THE ROLE OF ZOO VETERINARIANS IN CAPTIVE CONSERVATION PROGRAMS

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Introduction

As recently as 1982, author Robert Bendiner noted that "Until the last decade, a resident veterinarian was the rarest animal to be found at the zoo."[1] Fortunately, that situation has changed and increasing numbers of trained zoo veterinarians have played a growing role in the conservation of threatened and endangered species. Although still vital functions of veterinary medicine in the zoo, the treatment of individuals and attention to catastrophic epidemics (eg, rhinotracheitis in nondomestic felids) has been supplemented with a renewed emphasis on herd health concepts applied on a national basis. The growth of Species Survival Plans (SSPs) and other Regional Species Conservation Plans (RSCPs) offers zoo veterinarians a remarkable opportunity to participate in the broader issues of disease and population management.

As these changes take place within the zoo community, the continued destruction of wild habitats results in dramatic declines in many wild populations. The effect of these changes is to bring the management of many small populations, whether they be captive or wild, closer together. For some species, eg, the black-footed ferret (*Mustela nigripes)*, the California condor *(Gymnogyps californianus)*, the Arabian oryx *(Oryx leucoryx)*, captive breeding has resulted in their survival. For others, such as the addax *(Addax nasomaculatus)* and the golden lion tamarin *(Leontopithecus rosalia)*, captive groups now make up a significant portion of the total population. However, the ultimate reality of species conservation lies beyond the border of any institution. The finite resources of zoological parks in a seemingly infinite world of endangerment prevent zoos from becoming "arks" for all (it has been estimated that zoological parks could manage 2000 vertebrate species).[6,9] In reality, they may offer "lifeboats" to selected species that represent the tip of the sinking iceberg of diversity. Given those limited resources, it is critical that zoo veterinarians maintain their focus on the larger conservation picture that includes education and research, captive breeding and field conservation. Regional Species Conservation Plans offer a vitally important avenue for such opportunities.

Regional Conservation Management Plans

For captive conservation plans to work on a numerical, epidemiological, and genetic basis, it is necessary to manage numbers larger than the individuals of a species housed at any single institution. The level of cooperation necessary to achieve such an effort requires a heretofore unachieved level of coordination. In North America, the organization challenge resulted in the American Association of Zoological Parks and Aquariums' (AAZPA) establishment of Species Survival Plans (SSPs). These plans, now over 65 in number, manage North American populations as a region. They are the forerunners of similar plans established by zoological associations in Europe, Australia/New Zealand, India, Africa and South America – each area represented by an alphabet soup of appropriate initials. The term Regional Species Conservation Plans (RSCPs) is a generic term for them all.

The next step in this effort is the international coordination of the regional plans. Currently, they are supervised by the Captive Breeding Specialist Group (CBSG), a 300 + member committee of the World Conservation Union (formerly, the IUCN). Part of the Species Survival Commission of the WCU, the CBSG focuses its efforts on species in which captive conservation efforts are deemed promising. The "mechanics," eg, the identification and location of animals, is aided by another international organization, the International Species Inventory System (ISIS).

Although this report will focus on Species Survival Plans of the AAZPA, the principles are equally applicable to most RSCPs. SSPs are established under the auspices of the Wildlife Conservation and Management Committee (WCMC) of the AAZPA and derive their authority from that organization. Each SSP Committee is chaired by a Species Coordinator and members are elected from institutions holding the species in question. The Chair may appoint Advisors to the Committee as needed. Often, expertise in

nutrition, reproduction, and medicine is solicited, and as Veterinary Advisors to these groups, herein lies one of the best opportunities for zoo veterinarians to contribute to the population management of a species.

With this opportunity comes all the problems associated with the medical management of small populations. Whether captive or wild, they offer unique challenges for veterinarians. O'Brien *et. al.* Have noted that the deleterious effects of inbreeding include the potential for altered resistance to disease.[8] Dr. Linda Munson has succinctly noted that disease could prove to be a greater modifier of small populations in the future than the past because of greater habitat and genetic restrictions.[7] The high morbidity of corona-viral infections in cheetahs *(Acinonyx jubatus)* may illustrate such a situation.[2] It is a disease that may be aggravated by the species genetic homogeneity and like many other diseases, complicates the movement of animals between institutions for breeding purposes. In addressing these problems, the Cheetah SSP Committee has been a leader in applying an interdisciplinary approach: its research advisory group includes a nutritionist, a geneticist, clinical veterinarian, veterinary pathologist, reproductive physiologist and a behavioralist.

In the role of SSP Advisor, veterinarians have unique opportunities to serve as a central "clearing house" for medical information pertaining for a species. Obviously, causes for mortality and determining their epidemiology are vital statistics. The medical status of the black rhinoceros *(Diceros bicornis)* in the early 1980s illustrates the point. Isolated cases of hemolytic anemia had been noted, but review of the captive black rhinoceros populations and correlation of the data identified a syndrome that was the leading cause of death in captivity. Further review of the data linked isolated cases of fungal pneumonia, encephalomalacia and oral/skin ulcers into more readily recognized syndromes that could be addressed by focussed research efforts. Such correlations would have been difficult, if not impossible, to make without a central review of medical information.

Beyond the identification of disease, Veterinary Advisors are central to the determination of its etiology and prevention. Veterinary Advisors should review preventive medicine measures, eg, vaccination, nutrition, management protocols, for a species and develop a preventive medicine program. In studying causes for disease, the recommendation of uniform testing standards, identifying clinical research needs, and establishing research projects are all vital. Often these lead to tissue collection protocols, and ideally, creation of central storage facilities for biological products of the species; all activities that can be coordinated by a Veterinary Advisor.

Preventive medicine is also the emphasis as some captive populations are being prepared for return to the wild. Preventive measures must be designed to prevent the spread of disease concomitant with the translocation (the same is true when wild animals are brought into captivity, or wild animals are translocated between habitats). As golden lion tamarins return to Brazil the problems of infectious disease and genetic defects must be addressed. In others, the issues may be more mundane, but no less important, eg, it is critical that Arabian oryx returning to the Middle East be free of tuberculosis. Again, the information generated by Veterinary Advisors can be critical reference regarding the prevalence of disease in captivity.

The need for Veterinary Advisors continues to grow, indeed one source suggests that 240 advisors will be needed by the year 2000 (presently there are approximately 100 full-time zoo veterinarians).[3] Noting the increasing role of Veterinary Advisors to the SSPs, the Animal Health Committee of the AAZPA, in cooperation with the Infectious Disease Committee of the American Association of Zoo Veterinarians and a working group of the Disease and Reintroduction Conference held in 1992 in Oakland, California, has taken steps to describe the roles and responsibilities of Veterinary Advisors. A copy of that document is appended to this report. It is hoped that these guidelines will serve not only as guidance to those already serving in advisory roles, but also encourage SSP Chairs to appoint a Veterinary Advisor to each Committee. Additionally, an advisory group to the Animal Health Committee is being formed is being organized to identify and address ongoing issues that face Veterinary Advisors in SSPs and other regional conservation plans.

Summary

As the wild grows smaller and zoological institutions expand their horizons, the line between the wild and captivity grows more indistinct. The status of the black rhinoceros in Kenya illustrates the point. Black rhinoceros populations in large, open and poorly protected parks have been poached to near extinction, and the stable, surviving populations are housed in smaller, fenced and protected parks and ranches containing from 15-100 animals.[5] Perhaps a quote discussing elephant populations best summarizes the situation for many species, "The distribution of human and elephant populations has changed from one characterized by human islands in a sea of elephants to increasingly small islands of elephants in a sea of prople."[4] In reality, whether it be the fencing around the rhinoceroses, or the sea of people around the elephants, the number of small populations and the significance of their management continues to grow. Thus the line between the historical approaches to "zoo" and "wildlife" medicine and also blurring, as disease, nutrition, genetic and reproductive studies in zoological institutions and in the field become increasingly interchangeable. Active, thoughtful participation in Species Survival Plans and other RSCPs is one way zoo veterinarians can play a vital role in this larger mosaic of species preservation.

LITERATURE CITED

1. Bendiner, R. 1982. The fall of the wild and the rise of the zoo. E.P. Dutton Co., New York, New York: P.100.
2. Evermann, J.E., M.E. Roelke, and M.B. Briggs. 1986. Feline coronavirus infection of cheetahs. Fel. Prac. 16: 21-30.
3. Hutchins, M., T. Foose, and U.S. Seal. 1991. The role of veterinary medicine in endangered species conservation. J. Zoo Wildl. Med. 22: 277-281.
4. Huxley, E., H. van Lawick. 1984. *Last Days in Eden.* Amaryllis Press, New York, New York: P. 181.
5. Miller, R.E. 1987. Black rhinoceros conservation in Kenya-a field SSP? Proc. Am. Assoc. Zool. Parks and Aquar.: Pp 537-543.
6. Miller R.E. Zoo Veterinarians – doctors on the ark? 1992. J. Am. Vet. Med. Assoc. 200: 642-647.
7. Munson, L.L. 1991. Strategies for integrating pathology into single species conservation programs. J. Zoo Wildl. Med. 22: 165-168.
8. O'Brien, S.J., M. E. Roelke, and L. Marker. 1985. Genetic basis for species vulnerability in the cheetah. Science 227: 1428-1434.
9. Soule, M., W. Conway. 1986. The millennium ark: how long a voyage, how many staterooms, how many passengers. Zoo Biol. 5:101-113.

GUIDELINES FOR VETERINARY ADVISORS TO REGIONAL CONSERVATION PLANS

As the role of Regional Conservation Management Plans (RCMPs) for species continues to grow, it is vital that veterinary input be standardized for the health of these protected species. At the preset time, many of the North American Species Survival Plans (SSP) Coordinators have appointed Veterinary Advisors (see attached list); ideally each RCMP will identify a source of veterinary input and advice (in this report, SSP will be used, but the suggestions also apply to TAGs and FIGs). However, it is also advisable that the role of veterinary advisor be established and clarified via reasonable guidelines. The benefit of such direction would be two-fold: 1) it offers the SSP Coordinator a reasonable expectation of the role of a Veterinary Advisor, and 2) it would supply the Veterinary Advisor with an outline of basic standards that should be met, regardless of the species involved. It is hoped that AAZPA's Animal Health Committee could submit such proposed guidelines to its Wildlife Conservatin and Management Committee (WCMC) for their consideration and inclusion in SSP protocols.

Commitment and Responsibilities of Veterinary Advisors

To Regional Conservation Management Plans

1. Institutional commitment: Each Regional Species Conservation Plan (RCMP) should designate a Veterinary Advisor for each species or taxa being intensively managed. The Veterinary Advisor should serve as a full member of the RCMP Committee and any reintroduction committees. The Veterinary Advisor must have a letter of commitment from his or her institutional employer supporting the nomination and approving the commitment to the RCMP.

2. Responsibilities of the Veterinary Advisor:

   A. Identify major medical problems in the species/taxa and pursue methods of diagnostic evaluation, treatment and prevention. Data collection, and diagnostic and treatment methods for particular disease problems should be coordinated through regional zoo and wildlife infectious disease committees.

   B. Identify scientific specialists in the areas affecting the health and well-being of the species and where possible, aid in the coordination of their efforts.

   C. Customize the quarantine, movement, reporting, preventive medicine, accounting and necropsy protocols so they best suit the species in question. These data should be made readily available to the SSP Committee and holding institutions.

   D. Facilitate centralized sera and tissue banking.

   E. Propose testing requirements and recommendation for the prevention of disease transmission during interzoo movements as well as the reintroduction of species.

   F. Provide regular reports (at least annual) to the RCMP Committee as well as the regional veterinary coordinator. These should include:

- summary of deaths and their causes
- description of significant illnesses (morbidity report)
- results and availability of significant diagnostic tests
- other significant medical activities

G. The Veterinary Advisor should review proposed research protocols and methods that pertain to his/her species and advise the RCMP Committee on the value and health risks posed by such proposals.

H. Advise the RCMP Committee on animal welfare as it pertains to movement, reintroduction, and/or breeding.

I. The Veterinary Advisor should cooperate closely with a nutritional specialist to encourage the use of a scientifically based system of dietary husbandry for captive animals.