

Background on Canine Distemper

Canine distemper was present in dogs in Europe during the mid-sixteenth century but little is known about the history of its presence in wildlife (Kirk 1922). Until 1955 reports of distemper were confined to domestic dogs and to captive species in fur farms or in zoological collections. It is generally assumed that all members of the Canidae and Mustelidae are susceptible to distemper, but an acceptable diagnosis is lacking for many species. Distemper in the dog is a worldwide problem; in wildlife canine distemper probably occurs in most temperate zones.

Distemper is caused by an antigenic type virus (Ott 1966) known as the virus of Carre (Carre 1905) in the genus Morbillivirus (Andrews et al. 1978). Transmission is by aerosol or direct contact. Nasal and conjunctival exudates, urine, and feces contain virus and domestic ferrets have been shown to shed distemper virus in nasal exudate from 5 to 46 days postinfection. Airborne infection has occurred over 1.5 m in domestic ferrets. Bloodsucking arthropods have also been suggested as vectors of the virus.

The Black-footed and the Influence of Canine Distemper

The black-footed ferret (Mustela nigripes) is the rarest mammal in North America. It is a member of the mustelid family, a family that includes martens, weasels, wolverines, badgers, skunks, and otters. It is closely related to the domestic ferret (M. putorius furo). The black-footed ferret has been infrequently seen since its discovery in 1851. Early observers disagreed about its historical abundance, with some writers reporting it as fairly common and others reporting it as rare. The original range of the ferret corresponded closely to the range of the prairie dog, occurring from Canada south to Mexico and from the Great Plains of Kansas and Nebraska west to mountain valleys of Wyoming, Utah, and Arizona. The ferret is closely associated with prairie dog colonies, depending on prairie dogs for food and on prairie dog burrows for shelter and for rearing its young. The current range of the black-footed ferret is unknown but is much smaller than its original range. Because ferrets are dependent on prairie dogs, the decline in ferret populations may be related to the decline in prairie dog populations that occurred because of changes in land use patterns and because of widespread poisoning programs. Prairie dogs have been considered pests since the settlement of the Great Plains because they sometimes eat farmer's crops and may compete with cattle for rangeland grasses. In consequence, a program of poisoning was begun during the early 1900's that greatly reduced prairie dog populations. In the late 1800's prairie dogs occupied approximately 700 million acres. By 1920 acreages were reduced to only 100 million acres and by 1971, to 1.5 million acres.

A small remnant population of ferrets was studied in South Dakota between 1964 and 1974. From this population 2 male and 4 female black-footed ferrets were captured in 1971 to establish a breeding colony. Each was vaccinated with 2 ml of a chicken embryo-tissue culture-origin canine distemper virus (CDV) vaccine previously used on domestic ferrets without any deleterious effects. Within 21 days after vaccination, all 4 females developed clinical signs of CDV infection and died. The 2 males did not develop signs of disease and probably had developed immunity before capture. Tests indicated insufficient attenuation of the vaccine for this species. Despite capture of other animals, the captive breeding program was unsuccessful and the South Dakota population disappeared in 1974.

In 1981, another ferret population was discovered in northwestern Wyoming near the town of Meeteetse. Surveys of the population located 59 animals (21 adults and 38 young in 12 litters) in 1982, and 88 animals (28 adults and 60 young in 18 litters) in 1983. In 1984, the population reached its maximum number, with 129 individuals observed (43 adults and 86 young in 25 litters). Each year, captured ferrets were vaccinated with a killed canine distemper vaccine (Thorne et al. 1985). Research from 1981 to 1985 provided data on life history, population dynamics, food and habitat requirements, and behavior. The results have been used to develop ferret survey methods and recovery strategies.

The Wyoming population declined drastically during 1985, when only 58 individual ferrets were observed (20 adults and 38 young in 13 litters), a decline of 55% from 1984. A portion of this decline can be attributed to the fact that sylvatic plague was present in the prairie dog population in

1985; 22% of the area occupied by prairie dogs during 1984 was inactive in 1985, thus eliminating that portion of the ferret's food source. During July and August 1985 prairie dog burrows on 75% of the 4300 acres occupied by prairie dogs were dusted with carbaryl to kill the plague flea vector and the spread of plague was halted for that year. However, the ferret population had declined to 31 individuals by September and several litters had disappeared.

During October, 6 ferrets were taken into captivity to provide the nucleus for a captive breeding population. By late October, canine distemper (a disease that is almost always fatal to ferrets) was diagnosed in two of the captive animals, both of which had probably contracted the disease in the wild. Some of the ferrets had been vaccinated in the field with the killed CDV but it failed to provide lasting immunity. Because the ferrets were not quarantined, all 6 eventually died. During the early course of their illness, affected black-footed ferrets manifested anorexia, depression, and ocular and nasal discharge, with subsequent development of erythema and scurfiness of the skin. Increased body temperatures, diarrhea, and dyspnea followed. In late stages, dehydration, subnormal temperature, hyperkeratosis of the foot pads and neurologic disorders occurred. The ferrets died within 1 to 2 days after the onset of central nervous system signs (Carpenter et al. 1976).

How was the canine distemper virus introduced into the black-footed ferret population? There is some speculation that canine distemper was introduced by humans during the plague control project. However, care was taken to prevent contact with dogs by the dusters; also, when ferrets were trapped by researchers, hands were sanitized with chlorhexidine scrub and

a viricidal disinfectant and face masks were worn (Thorne et al. 1985). It is more likely that canine distemper was introduced into the ferret population by domestic dogs (owned by ranchers or oil workers) or by other wildlife. Raccoons, badgers, coyotes, and skunks have been shown to carry the canine distemper virus (Budd 1981) and these predators are all common in the Wyoming area.

Another 6 animals captured late in 1985 and individually quarantined all survived. Breeding efforts for the captive black-footed ferrets began in February 1986 without success. Spotlighting surveys conducted in July and August 1986 located a total of 15 ferrets in the wild (two adult females with litters of five young each, one adult male, and two unidentified adults). The decision was made in 1986 to bring all the wild ferrets into captivity to increase the genetic diversity of the captive breeding program.

If the ferrets can be bred successfully in captivity, the greater longevity, lowered mortality, and longer reproductive life should optimize the number of young each female can produce. Eventually, transplants back into the wild are planned. A new vaccine was developed last year that more effectively imparts long-term resistance to canine distemper. However, in a wild population it will be very difficult to vaccinate all individuals.

Literature Cited

- Andrews, C., Pereira, H. G., and Wildy, P. Viruses of vertebrates. London: Bailliere, Tindall, 1978.
- Budd, J. 1981. Distemper. Pages 31-44 In Chapter 3. Infectious diseases of wild mammals, 2nd Ed. J. W. Davis, L. H. Karstad, and D. O. Trainer, Eds. Iowa State Univ. Press, Ames.

- Carpenter, J. W., M. J. G. Appel, R. C. Erickson, and M. N. Novicca. 1976. Fatal vaccine-induced canine distemper virus infection in black-footed ferrets. *J. Amer. Vet. Med. Assoc.* 169:961-964.
- Carre, H. 1905. Sur la maladie des jeunes chiens. *C. R. Acad. Sci.* 140:689, 1489. Cited by J. Budd, 1981, Chapter 3: Distemper. In *Infectious diseases of wild mammals*, 2nd Ed. J. W. Davis, L. H. Karstad, and D. O. Trainer, Eds. Iowa State Univ. Press, Ames.
- Kirk, H. *Canine distemper: Its complications sequelae and treatment.* London: Bailliere, Tyndall and Cox, 1922.
- Ott, R. L. 1966. Introduction to the symposium on canine distemper immunization. *J. Am. Vet. Med. Assoc.* 149:607.
- Thorne, E. T., M. H. Schroeder, S. C. Forrest, T. M. Campbell III, L. Richardson, D. Biggins, L. R. Hanebury, D. Belitsky, and E. S. Williams. 1985. Capture, immobilization, and care of black-footed ferrets for research. Pages 9.1-9.8 In Proc. black-footed ferret workshop, Sept. 18-19, 1984, Laramie, WY.

