2015 Pet Desert Tortoise Sterilization Workshop
Final Project Report

Executive Summary

To address threats to the wild desert tortoise due to the proliferation of pet desert tortoises from back-yard breeding, we undertook a workshop to train veterinarians in the procedures for the sterilization of desert tortoises. The training took place on August 15 and 16, 2015, at the Western Veterinary Conference Oquendo Center in Las Vegas, Nevada. The workshop was offered to the veterinarians at no cost, with the understanding that graduates of the training would offer their services at low or no-cost to tortoise owners by appointment or at future sterilization clinics in Las Vegas, Nevada. The workshop was attended by 26 veterinarians, their technicians, and veterinary residents from the states of Nevada (20), California (2) Utah (3), and Arizona (1). Tortoises participating in the workshop consisted of 78 animals; 54 (25 females, 29 males) were found to be of sufficient sexual maturity to undergo sterilization and were sterilized. The remaining 21 tortoises were not sterilized for various health-related issues that precluded surgery. Additionally, 58 tortoises were micro-chipped and registered by Tortoise Group, the remaining tortoises not micro-chipped and registered at the clinic previously received this service. The participating veterinarians and their staff were highly appreciative of the training and very supportive of our goals for the captive and wild desert tortoise programs, and all are willing to provide their services for future sterilization clinics open to the public. We have had numerous requests for future continuing education on desert tortoise care from local Las Vegas veterinarians and their staff.

Introduction

Background and Need

One of the least publicized threats to recovery of the wild desert tortoise is the proliferation of pet desert tortoises within the tortoise's natural range. Management of this population of pet tortoises is necessary to reduce the back-yard breeding that is resulting in:

- Thousands of unwanted pets were previously turned in annually to the Desert Tortoise Conservation Center in Las Vegas, Nevada prior to its closure at the end of 2014, many other tortoises are also turned in to other adoption centers throughout California, Arizona, and Utah for care and in need of medical attention.
- Unknown numbers of pet tortoises may be turned loose into the wild where they may spread diseases and disrupt resident wild populations; and, most critically,
- Use of funding to manage captive tortoises precludes the availability of limited funds for the recovery of wild populations, our primary goal.

Problem Solution

While this is not a problem that can be solved quickly, one solution to back-yard breeding is the sterilization of the pet tortoise population. All of the tortoises utilized at this year's clinic were obtained from private custodians. Almost all of the tortoises sterilized were from homes with

multiple tortoises that had previously been breeding. Many of these custodians were initially contacted during the first ever "Micro-chipping and Registration Clinic" held on May 30, 2015, that was attended by over 100 people and 73 tortoises were registered and micro-chipped. The Clinic was a cooperative effort between Tortoise Group, Nevada Department of Wildlife (NDOW), U.S. Fish and Wildlife Service and the Clark County Desert Conservation Program.

It is our goal to sterilize all pet tortoises prior to adoption and make sterilization of pet tortoises available and affordable to the public who may have multiple tortoises to result in a decrease in back-yard breeding. To provide sterilization to centers where desert tortoises are adopted and to the public custodians of desert tortoises, it is necessary to have veterinarians who are trained in the surgical procedure available to perform sterilizations either at a low cost or *pro bono* basis. Because it was necessary to have the sterilization techniques employed on desert tortoises tested and approved scientifically through peer review prior to implementation of a sterilization program for desert tortoises, a trial for the sterilization of desert tortoises was undertaken in 2013 and is described below.

In May 2013 fifteen (15) adult male and female desert tortoises from the Desert Tortoise Conservation Center, Las Vegas, Nevada, were transported to Dr. Stephen Divers at the University of Georgia, Athens, Georgia, to undergo a trial for endoscopic sterilization. Dr. Divers was selected to perform this trial surgery because of his success with these techniques performed on hybrid Galapagos tortoises in 2009 to ready them for release into the wild where they could serve as "habitat engineers" on Pinta Island where no native species was yet available (Flanagan 2011; Knafo et al. 2011; Innis et al. 2013). Relatively simpler sterilization of males by phallectomy (removal of the phallus) had been previously proved effective (Rivera et al. 2011).

Females had their ovaries removed (oophorectomy/ovariectomy) and males had their testes removed (orchiectomy) through the use of endosurgery. The objective was to develop a minimally-invasive means of sterilizing tortoises. A benefit of an endoscopic approach was that it offered the surgeon an opportunity to determine if there was any reproductive or other organ pathology present within the animal and provided an opportunity for the sex of the animal to be confirmed. The trial was successful (Proença et al. 2014). All but one animal (that did not recover from anesthesia) were returned to the Desert Tortoise Conservation Center where they were adopted to local homes. This trial was funded by Clark County (transport of tortoises and post-operative care) and by the University of Georgia.

At the completion of the sterilization trial, veterinarians from Nevada, California, Arizona, and Utah as well as management agencies from these four states expressed interest in learning these surgical techniques with the goal to make this service available to the tortoise-owning public and potentially offer sterilization clinics.

Materials and Methods

Sterilization training for veterinarians was implemented on August 15 and 16, 2015, at the Western Veterinary Conference, Oquendo Center in Las Vegas, Nevada. The clinic was offered to the trainees at no cost, with the understanding that graduates of the training would offer their services at low or no-cost to tortoise owners by appointment or at future sterilization clinics in

Las Vegas, Nevada. The training was led by Drs. Jay Johnson (Arizona Exotic Animal Hospital, Mesa, AZ), Peregrine Wolff (NDOW) and Katie Delk (San Diego Zoo Global), who demonstrated non-endoscopic assisted ovariectomy, ovariosalpingectomy, phallectomy, anesthetic techniques, and general veterinary diagnosis and care for desert tortoises. The clinic this year intentionally focused on non-endoscopic techniques as the technique is less costly to perform, and access to an endoscope is often not readily available in most veterinary clinics.

In order to permanently identify a tortoise as being sterilized, animals that underwent an ovariectomy or phallectomy received two notches in their supracaudal scute, one notch on each side of the tail. This scute was chosen as it is not utilized in any of the identification notching schemes that are used for marking wild tortoises. Tortoises that were too immature to undergo sterilization had a piece of paper with either M or F applied with epoxy to the supracaudal scute.

All tortoises were taken in from private custodians 2-3 days prior to the clinic and were held at the Oquendo Center where the received health assessments, and were soaked 48 to 72 hours pre-surgery to encourage emptying of the urinary bladder and colon. At this time animals were also held of feed. Each tortoise was housed in an individual 50 gallon tote on newspaper. The temperature within the holding rooms was maintained at approximately 85 degrees F.

The animal's individual ID # was written on the tote as well as on a piece of colored tape that was applied to the carapace. The tortoises were kept separated in totes to minimize the potential for cross contamination. All animals were handled with exam gloves and gloves were changed between each animal.

All of the tortoises that were sterilized were held for a week after surgery for post-operation care and observation that included the administration of analgesics and antibiotics. Post-op care and observation was conducted at least once per day by a veterinarian, with additional care provided by vet-techs and Tortoise Group staff and volunteers.

Results and Evidence of the Results

Participants in the training clinic consisted of 26 veterinarians, their technicians, and veterinary residents from the states of Nevada (20), California (2) Utah (3), and Arizona (1). Tortoises in the workshop consisted of 78 animals; 54 (25 females, 29 males) were found to be of sufficient sexual maturity to undergo sterilization and were sterilized. The remaining 21 tortoises were not sterilized for various health-related issues that precluded surgery. Additionally, 58 tortoises were micro-chipped and registered by Tortoise Group, the remaining tortoises not micro-chipped and registered at the clinic previously received this service.

All participants were provided with a flash drive containing pertinent literature, videos, and Power Points of the instructor presentations and surgical procedures for future reference.

In free-ranging Mojave Desert tortoise a midline carapace length (MCL) of =/> 180 mm corresponds with the appearance of sexually dimorphic traits, and the onset of egg-laying in females. Tortoises of this size are generally considered to be "adults". However, in captive

populations, it is not unusual for tortoises to reach this size prior to obtaining sexual maturity due to the increased availability of feed and water.

Tortoises were maintained in the individual 50 gallon totes for 7-9 days post-operatively at the Oquendo Center. All animals received pre-operative antibiotics and pain medication and for 3 days following the procedures. Animals were observed and cleaned daily if they had defecated or urinated. The presence of a bowel movement or urination was noted for each animal. If males had undergone phallectomy they were also monitored for the presence of blood being passed from the cloaca. Post-op care and observation was conducted at least once per day by a veterinarian, with additional care provided by veterinary technicians, and Tortoise Group staff and volunteers.

Starting the day after the clinic, Mazuri® Tortoise Diet nuggets were soaked into a firm mush and this was offered daily to each tortoise. In cases where the tortoise did not eat Tortoise Diet, natural food sources were offered.

Surgical and Post-operative Complications

One large female tortoise had intra-operative complications due to large follicles at the time of surgery. However, the tortoise is doing well and appears to have made a full recovery at this time. Several other large females were determined to have large follicles and were disqualified from surgery upon inspection with an ultra-sound. The dates for the clinic were chosen (late August-early September) because it was anticipated that all females would have laid eggs by this time and would be egg and follicle free, as egg-laying in wild Mojave populations generally occurs in May-June. However, Mojave desert tortoises may lay more than a single clutch per season, and therefore, eggs and/or enlarged follicles may be present throughout the summer active season (April – August). The documentation of multiple clutches in captive female Mojave tortoises led to the development of recommended changes to procedures for next year's clinic (please see "Recommendations" below).

Six males passed small amounts of blood (primarily clots) from their cloaca post phallectomy, of these, three tortoises needed to be resutured. Although these were minor complications, we are recommending additional time and instruction be spent on the phallectomy procedure to help further minimize the potential for post-operative complications (see below).

Recommendations

Based on the verification that female Mojave desert tortoises may lay multiple clutches during the summer active season (April – August), and therefore, may have eggs and/or enlarged follicles at any time during this period, the following changes in procedures for subsequent sterilization clinics are recommended. We are also recommending the following change to phallectomy classroom and wet-lab instruction in an effort to further reduce cloacal bleeding and post-operative complications with male tortoise undergoing phallectomies.

1. All female tortoises will receive an ultra-sound to determine the presence of enlarged follicles prior to initiating surgery.

2. Female tortoises with follicles larger than 15 mm are not candidates for oophorectomy/ovariectomy and should be precluded from sterilization at the clinic (J. Johnson, personal communication, August 27, 2015). This is because follicles larger than this size cannot be safely removed through an incision in the prefemoral fossa, the incision that is used to perform the oophorectomy/ovariectomy.

3. Enhance classroom instruction and wet-lab oversight for students performing phallectomies in an effort to reduce post-operative complications due to cloacal bleeding.

Evaluation/Discussion of Results

A total of 54 (25 females, 29 males) tortoises were successfully sterilized from private custodians in the Las Vegas area. The participating veterinarians and their staff were highly appreciative of the training and very supportive of our goals for the captive and wild desert tortoise programs. As a show of support, four of the participating clinics offered to remove sutures from the sterilized tortoises free of charge to new tortoise custodians. Most or all of the participating veterinarians are willing to provide their services for future sterilization clinics open to the public. We have had numerous requests for future continuing education on desert tortoise care from local Las Vegas veterinarians and their staff. Also, the primary veterinary instructor from last year the University of Georgia (Dr. Steven Divers) conducted a trial sterilization procedure for smaller tortoises utilizing endoscopic methods in July of this year in cooperation with the U.S. Fish and Wildlife Service, NDOW and Tortoise Group.

The following is a list of benefits to the desert tortoise provided through the experience of this clinic:

- 15 local (Las Vegas) veterinary hospitals that are willing to participate in sterilization clinics for pet tortoises, treat local pet tortoises for other health issues, and wish to continue to be educated in desert tortoise biology and medical care.
- Veterinarians and veterinary technicians from other states throughout the range of the Mojave desert tortoise (California, Arizona, and Utah) also participated promoting consistency in captive tortoise management throughout the range of the Mojave desert tortoise.
- A local veterinarian trained in the sterilization techniques is under contract to provide the procedures on an “as needed” basis as part of our captive tortoise management program.
- Safe, effective and cost-efficient methods for sterilization, and trial of new sterilization for smaller tortoises which are not yet reproductively mature.
- Sterilization of 54 tortoises with application of permanent ID.
- Cooperation and enthusiastic support of the Western Veterinary Conference Oquendo Center for future endeavors to benefit the desert tortoise, including additional training and sterilization clinics. Positive public relations for desert tortoise issues as a whole.
- Increased and positive messaging to discourage back-yard breeding.

Conclusion

- Two sterilization clinic annually for the sterilization of pet tortoises from the public and prospective pet tortoises from the Tortoise Group where tortoises will be sterilized at low or no cost to custodians.
- Begin sterilization of all tortoises handled by the Tortoise Group before they are transferred to a new custodian.
- Continue to conduct micro-chipping and registration clinics for the public to support the sterilization program and improve management of captive tortoises.
- Continue the "stop backyard breeding" public education and awareness campaign.
- Continue to support the development of additional sterilization techniques for "smaller" tortoises that are not yet reproductively mature.

Recommendations

The USFWS and NDOW will be planning a sterilization clinic for 2016 to sterilize additional tortoises. Tortoises for this clinic will be those brought in by their custodians and prospective adoptees from the Tortoise Group. All participants (vets and instructors) are enthusiastic about these future clinics and are willing to provide their services on a *pro bono* basis.

Literature Cited

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