WARTHOG IMMOBILIZATION, DISEASE SURVEILLANCE AND BUFFALO RELEASE IN THE SANCTUARY

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Gorongosa National Park Restoration Project

Introduction

In the period of 15-30 of September the following activities were carried out:

- Immobilization and sampling of 10 warthogs in the framework of the project “African Swine Fever Virus: Development of Vaccines and Epidemiological Investigations” (OV25/03/c132)
- Collection of soft ticks from 32 warthog borrows. (Carried out by the visiting scientists)
- Improvement of the veterinary office. Establishment of testing for intestinal parasites.
- Disease surveillance.
- Buffalo release in the sanctuary.

1. Immobilization and sampling of warthogs.

Immobilization of warthogs is seldom done in wildlife veterinary practice. Warthogs are difficult animals to approach, immobilize and very often react with hyperthermia resulting in death (Figure 1).

Figure 1. Warthogs are difficult to approach. When this is not the case, like the animal in the picture, they are usually suffering from some kind of impairment. This one was lame and after some pursuit decided to return to the pond for cooling. The breathing frequency was high and the decision was taken not to dart him despite of the close distance achieved (6 meters).

Due to the need to immobilize a large number of warthogs (30) within the revised sample size (initially only 10), it was decided to adjust the immobilization protocol to the conditions of Gorongosa National Park, especially in relation to warthogs present in the open plains. Three (3) protocols of immobilization were used and evaluated. Three animals were used for each protocol. Protocol Z (Zooletil alone), Protocol KXH (Ketamine+Xylazine+Hylase) and Protocol ZA+KA (Zooletil+Azaperone with toping up Ketamine+ Azaperone IV);
The results indicated that protocol Z (used previously in the area with 30% tree cover (i.e Picada 2 and 3), was not appropriate for animals darted in the plains. The induction and recovery were both violent and animals moved out from shaded areas being exposed to direct sunlight resulting in death by hyperthermia.

The second protocol KXH did not result in proper immobilization. After falling the animals wandered around erratically and this made sampling impossible.

The third protocol (ZA+KA) was designed to produce a smooth induction and recovery and limit the movement of the animals during the recovery phase. This protocol was adequate for the immobilization of warthogs close to the open areas with limited shade available. A toping-up cocktail of (AK) Azaperone Ketamine 10 mg and 50 mg respectively was used in the cases of warthogs in which only very superficial anesthesia was achieved.

For all immobilizations water (20-40 liters) was used to cool the animals down. The warthogs were left alone once recovery was on the way. As soon as it was possible to approach them safely the animals were blindfolded (Figure 4.), and an ointment used to protect the cornea. After the sampling was finished, to some animals Doxapran - a respiratory stimulant was administered, to improve the respiration. Animals were immobilized either in the morning or late in the afternoon. Some animals were left to recover in lateral recumbence while others were left in sternal recumbence.

Figure 2. a) Warthog moved to a shaded area being cooled with at least 20 liters of water and being treated for bruising after immobilization with Z protocol b) Warthog immobilized with ZA+KA protocol in sternal recumbence after induction of anesthesia.

Figure 3. a) Natural sternal position of warthogs while resting\(^2\) and b) warthog immobilized and left in sternal recumbence to recover.

\(^2\) Adult male warthogs seemed not to tolerate young animals in the same shaded area. This one chased the younger one away and then went to rest. This fact may have some influence if a ‘no owner’ of the shade is left to recover from anesthesia in a shade that “belongs” to another male adult.
The sternal recumbence was decided upon observation that animals rest in that position and/or fall under anesthesia also in that position. Three (3) animals died due to hyperthermia as a result of violent recovery and exposure to direct sunlight. All three animals moved from the shades where they were left after the immobilization. The dead animals were examined and tissue samples collected. The necropsy finding indicated that hyperthermia was the main cause of death although one individual had pneumonia in one of the lungs (the function of this lung was compromised) and peritonitis. Other animal had a mild parasite infestation in the spleen (possibly Filarias) and the third one was an old individual. Due to all constraints mentioned (difficulties in approaching, anesthesia, recovering time and susceptibility to hyperthermia) this activity proved to be time consuming and progress was slow.

All samples including tissue samples will be sent to Onderstepoort Veterinary Institute (South Africa) for further analysis. No samples will be kept in GNP because of lack of reliable freezing facilities.

Fecal samples of all animals were examined for parasites using a centrifugation/ flotation method with saturated saline solution. Slight infestations of intestinal nematodes (Strongyles) were found in 3 animals. These findings indicate the negligible role of these parasites in the sample of warthogs examined.

To move the warthogs from the places of their immobilization to more suitable places where the recovery should take place, a dragging mat (made of several layers of shade cloth) pulled by the car was devised and used. This helps much to move the animals and avoids bruising or straining of the joints when animals are relocated by hand (Figure 4).

Recommendations: Based on the findings and results of immobilization it is recommended that (i) further work with warthogs to be carried out with the ZA+KA protocol (ii) immobilizations should be carried out preferably in the late afternoon, (iii) a 4th protocol (ZM +A) Zooletil + Medetomidine with Atipamazole to revert Medetomidine or with Atipamazole + Flumazenil (the latest to revert Zooletil) should be experimented. This protocol may allow for fast-induced recovery (45-60 min after induction against 60-180 min for the other protocols used). The drugs needed will be requested from the ASF project team leader.

Figure 4. a) Warthog blindfolded after immobilization and b) blood sampling in the saphena vein (hind leg).
2. Collection of soft ticks.
Collection of ticks was carried out by the visiting scientists from Mozambique South Africa and France. Thirty two (32) warthog borrows were examined and soft ticks found and collected for further examination. The method used followed a specific protocol established in advance which consisted in cleaning up the entrance of the borrow, collecting earth from the floor and walls and picking up the soft ticks by hand. A petrol mulching blower/vacuum (RYOBI) with an iron filter was used to obtain the samples of earth from the depths of the borrows.

3. Improvement of the veterinary office. Establishment of testing for intestinal parasites.
Despite of lack of water and better cover agreed on more that 5 weeks ago, we tried to improve the working conditions in the Veterinary Office. We processed samples of blood, hair, skin and fecal material. The latest was examined for parasites using simple centrifugation and flotation techniques with saturated saline solution. We have a freezer and a refrigerator working and installed recently a solar panel to supplement energy for the refrigerator, which can switch automatically from AC to DC (12-14 volt). We installed a manual centrifuge and used the microscope for the first time. We battle with decontamination of potentially infected material but we used powerful chemical disinfectants to inactivate possible pathogens and kept all disposable material in the office for the time being.

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Figure 5. a) Warthog being relocated to a shaded area using the car and b) later using a mat pulled by the car.

Figure 6. a) Ferran Jori CIRAD-France), visiting scientist digging a warthog borrow and b) Wilna Vosloo (OVI, South Africa), and Carlos Quembo (LRM Mozambique) looking for soft ticks.
**Recommendations:** The water connection is urgent as it is urgent the acquisition of lockable cupboards to keep the equipment, drugs and reagents safe. The office needs at least 2 adjustable chairs that can be used both for the office and laboratory table.

4. Disease Surveillance
During the work carried out we looked for dead animals to investigate the possible causes. Apart from animals caught by the fire in and around the sanctuary (5 oribi, 1 bush pig and warthog and one python), we have examined one bush pig found dead in Picada 2, approximately 8 km form Chitengo. This animal had signs of burns and probably died as a consequence of that. Observations were carried out in Picada 4, 5, 2, 3, 11 (Urema Road). Apart from one old warthog seen by Mr. Mike MacNamara showing signs of weakness (Urema road) there were no more cases reported or seen (Figure 7). From the necropsies of 3 animals that died from hyperthermia after immobilization we got evidence that apparently healthy warthogs may be suffering from parasitism (other than intestinal) and other diseases, such as respiratory infections (Figure 8). 

**Recommendations:** (i) any death found in the park must be reported to the veterinarian. A first report would consist on location of the animal and the signs observed by the “fiscais”. If at all possible this animals (recently died) should either be transported to the Chitengo to the veterinary office when the veterinarian is present for further examination. Alternatively the veterinarian will visit the location where the animal was found, obtain information from the “fiscais” and examine the carcass. (ii) a simple report format should be prepared to be included in the kit of the “fiscais” for them to report deaths and other abnormalities with the animals. This should be followed up by a short instruction session on how to collect information and samples in the future.

![Figure 7. Areas inspected for sick or dead animals and location of dead bush pig.](image_url)
5. Buffalo release in the sanctuary.
The health status of the buffaloes was in general good. Most of the animals are adapting well. Only two animals seemed to have problems and show a poor body condition.
Due to the problems of water supply it was decided the gates to the sanctuary to be open to allow for the passive movement of the buffaloes into the sanctuary. The gates will be kept open to allow the buffaloes to have free access to water while availability of water is a reality in the sanctuary. Although the lack of water has been a major problem for the release of the buffaloes and for further animals to be introduced in the sanctuary, the establishment of artificial water points as it is being pursued will allow for close observations of the animals introduced and for any intervention that might be needed.

6. Other issues.
Security: Before the scientific work started we requested 2-armed scouts 1 vehicle and 2 radios.
Security during work was of low standard. The scouts that accompanied the two groups knew very little about the area (we worked in the road network area), allowed the group to disperse and even get lost. They never before saw a lion, for instance. Part of the fault lies on the scientists and the nature of their work. Borrows had to be found and samples collected, so people moved around looking for them. The second group had a better security record since the members did not need to disperse to carry out the work and had at least some means (darting) of keeping unwanted animals at a distance. A dart with scoline (Succinylcholine) was prepared in case the elimination of an attacking animal was necessary. Unfortunately in case scoline should be used the animal would certainly die. A rifle can be used to scare an animal away.

Recommendations: Knowing that the process of acquiring rifles and deploying them is a complex issue in GNP, we suggest that at least the veterinarian in charge should have a license to carry a rifle. This is an individual process that can be only supported by the GNP Administration to justify the request. Effort to acquire at least one rifle and have a scout properly trained to use it should be a priority.
Communication: A radio and a specific channel for communication should be arranged for the veterinarian to allow swift communication with the “fiscais”, park warden and sanctuary manager.
Equipment: Some of the equipment was acquired and paid by the Carr foundation and delivered directly to Chitengo. Until now we were unable to locate the pole syringe brought to the park by Jeremy Anderson. Although we were able to locate the speakers and the amplifier for the lion call, the CD player as well as the CDs is not yet accounted for. Some of the equipment being used for the
veterinary activities either belongs to individuals or to the National Directorate of the Veterinary Authority.
Recommendation: Start an inventory process of all the equipment that belong to the Carr Foundation and keep duplicate of the records at the administration.

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