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**REINTRODUCTION OF ENDANGERED ANIMALS**

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Reintroduction programs of endangered species require a tremendous investment of time, effort and finances to properly manage captive breeding, conditions and habitat for release, and to provide adequate evaluation of the reintroduction. Guidelines for effective reintroduction programs have been outlined by the International Union for Conservation of Nature (IUCN) and Association of Zoos and Aquariums (AZA). Studies focusing on the post-release causes of mortality of captive-bred animals have been published for many species. Equally important, though rarely reported, are the results of pre-release veterinary management considerations, despite the fact that successful release is contingent on the establishment of a healthy population.

The Whooping Crane Eastern Partnership (WCEP) in the USA has generated a considerable amount of data and organizational information related to the production of a population of healthy whooping cranes (Grus americana) suitable for release and migration. In many ways, the program employs a form of adaptive management, by striving to collect and integrate health data within a framework of preventive medicine and improved husbandry from year to year. The goals of the program have been to produce a population of properly imprinted birds, prevent pathogen transfer from the captive cranes to wild animals, and increase individual crane fitness and survival to release and beyond. Our paper reviews the components of this health management program as practiced by the International Crane Foundation (ICF, Baraboo, Wisconsin, USA).
Between 2005 and 2010, 63 (27 male, 36 female) captive-bred, costume-reared whooping cranes were hatched at ICF for reintroduction. The birds were transferred after 5 weeks to pens at the release site, and then released at four months of age.

Complete physical examinations of chicks were performed by a veterinarian at scheduled intervals. Physical examinations, fecal parasite testing, blood collection for infectious disease screening, heavy metal blood level testing, routine hematology, biochemistry and serum banking were scheduled for approximately one week prior to shipment to the release site and 30 days prior to release. Chicks with clinical signs of illness or injury were given physical examinations as needed. Prophylactic vaccination for West Nile virus (flavivirus) and eastern equine encephalomyelitis (alphavirus), as well as routine deworming, were used to prevent notable diseases. The cranes were also fed a coccidiostat-treated feed. Chicks were radiographed for the presence of metallic gastrointestinal foreign bodies one week prior to transfer to the release site. Whole blood treated with lithium heparin was submitted to determine concentration of blood zinc and lead. Infectious disease screening included serological testing for infectious bursal disease virus serotype 2 (birnavirus), inclusion body disease of cranes (herpesvirus), avian influenza (orthomyxovirus) and Newcastle disease (paramyxovirus), and cloacal swabs for bacterial isolation. Cranes that died prior to or following release were necropsied following procedures outlined in Cole et al.

Bacterial culture findings were limited to subclinical campylobacteriosis detected on routine fecal screening and a single positive Salmonella culture. In addition, bacterial disease did not appear to be a primary factor in the deaths of whooping cranes after release.

Seven whooping crane chicks died or were euthanized before three months of age as a result of respiratory aspergillosis. Similar problems have been noted in other avian captive propagation programs such as for the California condor (Gymnogyps californianus), and New Zealand stitchbird (Notiomystis cincta). Aspergillus sp. are ubiquitous environmental organisms, and infections are usually opportunistic. We believe the cases have resulted less from an overwhelming exposure to fungal contaminants than from a combination of multiple stressors and smaller exposures.

Musculoskeletal problems were the exclusive reason for removal of five birds from the program prior to release. These birds had conditions which were thought to preclude normal ambulation and foraging behavior. As a result, these animals were placed in zoological institutions to serve as education and/or breeding stock.

Tracking of the cranes following release confirmed that predation and trauma from collision with power lines and gunshot appear to be the most common cause of death in this population. This is consistent with previously published data on released whooping cranes. Power line collisions are also important causes of mortality in other migratory species. There have been promising developments related to reducing power line collisions by sandhill cranes, which may be applicable to whooping cranes. Gunshot trauma of cranes, whether the result of malicious or accidental involvement, warrants consideration of improved hunter awareness and education in regions of whooping crane migration. Crane injury and death by trauma appears to be independent of health status as no underlying medical conditions have been found in birds killed in powerline,
gunshot or predation incidents.

Surveys of reintroduction programs in the early 1990s revealed that less than half of the programs had veterinary involvement in medical screening or examination of the animals prior to release. The whooping crane program has followed the principles laid out in these guidelines and represents a positive case study for endangered animal reintroduction management in the future.

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References