

QUARANTINE PROCEDURES FOR AZA-ACCREDITED ZOOLOGICAL PARKS

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Quarantine is a basic component of preventive medicine programs in zoological parks. It is a fundamental step in the prevention of the spread of disease into an animal collection. Indeed, the word quarantine reflects that fact - it is derived from the Latin word for "forty." For, in medieval Venice, 40 days was the length of time that human immigrants were kept separate from the general population to limit the spread of plague. Although the prevention of disease is primary, quarantine also offers an opportunity to establish the baseline health status of new arrivals. The principles that apply to quarantine for interzoo and wild-to-zoo animal transfers, are also crucial for zoo animals moving to the wild in reintroduction projects, and may also apply to animal transfers between different wildlife areas.

Recognizing the importance of quarantine, in 1989 the American Zoo and Aquarium Association (AZA) requested that its Animal Health Committee (AHC) draft a written protocol that would be included as part of its requirements for accreditation. The protocol was completed in 1993 and adopted by the AZA Board in 1994. It represents the first specific, written standards that were incorporated into the accreditation process,

The original quarantine requirements covered terrestrial mammals, birds, reptiles and amphibians. Writing the regulations was the group effort of AHC members and numerous members of the zoological community. Separate sections were later added for marine mammals, an effort spearheaded by Dr. James McBain, and fish, written and submitted by members of the aquarist community. One challenge of the original process was attempting to create regulations that were meaningful and detailed, yet allowed the institutional veterinarian flexibility to use his/her judgement when exceptions might be advisable.

Additionally, the regulations had to reflect the reasonable realities of our institutions; for example, in the near future, not all zoological parks may have the ability to quarantine an adult elephant or an adult giraffe. However, pre-shipment testing and other procedures may assist in reducing the risk of disease transfer from those animals. A similar effort was the quarantine of great apes. Recognizing the limitations of some smaller institutions, the regulations allow for the isolation of a primate at either the shipping institution (if shipped without contact with other nonhuman primates) or at an AALAS approved institution.

These quarantine regulations have also been of value in assisting the AZA's pursuit of exemptions from disease testing when animals are transferred between AZA-accredited institutions. One example is the exemption from federal requirements for cervid tuberculosis testing. The AZA noted and the USDA accepted the fact that AZA-accredited zoos 1) identify and keep individual records on animals (critical to tracing them), 2) they have animal health programs, including quarantine of new arrivals, in place, and 3) all deaths are necropsied by a veterinarian. These exemptions are advantageous for AZA institutions and they behoove the zoological community to strictly monitor its own performance to both maintain our standards and not endanger these exemptions.

Finally, it is important to note that the regulations were written to be minimum standards and those that wish to exceed them are encouraged to do so. Following are the regulations as adopted by the AZA and now required for accreditation:

Quarantine procedures recommended for AZA-accredited institutions

Quarantine Facility: A separate quarantine facility, with the ability to accommodate mammals, birds, reptiles, amphibians and fish should exist. If a specific quarantine facility is not present, then newly acquired animals should be isolated from the established collection in such a manner as to prohibit physical contact, to prevent fomite transmission, and to avoid aerosol and drainage contamination. Such separation should be obligatory for primates, small mammals, birds, and reptiles, and attempted wherever possible with larger mammals such as large ungulates and carnivores, marine mammals and cetaceans. If the receiving institution lacks appropriate facilities for isolation of large primates, preshipment quarantine at an AAZPA or AALAS accredited institution may be applied to the receiving institution's protocol. In such a case, shipment must take place in isolation from other primates. More stringent local, state or federal regulations take precedence over the recommendations of this report.

Quarantine Length: Quarantine for all species should be under the supervision of a veterinarian and consist of a minimum of 30 days (unless otherwise directed by the staff veterinarian). **Mammals:** If during the 30 day quarantine period, additional mammals of the same order are introduced into a designated quarantine area, the 30 day period must begin again. **Birds, reptiles, amphibians or fish:** The 30 day quarantine period must be closed for each of the above Classes. Therefore, the addition of any new birds into a bird quarantine areas requires that the 30 day quarantine period begin again on the date of the addition of the new birds. The same applies for reptiles, amphibians and fish.

Quarantine Personnel: A keeper should be designated to care only for quarantined animals or a keeper should attend quarantined animals only after fulfilling responsibilities for resident species. Equipment used to feed and clean animals in quarantine should be used only with these animals. If this is not possible, then equipment must be cleaned with an appropriate disinfectant (as designated by the veterinarian supervising quarantine) before use with post-quarantine animals.

Institutions must take precautions to minimize the risk of exposure of animal personnel to zoonotic diseases that may be present in newly acquired animals. These precautions should include the use of disinfectant foot baths, wearing of appropriate protective clothing and masks in some cases, and minimizing physical exposure in some species, e.g., with primates, by the use of chemical rather than physical restraint. A tuberculin testing/surveillance program must be established for zoo/aquarium employees in order to ensure the health of both the employees and the animal collection.

Quarantine Protocol: During this period, certain prophylactic measures should be instituted. Individual fecal samples or representative samples from large numbers of individuals housed in a limited area (e.g., birds of the same species in an aviary or frogs in a terrarium) should be collected at least twice and examined for gastrointestinal parasites. Parasiticide treatment should be prescribed by the attending veterinarian. Ideally, release from quarantine should be dependent upon obtaining two negative fecal results spaced a minimum of two weeks apart either initially or after parasiticide treatment. In addition, all animals should be evaluated for ectoparasites and treated accordingly.

Vaccinations should be updated as appropriate for each species. If the animal arrives without a vaccination history, it should be treated as an immunologically naive animal, and given an appropriate series of vaccinations. Whenever possible, blood should be collected and sera banked. Either a -70 degree C freezer or a -20 degree C freezer that is not frost-free should be available to save sera. Such sera could provide an important resource for retrospective disease evaluation.

The quarantine period also represents an opportunity to, where possible, permanently identify all unmarked animals when anesthetized or restrained (e.g., tattoo, ear notch, ear tag, etc.). Also, whenever animals are restrained or immobilized a complete physical, including a dental examination, should be performed.

Complete medical records should be kept and available for all animals during the quarantine period. Animals that die during quarantine should have a necropsy performed under the supervision of a veterinarian and representative tissues submitted for histopathologic examination.

Quarantine Procedures: The following are recommendations and suggestions for appropriate quarantine procedures for several animal groups:

MAMMALS

Primates

<u>Required</u>	<u>Strongly Recommended</u>
1. Direct and flotation fecals as described above.	1. chest radiographs
2. A minimum of 2 negative tuberculin tests using a tuberculin containing least 1500 units/. 1ml (e.g., Mammalian Human Isolate, Coopers Animal Health, Kansas City, KS) or other appropriate regimen as necessary for the species in question (eg, orangutans, New World primates, etc.).	2. Appropriate viral panels (SIV, retrovirus type D)
3	3. Urinalysis
4	4. CBC/sera chemistry panel
	4. Culture of feces for <i>Salmonellai/Shigella/ Campylobacter</i>
5	5. For appropriate species; eg, Old World monkeys, serology for <i>Herpesvirus simiae</i> (Herpes B).

Hoofstock

1. Direct and floatation fecals
2. TB test whenever possible
1. CBC/sera profile
2. Appropriate serology, eg, leptospirosis, brucellosis, MCF, IBR, BVD, etc. Paired titers whenever possible.
3. Urinalysis
4. Johnes diagnostics if history of disease in herd of origin.
5. Coggins test for equids.
6. Vaccinate as appropriate (See Zoo and Wild Animal Medicine, ME Fowler, WB Saunders Co., Philadelphia, 1986, pp 884-1036.)

Small Mammals/Carnivores

1. Direct and floatation fecals
2. Vaccinate as appropriate. (See Fowler as under hoof-stock recommendations, pp 800-881; and recommendations for small exotics in upcoming Current Veterinary Therapy XI WB Saunders Co., Philadelphia).
1. CBC/sera profile
2. Urinalysis
3. Appropriate serology, FIP, FeLV, FIV)
4. Heartworm testing in appropriate species.

BIRDS

1. Direct and floatation fecals as above.
2. Evaluate for ectoparasites.
3. Appropriate serological tests for psittacosis, and if positive, confirmed by culture.
1. CBC/sera profile
2. Fecal culture for *Salmonella* sp.
3. Fecal gram stain,

REPTILES/AMPHIBIANS

1. Direct and flotation fecals
2. Evaluate for ectoparasites.
1. Veterinary examination
2. CBC/blood chemistries
3. Paramyxovirus titers for viperids, incoming after being quarantined for 30 days.
4. Full post-mortem examination and histopathology on all specimens dying while in quarantine.

FISH

General Comments: Quarantine standards for other zoo and aquarium animals cannot always be applied to fish, and adaptations must be made to the proposed procedures as they apply to fish populations. Proper and appropriate fish quarantine is a vital component of any successful health management program for fish. Quarantine procedures must be tailored to individual species and require greater variation than quarantine for other zoo and aquarium animals. It is in the interest of accredited institutions to carry out quarantine procedures that are both effective and practical, leading to improved animal health.

Fish are usually acquired as populations, not as individual specimens, and individual identity may be impractical to establish. Few aquariums have the facilities and/or space to properly maintain large fish specimens in separate life-support systems, making individual quarantine of these specimens difficult. Aquariums may operate as open or semi-open systems, and specimens acquired from the surrounding waters of these institutions may not benefit from rigid quarantine procedures due to the constant introduction of potential disease organisms. Veterinarians may be part of the team supervising quarantine, but the institutions should appoint staff it feels has the best expertise to supervise and operate the quarantine program. It is appropriate to note that state and federal fish hatcheries do not often employ veterinarians, yet have well-established and internationally recognized fish health programs of which quarantine is an important factor.

Specific recommendations:

Quarantine Facility: Where appropriate, separate life support systems (LSS) with the ability to quarantine fishes should exist. The LSS should be operated in such a way as to preclude disease transfer from one system to another and/or introduction into natural waters. Quarantine tanks should have viewing that is adequate to observe fish for behavior and signs of pathology, the LSS should be adequate to maintain the health of the quarantine population. If an aquarium does not have a separate LSS, it should have the ability to divert flow through the quarantine systems, bypass the common filter, and discharge the water. Disinfection of the discharge water prior to release is advisable. In addition, discharge of this water must comply with federal, state and local environmental regulations.

Quarantine Length: A quarantine period of 30 days is an adequate standard; however, it must be recognized that certain species or disease problems may require more or less time.

Quarantine Personnel: The institution will appoint the staff it feels has the most expertise to supervise and operate the quarantine program. All equipment (boots, nets, cleaning equipment, etc.) should be confined to the quarantine area. Access to and from the quarantine area should be restricted so as to minimize cross-contamination. Precautions must be taken to minimize the risk of zoonotic disease to personnel.

Quarantine protocol: Each institution must have a written quarantine protocol. During quarantine, appropriate prophylactic measures should be instituted. Complete medical records should be maintained for the species during the quarantine period. Fish that die during quarantine, or a representative sample thereof, should be necropsied. Care must be taken that all equipment used with quarantined fish is separate from other systems (if this is not possible, adequate disinfection procedures must be employed before equipment is used for post-quarantine fish).

Required quarantine protocol: Due to the great diversity of fish, required quarantine procedures are difficult to establish. The institution should follow the guidelines stated in the above sections to fashion a quarantine program best suited to their needs.

MARINE MAMMALS

All AZA member zoological parks and aquariums should have a quarantine program for new marine mammal arrivals at the institution. A facility should be available which can provide for the isolation of newly acquired marine mammals in such a manner as to prohibit cross-contamination resulting from physical contact, disease transmission, aerosol spread, waste drainage, or the reuse of untreated water. Ocean pens must be located in a way that prevents the spread of any disease from animal to animal through natural water movement and at a distance from other penned animals deemed adequate by the supervising veterinarian. If a receiving institution does not have appropriate isolation facilities, the staff should arrange for quarantine at an acceptable alternate site or only receive animals that do not require quarantine. More stringent local, state or federal regulations relating to marine mammal quarantine take precedence over these recommendations.

Isolated practices should be instituted based on the prior medical history of the newly arrived animals. Those situations where isolation is recommended would have one or more the following characteristics:

1. Recently collected (less than 30 days prior to arrival).
2. Recently exposed to a new arrival for which an adequate medical history is not available (less than 30 days prior to arrival).
3. Lack of a documented medical history.
4. Apparent medical problems at the time of arrival.
5. At the direction of the supervising veterinarian.

Standards for veterinary supervision, mixing of new arrivals with animals undergoing quarantine, keeper policies, sanitation, prophylactic measures including vaccination, identification, medical records and pathology are similar to those already described in the general section for mammals.

Following are recommendations and suggestions for appropriate medical procedures to be performed during or immediately prior to the quarantine period, by animal group:

Cetaceans

<u>Required</u>	<u>Recommended</u>
1. CBC/sera chemistry panel Physical examination	1. Direct and floatation 2. fecal examination 2. Urinalysis 3. Blowhole and stool culture and cytology 4. Blood zinc levels

Additionally, others have made initial inquiries about regulations for invertebrate quarantine. It is anticipated that the above regulations will be changed and updated as new findings refine or knowledge of disease transmission and testing, and thus, appropriate quarantine protocols.