

ASSOCIATION  
OF ZOOS &  
AQUARIUMS



## AMBASSADOR ANIMAL GUIDELINES

Serval, *Leptailurus serval*

Created by the Ambassador Animal Scientific Advisory Group in Association with the Serval Species Survival Plan®  
Program

## **Serval, *Leptailurus serval*, Ambassador Animal Care Guidelines**

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**Disclaimer:** This manual presents a compilation of knowledge provided by recognized animal and education experts based on the current science, practice, and technology of ambassador animal management and presentation. The manual assembles basic requirements, best practices, and animal care recommendations to maximize capacity for excellence in animal care and welfare. The manual should be considered a work in progress, since practices continue to evolve through advances in scientific knowledge. The use of information within this manual should be in accordance with all local, state, and federal laws and regulations concerning the care of animals. While some government laws and regulations may be referenced in this manual, these are not all-inclusive nor is this manual intended to serve as an evaluation tool for those agencies. The recommendations included are not meant to be exclusive management approaches, diets, medical treatments, or procedures, and may require adaptation to meet the specific needs of individual animals and particular circumstances in each institution. Commercial entities and media identified are not necessarily endorsed by AZA. The statements presented throughout the body of the manual do not represent AZA standards of care unless specifically identified as such.

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Serval kitten  
Photo Credit: Cari Inserra

AZA recognizes many public education and conservation benefits from ambassador animal presentations. AZA's Conservation Education Committee's Ambassador (previously called Program) Animal Position Statement (Appendix A) summarizes the value of ambassador animal presentations. For the purpose of this policy, an ambassador animal is described as an animal presented either within or outside of its normal exhibit or holding area that is intended to have regular proximity to or physical contact with trainers, handlers, the public, or will be part of an ongoing conservation education/outreach program.

Ambassador animal presentations bring a host of responsibilities, including the welfare of the animals involved, the safety of the animal handler and public, and accountability for the take-home, educational messages received by the audience. Therefore, AZA requires all accredited institutions that give ambassador animal presentations to develop an institutional ambassador animal policy that clearly identifies and justifies those species and individuals approved as ambassador animals and details their long-term management plan and educational program objectives. The policy must incorporate the elements contained in AZA's "Recommendations for Developing an Institutional Ambassador Animal Policy". If an animal on loan from another facility is used as an ambassador animal, the owner's permission is to be obtained prior to program use.

## **1. HUSBANDRY**

AZA's accreditation standards require that the conditions and treatment of animals in education programs must meet standards set for the remainder of the animal collection, including species-appropriate shelter, exercise, sound and environmental enrichment, access to veterinary care, nutrition, and other related standards (AZA Accreditation Standard 1.5.4).

### **1.1 Housing**

Providing ambassador animals with options to choose among a variety of conditions within their environment is essential to ensuring effective care, welfare, and management (AZA Accreditation Standard 1.5.2.2). Some of these requirements can be met outside of the primary exhibit enclosure while the animal is involved in a program or is being transported. For example, housing may be reduced in size compared to a primary enclosure as long as the animal's physical and psychological needs are being met during the program; upon return to the facility, the animal should be returned to its species-appropriate housing as described below.

Careful consideration must be given to the design and size of all ambassador animal enclosures, including exhibit, off-exhibit holding, hospital, quarantine, and isolation areas, such that the physical, social, behavioral, and psychological needs of the species are met and species-appropriate behaviors are facilitated (AZA Accreditation Standard 10.3.3, 1.5.2, 1.5.2.1).

The physical needs of servals as ambassador animals and exhibit animals are identical; both require appropriate housing, diet, enrichment, and social groupings. The substrate and climbing structure requirements are similar and the enclosure should allow adequate space for exercise and ability to display natural behaviors (jumping, climbing, hiding, etc.), such as access to higher points through rockwork, perching, catwalk platforms, with shelters to escape to when needed. Natural substrate such as dirt, bark, mulch, and sand; along with live plants should be included in serval habitats. It is recommended that these items be introduced to the serval early in their development and rotated often in order to decrease the risk of consumption due to novelty. While ambassador servals can live on exhibit, it is a best practice to house them separately in order to minimize health risks to other animals in the collection; this is especially true if they are going off grounds around other carnivores. Creating an ambassador animal policy that reduces risk by prohibiting mingling with other non-collection carnivores is a wise requirement; maintaining a 20-foot distance from other non-collection carnivores can prevent cross contamination.

The psychological needs can be assessed through the five opportunities to thrive: the opportunity to express species specific behavior, the opportunity to self-maintain, the opportunity for optimal health, the



opportunity for a thoughtfully presented well balanced diet, and the opportunity for choice and control. Below are some key points to consider.

- Are they able to express species specific behavior? While the demonstration of species-specific behavior is helpful in the interpretation of public presentations, these behaviors should also be able to be expressed in their home habitat on a regular basis. Climbing, jumping, eating whole prey, variability in substrate, scents, and experiences are all provided by wildlife care specialists to meet this opportunity.
- Can they self-maintain? In addition to self-grooming can they also seek out water or rough surfaces to rub on?
- Do they have access to a quality diet and medical care? Regular body scoring, frequent reviews of diet including reinforcers, and routine medical checkups can help maintain health inside and out. Can their diet be presented in differing and challenging ways? Often the habitat structures can provide a never-ending list of diet presentation locations.
- Does their habitat provide appropriate shelter and the ability to choose options for their own comfort and needs in changing weather and climate conditions? What are the circumstances around their habitat, are they free from stressful interactions and can they see out? Can they utilize the space well? Many cats appreciate being able to get up high and see their surroundings. Ambassador specialists should be in tune with antecedent arrangements in training, and this should be considered in habitat set up as well in order to provide the best psychological living situations.

## 1.2 Diet

A formal nutrition program is recommended to meet the nutritional and behavioral needs of any species (AZA Accreditation Standard 2.6.2). Diets should be developed using the recommendations of nutritionists, including the Nutrition Scientific Advisory Group (NAG) feeding guidelines (<http://nagonline.net/guidelines-aza-institutions/feeding-guidelines/>), and veterinarians as well as AZA Taxon Advisory Groups (TAGs), and Species Survival Plan® (SSP) Programs. Diet formulation criteria should address the animal's nutritional needs, feeding ecology, as well as individual and natural histories to ensure that species-specific feeding patterns and behaviors are stimulated.

Serval nutrition has not been rigorously studied to allow for a recommended diet based on scientific evaluation. Currently, the domestic cat is used as a model for formulating serval diets. Table 1 includes a list of suggested and commonly used diet items that was composed with input from nutritionists, as well as the evaluation of a survey conducted by the Serval SSP in 2016 compiling the diets fed to most of the servals in the SSP. Note that the exact composition of the diet will vary based on individual nutritional needs, and body condition assessment; therefore, it is not practical to provide guidance on feeding amounts within this document.

It is believed that servals are solitary, opportunistic hunters that consume several small meals per day. Servals have a simple gastrointestinal tract, and their stomach is relatively large and non-compartmentalized. Their relatively short small and large intestines accommodate a fast passage rate of food, allowing for large food components with high bacterial loads such as bones, organs, and hide to pass through quickly. For a variety of reasons, which may include availability, cost, convenience, etc. processed meats are commonly fed in human care. However, servals are believed to naturally consume the whole carcass of the prey that they catch. It is presumed by nutritionists that feeding a variety of whole prey would optimally accommodate their nutritional needs (Dierenfeld, Alcorn, and Jacobsen, 2002).

Diet amounts and food presentation should vary depending on the individual serval. It is important to frequently monitor weight and body condition and adjust diet amounts accordingly. Regular checks by trained keepers and/or veterinary staff to evaluate body condition should be used in conjunction with behavior to determine if diet amounts need adjustment. Weights should be taken regularly and used to help monitor animal health. Finally, nutritional health should be monitored through regular analysis of drawn blood and body part palpation. This may be accomplished through regular preventative health exams

(recommended by Felid TAG veterinary advisors to happen every 2-3 years) while anesthetized or through operant conditioning.

Food is often used as a reinforcer when conditioning servals to perform their roles as ambassadors. All food (amount and type) being fed during training sessions or presentations should be accounted for when devising each individual serval's diet. Food fed during training sessions or presentations should not be in excess to the documented diet. Size and type of food offered should also be taken into account during training sessions and presentations.

Table 1.  
*Suggested components of a Serval Diet*

| Food item  | Purpose in Diet | Frequency |
|--|-----------------|-----------|
| Chicken (necks, thigh, chicks, canned)   | Primary         | Daily     |
| Mice / Rats/ Rabbits / pinkies   | Primary         | Varies    |
| Chunk Horse Meat<br>(may be primary if appropriately supplemented with vitamins A, B, D, Calcium, and Taurine) | Supplemental    | Varies    |
| Commercially prepared beef or horse product<br>(Nebraska/Toronto brands as example)                            | Primary         | Daily     |
| Beef Heart   | Supplemental    | Daily     |
| Bones (beef rib, knuckle bones)  | Primary         | Varies    |
| Bull meat (chunk)  | Supplemental    | Varies    |
| Fish   | Supplemental    | Varies    |
| Hard-boiled egg  | Supplemental    | Varies    |
| Oxtail   | Supplemental    | Varies    |



Example of food items that may be used for training  
Photo credit: Carlee Westbrook

Body condition should be maintained in a healthy manner year-round, as there are generally not large weight fluctuations seasonally with this species. This may vary in different climates but servals are a hearty species. Still, it is good practice to track seasonal trends with at least monthly weights year-round, as obesity can lead to a variety of health problems including arthritis and various organ function issues. Each animal is an individual and through body scoring and behavior, monitoring an appropriate target weight should be identified. Females often range from 8-10 kg and males 10-13 kg, but each animal has its own unique size and needs. Training voluntary palpation of the spine and ribs is a good way to be able to body

score under the fur. See the nutrition section of the Felid TAG website for body scoring charts to properly assess a body score ([Felid Taxonomic Advisory Group \(TAG\) of the Association of Zoos & Aquariums \(AZA\) > Husbandry](#)).

- Basic: Nutritionally complete diet offered daily.
- Better: Diet (primary and supplemental items) presented either by hand feeding or self-feeding through enrichment opportunities (based on individual animal).
- Best: Basic diet plus select supplemental items presented in a way to encourage species-specific behavior and on a varied schedule.

### 1.3 Enrichment

AZA standards require that institutions follow a formal written enrichment program that promotes species-appropriate behavioral opportunities (AZA Accreditation Standard 1.6.1.). Servals are known for their ability to stalk, jump, and dig; these are behaviors not only well suited to be trained and demonstrated during an educational program but also encouraged during the time spent in their enclosure space. Enriched environments with moveable platforms, catwalks, and hammocks allow servals the opportunity to explore their habitats from a variety of vantage points and can encourage jumping and balance. Providing an area of deep substrate can stimulate the serval to dig, especially when a desired item is buried in the substrate. Many servals have been noted to engage in “fishing” activities when provided with a water source stocked with either toys or food. Food and favorable scents can be hidden to encourage the manipulation of the environment to acquire them. This is accomplished through the use of novel or slightly unstable access points, bags/boxes/paper wrapping, or commercially available puzzle type feeders. The use of items such as cat teasers or wand toys can be extremely engaging for servals but special attention needs to be paid to the strength of the toy and the handler’s ability to retrieve the toy safely. Boxes and bags are to be large enough that a serval cannot get its head stuck inside the item.

Ambassador handlers should be cautious of treating training sessions as the sole means of daily enrichment since these sessions do not provide any ongoing stimulation and are finite in the time that they span. Similarly, while enrichment provided during a training session can lead to a more informative and entertaining presentation, these items should not be viewed as the sole enrichment opportunity. Ideally animal care staff will determine a behavior they would like to elicit and then offer enrichment based on this desired outcome. It is important to remember that for most ambassador servals the majority of their time will be spent in their enclosure with only a small portion of their day spent with their trainers. Additionally, this time with trainers normally occurs mid-day and not at dawn and dusk when they are most active.

- Basic: A novel object or stimulus is introduced daily on a set schedule.
- Better: Behavioral-based enrichment will be offered according to a set schedule.
- Best: Behavioral-based enrichment will be offered according to a varied schedule. Enrichment is recorded and evaluated to determine if its use will be repeated.



Serval watching as live fish are added to a pool.  
Photo credit: Carlee Westbrook

Servals are known to ingest inappropriate items such as a cloth or hay, so facilities are encouraged to maintain a list of approved items specific to each individual. Ambassador servals may have the opportunity to interact with various items during a presentation that are not suitable to be left unsupervised; these items should be clearly noted on the approved enrichment list. It is also very helpful to maintain a list of denied enrichment items or ones where use has been discontinued to decrease the chance of these being offered. The enrichment approval process can include various levels of staff and approved enrichment items should be re-evaluated regularly to ensure safety and positive outcomes.

- Basic: Enrichment items are researched and deemed appropriate by the keeper staff and are then approved by the area manager.
- Better: All of the above, plus enrichment items are also approved by the facility's nutritionist/veterinarian/enrichment specialist if applicable. Enrichment is chosen and evaluated on the potential for the exhibition of natural behaviors.
- Best: All of the above, plus enrichment items are approved for specific animals and are re-evaluated yearly for impact and safety.

Enrichment should be recorded and evaluated each time it is offered. Some examples of evaluation criteria include:

- Did the serval interact with the enrichment?
- Did the serval show a change in behavior following the presentation of the enrichment?
- What type of behavior was the enrichment meant to elicit (exploratory, manipulative, foraging, social, jumping, climbing, etc. and was the desired result achieved?
- How long did the serval spend with the enrichment item?

It is understood that servals may not immediately investigate or engage with an enrichment item and so records may be written the following day based on indirect evidence of use. Additionally, enrichment records should be evaluated on a regular basis to ensure that the offered enrichment is producing a desired outcome and so can in fact be considered enriching to the serval. Items that do not elicit a desired behavior should be discontinued or used more sparingly to see if its effect can be strengthened.

#### **1.4 Animal Training**

Servals are typically successful ambassadors due to their outgoing personality and calmer demeanor as compared to many other felids of similar size; however, trainers should always respect the fact that servals are wild animals. All servals should be trained with operant conditioning using a positive reinforcement strategy as frequently as possible. Socialization and training should begin as early in the serval's development as possible and should be repeated frequently. It is a best practice to limit the training of a new or novel behavior to a single trainer. In scenarios where this is not possible or with basic introductory behavioral conditioning (such as bridge conditioning) the number of staff working on the same behavior should be minimized to the smallest number possible given the situation. It is recommended that the serval have a positive relationship with each trainer before behaviors are asked. Behaviors that have been proven as useful foundational behaviors include target training, name recognition, a "come" behavior, and a mark or station behavior.

Crate training is encouraged to be incorporated at the earliest time possible. Care should be taken during this process to ensure that the crate remains a positive place and that the serval's behavior will dictate progressions in duration or movement of the crate.





Serval crating voluntarily at San Diego Zoo  
Photo credit: Katie Springer

Collar or harness training is also something that is encouraged to occur while under stimulus control. Beginning this training at a young age and incorporating repetitions into every session, including play and socialization sessions, can be very beneficial to maintaining full participation and providing the serval with choice and control over this action. It is not recommended that servals wear their collars when not engaged in a training session due to the risk of injury this presents.

Ambassador servals should be acclimatized or desensitized to a variety of scenarios preparing them to travel to new venues. This can be done at the same time as the leash/harness training, once the serval is comfortable in the crate. Small approximations to crate movement, driving in a variety of vehicles, touch, and loud noises are all part of the training process for a successful animal ambassador.

Additional behaviors should be trained to allow demonstration of natural behaviors, such as jumping and digging, in order to complement the conservation messaging. This list is not exhaustive and represents a guideline. Working with the Animal Ambassador Animal Scientific Advisory Group and SSP Coordinator for further questions is highly recommended.

As animal management continues to progress, zoological facilities are encouraged to explore ways in which they can minimize the public's perception of ambassador animals as pets. Institutions should consider mother-reared ambassadors (outlined in section 1.5 of this document), allowing ambassador animals to breed and participate in the SSP, provide high quality habitats whether on or off public view, and work on training off leash behaviors whenever possible. Ambassadors represent their wild cousins and create a great opportunity to connect people to wildlife and conservation; therefore, off leash behaviors help break the public perception of pet mentality. Each serval ambassador trainer has an obligation to train with the highest standards, utilize the interpretive opportunity to further conservation, and create empathy for wildlife as a whole.

## 1.5 Social grouping

Like most felid species, servals are generally solitary as adults, and therefore should most often be housed alone when they reach maturity. Some exceptions may include housing same sex littermates together prior to sexual maturity, at which time they are likely to become more intolerant of social grouping. (Of course, separation of opposite sex littermates is essential prior to sexual maturity to avoid potential inbreeding.) Those ambassador animals that have been contracepted or neutered due to SSP recommendations may be more likely to be tolerant of conspecifics for a longer period of time, however caution should be taken to avoid potential aggression.

Historically, servals have been socialized, and even housed successfully with a variety of species, including domestic dogs and cats, as well as other appropriately sized exotic carnivores. For example, one facility opportunistically and successfully socialized a serval kitten with a Sumatran tiger cub and a clouded leopard cub that they happened to be hand-raising at the time, and another facility has successfully paired a serval with a Siberian lynx into adulthood. Many have found early socialization to be remarkably beneficial for the welfare and temperament of solitary serval kittens in particular, but naturally, any such introductions should be approached cautiously. Ideally, any potential introduction should begin with protected contact interaction before progressing to supervised, free contact interaction following positive, affiliative signs.

There has been success in raising ambassador servals in a co-parenting environment where the kitten(s) is not hand raised but rather left with the mother until weaning. During this period the kitten has at least once daily visits and interactions with animal trainers. This process is labor intensive and requires a dedicated staff commitment. Staff should be prepared to work with both the kitten and the mother to ensure adequate exposure of trainers to the kitten. Initially the mother should be trained to shift away from her kittens and be offered sufficient enrichment or food items so that she will remain calm during the separation. Visits should be kept quite short when the kittens are very young and increase in frequency and duration as the kittens grow. Toys and food can be utilized by the trainers to ensure that their interactions with the kittens remain positive. Progressions in duration and frequency should begin only when the kitten is engaging with and approaching the trainers. There are several advantages to this rearing method. The first is that the serval's temperament and interest in training can be evaluated prior to them being separated from their mother. Additionally, servals raised in this manner may have better success themselves in fulfilling breeding recommendations since they have not imprinted on their human trainers. Finally, the servals that have been raised in this manner tend to be extremely confident cats who exhibit a wide array of natural behaviors. If you are interested in learning more about this process, please contact the SSP Coordinator who can connect you with facilities who have successfully completed this process.

## **1.6 Signs of stress**

Signs of stress can include open mouth breathing, pinned ears, and hissing. These should also be noted as precursors to aggression. Swatting and charging would also fit in that category. Trainers should know specific traits of their individual, pay careful attention to signs of stress, and be thoughtful in ways to mitigate stress and events leading to aggression. Pacing can also be seen with servals and many cat species; carefully assessing stressors might help reduce this maladaptive behavior. How the animal is trained, including desensitization and handling, can make a huge difference in a successful ambassador. Looking at the antecedent arrangement and making sure to set the animal and trainer up for success can prevent injury and improve the welfare of the animal.

## **2. PROGRAMS**

Program use of all ambassadors should be carefully tracked, and assessed side by side with the physical condition, health, and behavioral repertoire of each individual.

### **2.1 Program types**

Ambassador servals participate in many settings to engage, educate and create connections with zoo visitors. This is clearly a win for conservation and demonstrates how these dynamic animals can be successful in a wide variety of situations. Servals are presented both on and off-grounds in formal (classroom) and informal (chats or displays) programs.

Ambassador animals that are taken off zoo or aquarium grounds for any purpose have the potential to be exposed to infectious agents that could spread to the rest of the institution's healthy population. AZA-

accredited institutions must have adequate protocols in place to avoid this (AZA Accreditation Standard 1.5.5)



Serval at San Diego Zoo  
Photo credit: Kym Janke

## 2.2 Temperature guidelines

The temperature restrictions for servals depend on the individual being used in programs, the temperature to which it has been acclimated, the destination of the program and the policies of the institution's animal management team. Depending on the situation, caution should be exercised when exposing servals to temperatures above 90°F (32°C) and below 32°F (0°C). Monitor behavior closely if temperatures rise or exposure to direct sunlight is present. If the program is in an area that is not climate controlled, please discuss the logistics and potential risks with your animal management team. There may be times when the physical environment can be modified to maintain the serval in a safe and healthy manner; for example, shade or portable heat can be provided.

## 2.3 Transport

Similar consideration needs to be given to the means in which an animal will be transported both within the institution's grounds, and to/from an off-grounds program. Animal transportation must be conducted in a manner that is lawful, safe, well planned, coordinated, and minimizes risk to the animal(s), employees, and general public (AZA Accreditation Standard 1.5.11). Servals should be trained to voluntarily enter a transport crate to go to educational programming events.

Removal and return from an enclosure will vary between institutions. All institutions should take removal and return strategies into account when designing new serval ambassador space to maximize ease of use and accessibility for both the serval and the trainer. Regardless of the enclosure style, servals should be trained to signal that they are interested and willing to leave their enclosure for enrichment, training session, and/or a program. One option is to teach a "station" behavior, where the serval is directed to position themselves (stand, sit or lay) on an object, such as a log, den box or crate, while the trainer enters their enclosure. The trainer can then prepare the serval to leave the enclosure after applying the necessary equipment, such as a leash, collar, harness, etc. Another option is to crate the serval directly from their enclosure. Servals learn that crating is the cue that a training session or program will follow.

Servals should be taught familiarity with a crate at a young age and should be comfortable with crating if they are going to be transported frequently (or for husbandry behaviors, such as weighing or transport to the veterinary hospital). Crates should be of enough size that the serval can stand, circle and lay down comfortably in the crate. Species and individual appropriate bedding can be placed in the crate to increase serval comfort and keep the serval clean and dry if they urinate or defecate while in the crate. Bedding can include straw, wood or cardboard chips. Bedding options should be tested in advance to make sure the serval does not ingest bedding while in their crate.

Individual institutions should follow their set guidelines for disinfecting surfaces, crates, enclosures, etc. between use by servals. If a serval has a contagious disease, they should have an individually designated crate that should not be used by any other individual.

USDA regulations require reporting for all mammals, including servals, that are taken away from the zoo overnight. Other permits and regulations for servals vary from state to state. Each institution should contact their State Wildlife Agency and Agriculture Department to determine what regulations are in place for any state that a serval intends to pass through, visit, or overnight when it is away from the zoo.

## **2.4 Display options**

Careful consideration should be given to the presentation of ambassador animals, including safety of the animal, handler and public, as well as the messages associated with the visual display of the animal. Displaying natural behaviors such as jumping for lure, camouflaging with grass and reaching down mock rodent tunnels can inspire the learner to understand servals natural behavior.

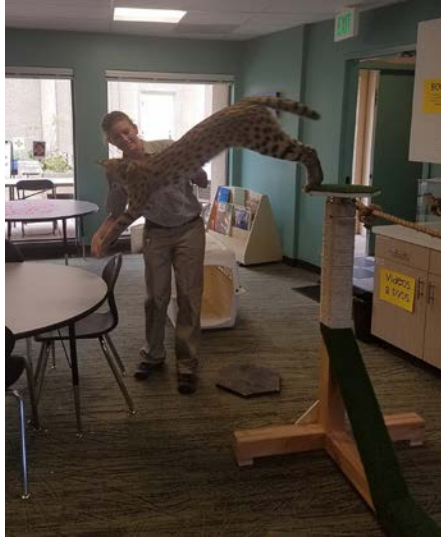
Servals have dynamic natural behaviors that can inspire and wow any audience during a program. The most important consideration during programs is the health and safety of the serval, staff and visitors. Each facility will consider the limitations of their presentation spaces when determining how a serval is best presented. Facilities with proper containment can present their serval in a program without a collar/harness and leash. If the presentation space is without proper containment a collar/harness and leash are recommended to maintain control of the serval during a presentation. Servals who are trained to jump for a lure should be presented on a longer leash line so that they are uninhibited when jumping. In addition, while servals jump vertically, consideration should be given to the space where a serval is jumping to ensure they have plenty of space to land safely. Reinforced landing spots, such as a carpet square or mat, can be provided if servals are landing on hard and/or slippery surfaces (such as concrete or gymnasium type floors).

Training for presentations is most successful when operant conditioning strategies are employed. Servals can be taught to perform their natural behaviors on cue (jumping for the lure, reaching down mock tunnels, etc.) and they are quick learners.

Servals can be friendly and easy-going cats but proper distance should be maintained between a serval and the public in order to ensure the servals' comfort and public safety. Serval temperament and presentation space will dictate how close public can be from the serval in order for the serval to perform their behaviors unhindered. Public can participate in serval programs depending on the comfort of the serval, the trainers, and each facility's rules about interactions. For example, public can hold the lure pole for the serval jump, present the mock tunnel, or cue serval behaviors. If public are allowed to offer food rewards to the serval, a feeding stick of some sort is recommended to prevent direct hand to mouth contact between the public and a serval.

Visitors should be set up for success in any presentation space by having clearly outlined areas where they can view the serval. Visitor management will depend on program space. Servals have been successfully presented in large stadium seating spaces, small stages with seated visitors, in designed roped off spaces where visitors can come and go to view them, indoors in classroom type programs and in school gymnasiums. Visitor expectations can be expressed by the space set up (seating or standing space with barriers and/or signage) and/or by verbal directions prior to the presentation (please remain seated, hold applause, etc.).





Serval demonstrating a jump behavior  
Photo credit: Kym Janke

Ambassador servals can be exposed to a variety of diseases, both on zoo grounds and when they are off zoo grounds. Ambassador animals that are taken off zoo or aquarium grounds for any purpose have the potential to be exposed to infectious agents that could spread to the rest of the institution's healthy population. AZA-accredited institutions must have adequate protocols in place to avoid this (AZA Accreditation Standard 1.5.5). Servals should be part of a facility's regular veterinary care and disease prevention program. Facilities can consult the Felid Taxon Advisory Group Preventative Medicine Recommendations (Appendix B) for further details and recommended best practices among felid species.

Disease prevention protocols will vary based on the precautions implemented by veterinary staff. Some facilities house ambassador animals that leave zoo grounds in separate holding areas from the remainder of the collection, which does not leave the zoo facility, and prevent mixing of holdings, exhibits and/or enrichment and furniture between animals that leave the zoo and those that do not. These regulations will vary based on disease prevention programs, individual animal health, facilities available and veterinary recommendations. Animal care staff should consult their director of animal health to discuss their concerns.

Best practices to minimize disease transfer for ambassador animals are the same as best practices for any collection. Proper hand washing, disinfection and sanitizing should be followed according to facility standards. Because serval diets are primarily made up of raw meat product, hand washing is recommended prior to and immediately following working with servals. Alternatively glove use may also be recommended based on individual preference, especially if animal care staff are hand feeding during training and presentations. Mask use is recommended for any animal care staff who is feeling ill, since servals can be susceptible to human disease, such as coronavirus.

If resources allow, each ambassador animal can have individually designated crates and supplies (collar/harness, leash, training props, etc.) to reduce disease transfer between animals in the collection.

## 2.5 Messaging

AZA's policy on the presentation of animals is as follows: AZA is dedicated to excellence in animal care and welfare, conservation, education, research, and the presentation of animals in ways that inspire respect for wildlife and nature. Education and conservation messaging must be an integral component of any ambassador animal demonstration (AZA Accreditation Standard 1.5.3).

The Conservation Education Committee has developed the following learning outcomes as desired components of effective educational presentations of ambassador animals. Included in these desired outcomes are some suggestions specific to messaging with servals.

Outcome 1: Species information: Understanding of the species natural history, role in the ecosystem, and/or status in the wild.

- Include points here about species natural history, taxonomy, “fun facts,” conservation status, ecological niche, etc.

Outcome 2: Animals in human care: Understanding of the commitment of AZA facilities to excellence in animal care and conservation and appropriate pet choices, where applicable.

- Include information about animal husbandry, management, and training in AZA facilities
- Effects of the pet trade and hybridization of servals with domestic cats (savannah cats). Include information about responsible pet choices and the impacts of managing these cats both in private homes and zoological settings
- In contact and behind-the-scenes programs, there is an opportunity to explain more thoroughly the relationship that keepers have with the cat. The keeper should discuss the benefits of training, proper ways to handle and train a wild cat, and the time spent developing the animal/keeper relationship in order to ensure the animal is comfortable being in programs

Outcome 3: Empathy development: Foster a sense of empathy and wonder by connecting visitors and audiences to the individual animal.

- Develop methods for presenting the species or individual animal, as well as information focused on encouraging empathy in audience members. Seattle Aquarium’s [Fostering empathy for wildlife](#) is an excellent resource.

Outcome 4: Conservation action: Empower audiences and visitors to take action to protect the species and wildlife in general.

- Include threats to the species in the wild and recommended actions that the visitor can take to help protect the species, related species, or wildlife in general.
- Human and wildlife interactions: some populations have increased with farming. Some human animal conflict (poultry farmers).
- Model species for human encroachment

It is strongly recommended that programs and experiences with ambassador servals be evaluated regularly to measure the impact of the programs’ education and conservation messaging on visitor knowledge, attitudes, and/or behavior. Recommended methods include pre-post surveys, delayed surveys, participant observation, and participant interviews.



Serval Presentation at San Diego Zoo  
Photo credit: Kym Janke

### **3. HANDLING AND STAFF TRAINING**

Handling protocols and staff training should follow institutional guidelines and be tailored to each individual serval's behavior, history, and repertoire.

#### **3.1 Handling limits**

Consideration should be given as to appropriate times for handling ambassador animals during presentations, and rest breaks scheduled accordingly. Program handlers should maintain the animal's basic husbandry needs and a medical protocol should be in place in case concerns arise.

It is generally recommended that ambassador servals be away from their main enclosure for no more than 2 hours. They should have rest days scheduled, and should also have the option to choose if they wish to participate in a program. Animal usage should be tracked and behavior monitored for stress. Each individual will have different tolerances for program participation frequency and duration. Handlers should know their serval's behavior and adjust their presentations accordingly; for instance, many servals prefer to do programs during the day so night events or very early morning events might not set the cat up for success. Each facility should evaluate the timing of events and adjust accordingly in the cat's best interest.

#### **3.2 Handlers and Handler Training**

Animal care and education staff should be trained in ambassador animal-specific handling protocols; conservation, and education messaging techniques; and public interaction procedures. Staff assigned to handle animals during demonstrations or educational programs must be trained in accordance with the institution's written animal handling protocols. Such training must take place before handling may occur (Accreditation Standard 1.5.12). These staff members should be competent in recognizing stress or discomfort behaviors exhibited by the ambassador animals and be able to address any safety issues that arise.

Any staff that will be utilizing servals in programs should be trained in the specific handling protocols for each individual animal. Training staff to properly handle servals is as important to providing positive welfare as is enclosure size, husbandry protocols, enrichment, and diet. It is recommended that only paid animal

caregivers handle servals and that docents/volunteers only fill the role of an assistant to programs/presentations where they provide interpretation for guests and/or crowd control. It is important that training be specific to each serval and not generalized across a group of animals. Serval behavior and tolerances for program types will be highly individualized.



Serval presentation at San Diego Zoo.  
Photo credit Cari Inserra.

The number of handlers working with an ambassador serval should be determined based on the individual serval's temperament, time available for training, and level of cooperation and experience of the team. All serval handlers should meet regularly to discuss animal needs/behavior and to evaluate program use. Handlers are encouraged to watch the training sessions of their teammates and/or take video of their training sessions so that criteria and technique remain as consistent as possible across the team. Serval temperament and acceptance of new trainers varies widely based on the individual. Training of new handlers should progress at a pace acceptable to both the serval (as demonstrated by their behavior) and the trainer's comfort/institutional needs.

Relationship building efforts should be made on the part of the handler before utilizing the serval in a program setting. This can start by providing daily care and asking protected contact behaviors. It is a best practice for newly introduced handlers to work closely with experienced handlers to develop comfort in asking and rewarding behavior in a free contact setting before being responsible for putting on a harness or collar. These sessions can either occur in a controlled environment off leash or in a session where the experienced handler has control of the leash. New handlers should begin to work with servals in a free contact environment by asking easily reinforced established behaviors before attempting new or complex behaviors. A primary trainer should always assess a new handler's progress where complex behaviors are concerned.

Handling consistency and uniformity in technique across those who handle ambassador servals can have a profound impact on the welfare of the cats in our care. Although this is best achieved through careful and species-specific training to work with servals, handlers and their requirements will differ between institutions depending on many variables including staff size, program demands, and size of ambassador animal collection. AZA accreditation standards require that all handlers, whether staff or volunteers, must be properly trained in the institution's protocols before handling occurs (AZA Accreditation Standard 1.5.12.)

At a minimum, handlers should be trained and scored on the following criteria:

- Removal and return from home enclosure
- Proper equipment uses with collar and leash
- Removal and return from crate
- Safely handle and present the serval for educational programs



- Recognize the signs of stress for both the species and individual animal
- What to do in the event of an animal bite or other human or animal emergency
- Outreach parameters if applicable

Basic:

- Trainee is introduced to serval in a protected contact environment and begins to build relationship through daily husbandry duties
- Trainee observes multiple sessions with experienced handler/"certified trainer"
- Trainee is trained as a backup or secondary for the trainer
- Trainee begins to work through the actions needed to handle the serval as the primary trainer. An example of this progression would be as follows:
  - Take the leash from a primary trainer during a session
  - Ask the animal to enter/exit the crate and/or shift door during a session
  - Remove the leash (and collar/harness if applicable) after a session
  - Put on all needed equipment (collar/harness, leash) and complete the entire session
- Trainee then works the serval for multiple sessions with experienced handler
- Trainee assessed yearly on skill and ability by experienced handler

Better: All of the above, plus:

- Trainee given written protocol to review prior to introduction.
- Handler assessed and scored using institutional handling rubric

Best: All of the above, plus:

- Handler to work with serval a minimum of once per month (or more depending on individual handler and serval)

### 3.3 Handler Certification and Evaluation

Each institution should create an ambassador program animal handling policy that conforms to AZA guidelines as well as any local legislation. The policy should include messaging, required handler competencies, guidelines surrounding individual animal use, and any welfare or safety considerations. The program structure and policy components should be viewed as a living document and evaluated yearly to ensure that it is meeting all required criteria. Changes in physical space, servals in your care, institutional priorities, and AZA/governmental criteria should all necessitate the need for a revision to the policy. Evaluation of the program should include a review of institution goals/mission, an examination of animal welfare and the servals' voluntary participation in programs, handler training, safety protocols and disciplinary action.

Handler competency should be evaluated regularly such as during periodic institutional performance reviews. Any concerns with training performance should be addressed and re-training or additional lessons may be instituted. Table 2 provides a sample rubric for evaluating handler competencies.

Table 2.  
Sample rubric for evaluation of handler competencies

| <b>Score</b>                              | 2 = Major mistakes, issues, concerns<br>(does not currently have the handling skills or comfort level needed for handling specific animal)  | 1 = Minor mistakes, issues, concerns<br>(needs more training before moving forward on specific animal)   | 0 = No mistakes, issues, concerns<br>(able to move forward with handling/certification)                                |
|---|---|--|--|
| <b>Comfort/<br/>Confidence</b>            | Handler lacks confidence <b>OR</b> is over confident in handling abilities. Handler appears uncomfortable handling the animal to the point where animal or human safety could be an issue.                            | Handler appears to lack some confidence, but is able to handle the animal in an appropriate manner.  | Handler demonstrates confidence and is relaxed while handling the animal.  |
| <b>Attitude</b>                           | Handler demonstrates a lack of respect for animal or safety and is not open to feedback.  | Handler shows respect for animal and accepts feedback.   | Handler demonstrates great care and respect for animal and willingly accepts feedback.                                 |
| <b>Removal from holding</b>               | Handler was unable to properly remove animal from holding without assistance and/or was unable/unwilling to follow trainer's instructions.  | Handler had some difficulty properly removing animal from holding, but followed trainer's instructions.  | Handler had little to no difficulty properly removing animal from holding.   |
| <b>Crating</b>                            | Handler was unable to properly set up/position travel container so animal could not enter.  | Handler had some difficulty setting up/positioning the travel container but followed trainer's instructions and was able to kennel/unkenel the animal.       | Handler had little to no difficulty setting up/positioning the travel container and animal kenneled/unkenneled easily. |
| <b>Handling/<br/>presentation</b>         | Handler lacked confidence <b>OR</b> was over confident while presenting animal. Was unable/unwilling to follow handling guidelines. Animal/handler/public safety was not prioritized by the handler.                  | Handler had some difficulty while presenting animal, but followed handling guidelines.   | Handler had little to no difficulty while presenting animal and followed handling guidelines.                          |
| <b>Return animal to holding</b>           | Handler was unable to properly return animal to holding without assistance and was unable/unwilling to follow trainer's instructions.   | Handler had some difficulty properly returning animal to holding, but followed trainer's instructions.   | Handler had little to no difficulty properly returning animal to holding.  |
| <b>Understanding of handling policies</b> | Handler is unable/ unwilling to adhere to institutional handling policies. Does not demonstrate an understanding or value the importance of policies. Handler poses a potential risk to animal/handler/public safety. | Handler requires written and/or verbal coaching on policies, but willingly accepts feedback. Handler poses a potential risk to animal/handler/public safety. | Handler has little to no difficulty understanding and following handling policies. Handler is proficient in this area. |

### 3.4 Safety

Handlers are responsible for the safety of the serval, the guests, auxiliary staff, and themselves during a program. It is recommended that injury response protocols be included in animal handling training. If an injury occurs to an animal, it should receive medical attention as soon as possible. The injury may not seem significant, but to ensure continued health, one should seek medical counsel. Servals have the potential to inflict human injury via bite or striking with their paws. It is important that all those handling ambassador servals receive training on institutional policies regarding injuries to staff and guests. As a best practice it is

recommended that servals not be handled by a trainer without at least one other trained staff member in the immediate area. This secondary staff member should be aware of all safety protocols and be trained to provide assistance to the handler in the case of an emergency. Additionally, it is recommended that the second staff member be responsible for conveying messaging and interacting with guests so that the handler directly responsible for monitoring the serval's behavior can remain focused on the cat.

Specific training should be provided in the methods of food delivery since food is the most common reinforcer used in serval training. Institutional handling and safety protocols should outline the procedure for food delivery. It is recommended that when hand feeding food should be presented on a flat palm and meat should be presented in the form of a meatball. Keep eye contact on the animal's mouth at all times while hand feeding. Alternatively, there are many options for food delivery tools, such as tongs or meat sticks, that may be used. Servals should be conditioned to these devices since they may cause a delay in food delivery. Food can also be dropped in front of the serval if on a flat surface, or presented in an enrichment device.

It is also recommended that the institution's written animal handling protocols include the steps to be taken if a break in protocol or a mishandling occurs. These protocols should be included as discussion points in the training process. Policies should be reflective of the fact that servals are carnivores capable of inflicting serious harm/injury to humans and other animals. As a best practice consequence should be reflective of the break in protocol and not to the outcome of the incident. Minor errors may only require a simple refresher whereas a blatant break in policy or repeated offenses may, depending on institutional policy, require retraining from square one, disciplinary action, or a removal from the animal handling team. It is understood that any break in protocol which results in a serious injury to staff, guests, animals, or the serval itself may be subject to more severe disciplinary action.

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## Appendix A: Ambassador Animal Policy and Position Statement

### Ambassador (Program) Animal Policy

*Originally approved by the AZA Board of Directors – 2003*

*Updated and approved by the Board – July 2008 & June 2011*

*Modified from "Program Animal" to "Ambassador Animal" to avoid confusion with "Animal Programs," approved by the CEC; no change to meaning of these terms - January 2015*

The Association of Zoos & Aquariums (AZA) recognizes many benefits for public education and, ultimately, for conservation in ambassador animal presentations. AZA's Conservation Education Committee's *Ambassador Animal Position Statement* summarizes the value of ambassador animal presentations (see pages 42–44).

For the purpose of this policy, an Ambassador animal is defined as "an animal whose role includes handling and/or training by staff or volunteers for interaction with the public and in support of institutional education and conservation goals." Some animals are designated as Ambassador Animals on a full-time basis, while others are designated as such only occasionally. Ambassador Animal-related Accreditation Standards are applicable to all animals during the times that they are designated as Ambassador Animals.

There are three main categories of Ambassador Animal interactions:

1. On Grounds with the Ambassador Animal Inside the Exhibit/Enclosure:
  - a. Public access outside the exhibit/enclosure. Public may interact with animals from outside the exhibit/enclosure (e.g., giraffe feeding, touch tanks).
  - b. Public access inside the exhibit/enclosure. Public may interact with animals from inside the exhibit/enclosure (e.g., lorikeet feedings, 'swim with' programs, camel/pony rides).
2. On Grounds with the Ambassador Animal Outside the Exhibit/Enclosure:
  - a. Minimal handling and training techniques are used to present Ambassador Animals to the public. Public has minimal or no opportunity to directly interact with Ambassador Animals when they are outside the exhibit/enclosure (e.g., raptors on the glove, reptiles held "presentation style").
  - b. Moderate handling and training techniques are used to present Ambassador Animals to the public. Public may be in close proximity to, or have direct contact with, Ambassador Animals when they're outside the exhibit/enclosure (e.g., media, fund raising, photo, and/or touch opportunities).
  - c. Significant handling and training techniques are used to present Ambassador Animals to the public. Public may have direct contact with Ambassador Animals or simply observe the in-depth presentations when they're outside the exhibit/enclosure (e.g., wildlife education shows).
3. Off Grounds:
  - a. Handling and training techniques are used to present Ambassador Animals to the public outside of the zoo/aquarium grounds. Public may have minimal contact or be in close proximity to and have direct contact with Ambassador Animals (e.g., animals transported to schools, media, fund raising events).

These categories assist staff and accreditation inspectors in determining when animals are designated as Ambassador Animals and the periods during which the Ambassador Animal-related Accreditation Standards are applicable. In addition, these Ambassador Animal categories establish a framework for understanding increasing degrees of an animal's involvement in Ambassador Animal activities.

Ambassador Animal presentations bring a host of responsibilities, including the safety and welfare of the animals involved, the safety of the animal handler and public, and accountability for the take-home, educational messages received by the audience. Therefore, AZA requires all accredited institutions that make Ambassador Animal presentations to develop an institutional Ambassador Animal policy that clearly identifies and justifies those species and individuals approved as Ambassador Animals and details their long-term management plan and educational program objectives.

AZA's accreditation standards require that education and conservation messages must be an integral component of all Ambassador Animal presentations. In addition, the accreditation standards require that the conditions and treatment of animals in education programs must meet standards set for the remainder of the animal collection, including species-appropriate shelter, exercise, appropriate environmental enrichment, access to veterinary care, nutrition, and other related standards. In addition, providing Ambassador Animals with options to choose among a variety of conditions within their environment is essential to ensuring effective care, welfare, and management. Some of these requirements can be met outside of the primary exhibit enclosure while the animal is involved in a program or is being transported. For example, free-flight birds may receive appropriate exercise during regular programs, reducing the need for additional exercise. However, the institution must ensure that in such cases, the animals participate in programs on a basis sufficient to meet these needs or provide for their needs in their home enclosures; upon return to the facility the animal should be returned to its species-appropriate housing as described above.

### **Ambassador Animal Position Statement**

*Last revision 1/28/03*

*Re-authorized by the Board June 2011*

The Conservation Education Committee (CEC) of the Association of Zoos and Aquariums supports the appropriate use of Ambassador Animals as an important and powerful educational tool that provides a variety of benefits to zoo and aquarium educators seeking to convey cognitive and affective (emotional) messages about conservation, wildlife and animal welfare.

Utilizing these animals allows educators to strongly engage audiences. As discussed below, the use of Ambassador Animals has been demonstrated to result in lengthened learning periods, increased knowledge acquisition and retention, enhanced environmental attitudes, and the creation of positive perceptions concerning zoo and aquarium animals.

### **Audience Engagement**

Zoos and aquariums are ideal venues for developing emotional ties to wildlife and fostering an appreciation for the natural world. However, developing and delivering effective educational messages in the free-choice learning environments of zoos and aquariums is a difficult task.

Zoo and aquarium educators are constantly challenged to develop methods for engaging and teaching visitors who often view a trip to the zoo as a social or recreational experience (Morgan & Hodgkinson, 1999). The use of Ambassador Animals can provide the compelling experience necessary to attract and maintain personal connections with visitors of all motivations, thus preparing them for learning and reflection on their own relationships with nature.

Ambassador Animals are powerful catalysts for learning for a variety of reasons. They are generally active, easily viewed, and usually presented in close proximity to the public. These factors have proven to contribute to increasing the length of time that people spend watching animals in zoo exhibits (Bitgood, Patterson & Benefield, 1986, 1988; Wolf & Tymitz, 1981).

In addition, the provocative nature of a handled animal likely plays an important role in captivating a visitor. In two studies (Povey, 2002; Povey & Rios, 2001), visitors viewed animals three and four times longer while they were being presented in demonstrations outside of their enclosure with an educator than while they were on exhibit. Clearly, the use of Ambassador Animals in shows or informal presentations can be effective in lengthening the potential time period for learning and overall impact.

Ambassador Animals also provide the opportunity to personalize the learning experience, tailoring the teaching session to what interests the visitors. Traditional graphics offer little opportunity for this level of personalization of information delivery and are frequently not read by visitors (Churchman, 1985; Johnston, 1998). For example, Povey (2001) found that only 25% of visitors to an animal exhibit read the accompanying graphic; whereas, 45% of visitors watching the same animal handled in an educational presentation asked at least one question and some asked as many as seven questions. Having an animal accompany the educator allowed the visitors to make specific inquiries about topics in which they were interested.

### **Knowledge Acquisition**

Improving our visitors' knowledge and understanding regarding wildlife and wildlife conservation is a fundamental goal for many zoo educators using Ambassador Animals. A growing body of evidence supports the validity of using Ambassador Animals to enhance delivery of these cognitive messages as well.

- MacMillen (1994) found that the use of live animals in a zoomobile outreach program significantly enhanced cognitive learning in a vertebrate classification unit for sixth grade students.

- Sherwood and his colleagues (1989) compared the use of live horseshoe crabs and sea stars to the use of dried specimens in an aquarium education program and demonstrated that students made the greatest cognitive gains when exposed to programs utilizing the live animals.
- Povey and Rios (2002) noted that in response to an open-ended survey question (“Before I saw this animal, I never realized that . . .”), visitors watching a presentation utilizing a Ambassador Animal provided 69% cognitive responses (i.e., something they learned) versus 9% made by visitors viewing the same animal in its exhibit (who primarily responded with observations).
- Povey (2002) recorded a marked difference in learning between visitors observing animals on exhibit versus being handled during informal presentations. Visitors to demonstrations utilizing a raven and radiated tortoises were able to answer questions correctly at a rate as much as eleven times higher than visitors to the exhibits.

### **Enhanced Environmental Attitudes**

Ambassador Animals have been clearly demonstrated to increase affective learning and attitudinal change.

- Studies by Yerke and Burns (1991), and Davison and her colleagues (1993) evaluated the effect live animal shows had on visitor attitudes. Both found their shows successfully influenced attitudes about conservation and stewardship.
- Yerke and Burns (1993) also evaluated a live bird outreach program presented to Oregon fifth-graders and recorded a significant increase in students' environmental attitudes after the presentations.
- Sherwood and his colleagues (1989) found that students who handled live invertebrates in an education program demonstrated both short and long-term attitudinal changes as compared to those who only had exposure to dried specimens.
- Povey and Rios (2002) examined the role Ambassador Animals play in helping visitors develop positive feelings about the care and well-being of zoo animals.
- As observed by Wolf and Tymitz (1981), zoo visitors are deeply concerned with the welfare of zoo animals and desire evidence that they receive personalized care.

### **Conclusion**

Creating positive impressions of aquarium and zoo animals, and wildlife in general, is crucial to the fundamental mission of zoological institutions. Although additional research will help us delve further into this area, the existing research supports the conclusion that Ambassador Animals are an important tool for conveying both cognitive and affective messages regarding animals and the need to conserve wildlife and wild places.

### **Acknowledgements**

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## Appendix B: Felid Taxon Advisory Group Preventative Medicine Recommendations

### FELID TAXON ADVISORY GROUP PREVENTATIVE MEDICINE RECOMMENDATIONS

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#### ROUTINE EXAMINATIONS

A routine examination schedule should be part of a comprehensive preventative medicine program for each institution holding felid species. Examinations under anesthesia should be performed at least every 2-3 years, but that frequency will be dependent on the age and history of the individual, the species, and the vet staffing of the facility. Many components of routine examinations can be done in between full anesthesia (e.g. in years when no full exam is planned or opportunistically) with training and visual examinations, including assessment of body condition, weight, blood draws, and palpation or visualization of specific body parts. However, this does not replace regular examinations under anesthesia for more thorough physical and diagnostic examinations.

Recommended components of routine examinations:

- 1) Minimum
  - a) Complete physical examination under anesthesia
  - b) Bloodwork:
    - i) Complete blood count (CBC) with manual differential and hemoparasite examination
    - ii) Serum chemistry panel
    - iii) Serum banking
  - c) Urinalysis, if possible
- 2) Recommended:
  - a) Serology
    - i) Baseline serology is recommended at preshipment examination (see below), repeat testing recommended at routine examination if there is a specific disease concern.
      - (1) Feline Leukemia Virus (FeLV)
      - (2) Feline Immunodeficiency Virus (FIV)
      - (3) *Toxoplasma gondii*
      - (4) *Dirofilaria immitis* (canine heartworm) antibody as applicable by region
  - b) Radiographs every 2-3 years
  - c) Ultrasonographic evaluation every 2-3 years if available



## VACCINATIONS

Vaccination of felids are based on recommendations made by the American Association of Feline Practitioners (AAFP)<sup>1</sup> as well as on specific risks to non-domestic felid species and captive situations and risks factors. Vaccination recommendations made by the veterinary advisors are divided into core (recommended for all felids) and non-core (optional depending on the specific disease risk of the species and institution, not generally recommended). Although vaccine-associated sarcomas have been reported rarely in the non-domestic felid literature to date, it is recommended by this group to note the site of vaccination, along with the lot of the vaccine. Vaccines under anesthesia can be given in defined sites on the limbs. The frequency of vaccination varies among institutions. Challenge and serology studies in domestic cats have shown that protection is ensured for at least three years for the killed rabies vaccine and the killed and modified live combination vaccine (panleukopenia, calicivirus, herpesvirus).<sup>2,3</sup> Due to the lack of serology studies and difficulty performing challenge experiments on non-domestic felids, specific information on length of protection from vaccination is lacking, so specific recommendations for vaccination frequency cannot be made, although most AZA institutions report a frequency of every 1-3 years for the core vaccines. A few AZA institutions currently assess need to vaccinate based on titer levels; however, which titer level is protective is not currently known for non-domestic felids species.

### 1) Core vaccines

- a) Rabies (killed, e.g. Imrab 3®, Merial; or recombinant canarypox-vectored, e.g. PureVax Rabies®, Merial)
- b) Feline panleukopenia, calicivirus, herpesvirus (killed, e.g. Fel-O-Vax®, Fort Dodge)

### 2) Non-core vaccines

- a) Canine distemper virus (CDV) only if risk is deemed high (ideally recombinant canarypox-vectored, PureVax Ferret Distemper®, Merial)  
Modified live CDV vaccines are not recommended
- b) FeLV only if risk is deemed high for certain species (killed)

## PARASITOLOGY

A fecal monitoring program is encouraged for all captive felids. Individuals should be treated based on current veterinary medical standards. Animals should be examined for ectoparasites at each physical examination, including fleas, ticks, flies, and other parasites.

## QUARANTINE

Quarantining of captive felids is of utmost importance in order to protect the rest of the collection from infectious diseases. Each institution has its own method of quarantine for different species. Ideally, quarantine should occur in an off-exhibit area separate from other animals, especially other carnivores. Proper sanitation and protective equipment, including

footbaths and removable clothing, when applicable, should be part of the quarantine protocol. Quarantine for all felid species should be at least 30 days.

Preshipment examination is the first step in the process of adding new felids to a collection, and both a thorough preshipment and quarantine examination under anesthesia are recommended. The preshipment examination provides the receiving institution with important information to assess whether specific diseases may be introduced into the existing felid collection and pose an unacceptable risk. The preshipment exam also serves as a baseline for comparison with the results of the quarantine examination. The examination during the quarantine period provides vital information about the animal after shipment and a change in environment, and is an excellent time to gather samples to assess shedding of parasites, recurrence of diseases, as well as to store samples and acquire baseline information for the future.

Recommended components of preshipment examinations:

1) Minimum

- a) Complete physical examination under anesthesia
- b) Body weight
- c) Blood work:
  - i) CBC with manual differential and hemoparasite examination
  - ii) Serum chemistry panel
  - iii) Serology to assess whether specific diseases may be introduced into the existing felid collection.
    - (1) FeLV
    - (2) FIV
    - (3) *Toxoplasma gondii*
    - (4) *Dirofilaria immitis* antibody as applicable by region

2) Recommended

- a) Urinalysis, if possible
- b) Thoracic and abdominal radiographs if feasible
- c) Ultrasonographic evaluation if feasible
- d) Fecal parasite examination

Recommended components of quarantine examinations:

1) Minimum

- a) Complete physical examination under anesthesia
- b) Body weight
- c) Blood work
  - i) CBC with manual differential and hemoparasite examination
  - ii) Serum chemistry panel
  - iii) Bank serum for future serology
- d) Urinalysis, if possible
- e) Permanent identification
- f) Thoracic and abdominal radiographs as baseline
- g) Ultrasonographic evaluation as baseline

2) Recommended:

- a) Three negative fecal parasite examinations during quarantine period

## INFECTIOUS DISEASE TESTING

### Test Definitions & Uses:

It is important to understand the different types of tests for infectious diseases because some tests document exposure while others document the presence of the infectious agent itself.

#### 1) ELISA (enzyme-linked immunosorbent assay)

An ELISA is an assay for detection of either antibodies against a certain infectious agent or antigens (typically proteins produced by the infectious agent). If an ELISA is an antibody test, it can be used to document *exposure* to an infectious agent not the presence of the agent itself. This does not necessarily imply that the animal has that disease, only that the immune system has been exposed to the disease and mounted a response. In some tests, antibodies produced as a result of vaccination will give a “positive” test result, therefore results need to be interpreted with caution and in light of vaccination history. ELISAs that test for antigens are a more direct test for the presence of the infectious agent, but are less commonly available.

Test results can be reported as either positive, negative, or with a titer (e.g. 1:50). Titers can vary by laboratory and repeated tests should only be compared if tests were conducted using the same laboratory.

#### 2) SN (Serum Neutralization)

Serum neutralization tests detect the presence of antibodies to a virus and thus document *exposure* to an infectious agent similar to an ELISA. SN utilizes the ability of antibodies produced by the animal to neutralize the ability of a virus to infect cells and cause damage. Results are typically quantitative and reported as titers, therefore collection of blood samples from two time points during infection (e.g. during the initial stage of infection and some time after) can indicate a “rising” titer and thus an active infection. The higher the number, the more antibodies against the infectious agent.

#### 3) PCR (Polymerase chain reaction)

PCR is a very sensitive test for the presence of RNA or DNA from a given target (e.g. viral RNA) within a sample and therefore is a more direct test for the presence of the infectious agent. PCR is useful for detecting shedding of viral particles and utilizes very small amounts of tissue and or swabs of affected areas. Real-time PCR is a variant of regular PCR and works using the same principles. When submitting samples for PCR, carefully review the laboratory’s guidelines for sample submission and transport.

#### 4) Virus Isolation

Isolation of the virus from tissues, fluids, or swabs identifies the virus within the submitted sample. While virus isolation is the most laborious (and thus expensive) test, the virus, once

isolated, can be further studied to determine whether it is a new strain and research can possibly identify where the virus originated (e.g. domestic cat strain vs. raccoon strain).

## **FELID INFECTIOUS DISEASE TESTING LABS**

### 1) Feline Herpes Virus (FHV)

Serum neutralization (SN) is the most commonly available test for feline herpes virus exposure. However, this test cannot distinguish between antibodies from natural disease versus vaccination. If you suspect an active case, virus isolation from biopsies of the conjunctiva or swabs of the conjunctiva, nasal and/or oropharyngeal region can identify and characterize the virus. Swabs should be sent in transport media or saline and shipped overnight on cold packs. PCR can also be conducted on conjunctival biopsies to confirm active infection.

Recommended laboratories:

Veterinary Diagnostic Laboratory at Cornell University ([www.diaglab.vet.cornell.edu](http://www.diaglab.vet.cornell.edu))

- Serology (serum neutralization)
- Virus isolation

The University of Tennessee College of Veterinary Medicine  
(<http://www.vet.utk.edu/diagnostic/virology/index.php>)

- PCR
- Virus isolation

### 2) Feline Enteric Coronavirus (FCoV)

For cheetahs, current recommendations include both serology (testing for antibodies) AND testing of fecal samples by PCR for active shedding. There are two types of feline coronavirus (type I and II). Currently, the University of Tennessee laboratory is the only laboratory that tests for antibodies against both virus types. To test for fecal shedding, five consecutive fecal samples from each cheetah should be quickly frozen (-20 C or -70 C) then shipped to the University of Tennessee (Dr. Melissa Kennedy) (submission information and forms can be downloaded from [www.vet.utk.edu](http://www.vet.utk.edu) then click on Diagnostic Services, then Virology; or email Melissa Kennedy at <[mkenned2@utk.edu](mailto:mkenned2@utk.edu)>). Serum should also be taken during routine exams.

Recommended laboratory:

The University of Tennessee College of Veterinary Medicine  
(<http://www.vet.utk.edu/diagnostic/virology/index.php>)

- Serology
- PCR for fecal shedding

### 3) Feline Leukemia Virus (FeLV)

ELISA is the most common and available serological test used to screen for FeLV infection. This ELISA tests for the presence of antigen (not antibody) and thus a positive result usually means that the animal is viremic (has virus circulating in the blood). However, viremia can be transient in some cases resulting in a negative result. Additionally, if exposure was recent, retesting a minimum of 28 days after the last possible exposure is recommended. False positive results are also known to occur in non-domestic felids and also when whole blood is used. Therefore, if positive, results should be repeated in 2-3 weeks to confirm. Testing at a second lab that uses a different ELISA kit is also recommended as differing kits have different cross-reactivity with non-domestic felid sera. Additional follow-up tests to discriminate discordant results are the indirect immunofluorescent antibody test (IFA), which tests for cell-associated antigen, and PCR.

Recommended Laboratory:

Veterinary Diagnostic Laboratory at Cornell University ([www.diaglab.vet.cornell.edu](http://www.diaglab.vet.cornell.edu))  
- Serology (ELISA)

#### 4) Feline Immunodeficiency Virus (FIV)

ELISA is the most common serological test used to screen for antibodies against FIV. Because this assay was developed for use in domestic cats, there can be nonspecific reactivity of other felid serum. Positive and/or equivocal results can be tested for specificity (confirmation) using a Western Blot. Cornell will automatically perform a Western Blot on equivocal samples.

Recommended laboratory:

Veterinary Diagnostic Laboratory at Cornell University ([www.diaglab.vet.cornell.edu](http://www.diaglab.vet.cornell.edu))  
- Serology (ELISA)  
- Western Blot

#### 5) Feline Calicivirus

Currently, vaccination for calicivirus is standard practice at most captive facilities, therefore serology may not be useful, as antibodies may be due to vaccination rather than current exposure. If an institution experiences an outbreak and would like to determine if disease is due to calicivirus, the virus can be identified by either virus isolation or PCR. No specific laboratories are recommended.

#### 6) Canine Parvovirus or Feline Panleukopenia Virus

Similar to calicivirus, vaccination is standard practice at most captive facilities. Antemortem diagnostic tests on clinical cases of enteritis include electron microscopy or PCR assays on feces. No specific laboratories are recommended.

#### 7) Canine Distemper Virus (CDV)



Serology using a serum neutralization assay is the most common test for Canine Distemper Virus infection. If this is suspected in a felid, it is recommended to contact the laboratory regarding the case prior to submission. The laboratory assay offered at the Cornell Diagnostic Laboratory has been utilized extensively to diagnose CDV in felids.

Recommended laboratory:

Veterinary Diagnostic Laboratory at Cornell University ([www.diaglab.vet.cornell.edu](http://www.diaglab.vet.cornell.edu))  
- Serology (Serum neutralization)