

**POPULATION AND HABITAT
VIABILITY ASSESSMENT FOR THE
NAMIBIAN CHEETAH (*Acinonyx jubatus*)
AND LION (*Panthera leo*)**

**11-16 February 1996
Otjiwarongo, Namibia**

**Workshop Report
February 1997**

SECTION 4

APPENDICES

Appendix I

**STATEMENT BY HIS EXCELLENCY PRESIDENT SAM NUJOMA
ON THE OCCASION OF
THE POPULATION AND HABITAT VIABILITY ANALYSIS WORKSHOP**

**12 FEBRUARY 1996
OTJIWARONGO**

Mr. Chairman
Honourable Minister of Environment and Tourism
Your Excellency, Ambassador Marshall McCallie
Dear Participants
Ladies and Gentlemen,

It is a great pleasure for me to have been invited to officially open this important workshop. I am filled with pride that Namibia is given the honour and responsibility to host an international workshop on the cheetah, which is Africa's most endangered large cat, and the lion -- that majestic symbol of the continent.

At the outset, I would like to welcome all participants to the workshop. A special word of welcome goes to those participants who come from outside our borders. In addition to local and regional delegates, I am informed that we have amongst us delegates from other parts of Africa and others from as far afield as the United States of America and Europe. You are all welcome indeed.

As Patron of the Cheetah Conservation Fund, I would also like to congratulate the organisers of the workshop for doing their best to give this workshop an international flavour. It is also commendable that the organisers saw it fit to involve local farmers, ranchers, and veterinarians in this effort.

Namibia is today home to the last large population of cheetah in the world. It, therefore, goes without saying that with such an asset, a great deal of responsibility has been placed on our shoulders. It is a responsibility that the Government, nongovernmental organisations, farmers, and private individuals must address collectively. In our efforts to fulfill this duty, we must avoid the temptation of neglecting or passing our duties to others. When it comes to

environmental conservation, be it our flora or fauna, we all have something to contribute towards the effort.

Ladies and Gentlemen, I would not be over-emphasizing when I repeat again and again that the only effective way to protect the environment is for the Government, the scientific community, the private sector, and the local people to collaborate in their efforts.

We in Namibia have introduced a Lion Policy which aims at protecting that species which is also endangered in the wild. It is my hope that this workshop will set in motion preparations, not only of Namibia's National Cheetah Plan, but also the preparation for an international cheetah plan covering all countries and territories wherever cheetah populations can be found. Just as the international community of nations has adopted protocols and conventions to protect several other endangered species, I do not see any reason why it cannot be done for the cheetah.

Ladies and Gentlemen, I mentioned earlier that collaboration between Governments and other social entities provides a winning strategy in conservation. I would like to mention here that such conservation efforts should not be impeded by national borders. Just as our wildlife does not recognize such borders, our efforts to protect them and conserve them must be uniform and not border-bound. In other words, we must find ways whereby conservation strategies can be harmonized to allow for effective conservation on a global scale.

As it has been said, the global village is becoming increasingly smaller, which makes co-operation and coordination inevitable and necessary.

As citizens of the world we must recognize the importance of teaching our children the values and the importance of environmental conservation and protection. We are living in times that are rapidly changing. As such, we must all adapt our lifestyles to these changing circumstances.

It has now become a necessity that environmental education should be part of each and every child's school curriculum. In that manner, they will grow up with the appreciation for protecting the natural environment and its wildlife. That in turn enables them to protect and conserve the environment and its sub-systems for their children and generations to come.

Ladies and Gentlemen, in developing countries such as Namibia, conservation of the environment presents many positive spin-offs. While protecting the lives of endangered animals, our efforts will and can promote the tourist trade. There is widespread consensus that tourism is set to grow and become an important economic sector, especially in the economies of Southern African States. I, therefore, believe the resources that we invest in environmental conservation today will eventually pay off.

It is my sincere hope that all participants present here today will learn a great deal from each other. Since delegates come from such diverse backgrounds, there is no doubt that the exchange of ideas and experiences will be most enriching. The presence of many experts in the field of conservation as well as farmers and community members who are in continual contact with the animals concerned will contribute greatly to the deliberations and dialogue that will get underway during the course of the workshop.

Ladies and Gentlemen, it is a sad truth, however, that in some instances nature conservation has been pursued at the expense of, and at times to the detriment of, human populations sharing the same habitats as the animals or plants targeted for conservation. It is my wish that this workshop looks critically at the dilemma of nature conservation on the one hand, and the preservation of humans and their livelihoods, on the other.

I would like to emphasize that our responsibility lies with both environmental conservation and safeguarding the interests of human beings and their livelihoods. It is my belief that this can be done. All we have to do to achieve it, is to find sustainable ways in which nature and human beings can co-exist peacefully. In fact, many Namibian farmers already serve as models of good wildlife and habitat management for other countries where lion and cheetah can be found.

A workshop of this nature provides a forum where conservationists from around the world can come together to devise new strategies, improve upon existing ones, and compare notes. It is my call to you that we must all do our best to protect our earth and preserve it for the coming generations. Our efforts must be coordinated regardless of what part of the globe we may come from. If we do not, posterity will judge us for having neglected a sacred duty.

Finally, I would like to wish all the participants fruitful and productive deliberations during the workshop.

With these words, I now declare this workshop officially open.

I thank you.

Appendix II

SPEECH OF MINISTER OF ENVIRONMENT & TOURISM**CHEETAH AND LION PHVA WORKSHOP
12-17 FEBRUARY 1996**

Mr. Chairman, visitors to Namibia, workshop participants,

It is my honour today to make some introductory remarks before the start of this serious and important workshop.

It is common knowledge that we take our wildlife conservation matters very seriously in Namibia and Southern Africa as a whole, and we like to think that we have made significant advances in this field.

In Namibia, we believe strongly that the only viable conservation policy is one that is based on the sustainable use of our natural resources. This principle is even spelled out in our Constitution, and I would like to refer to Article 95 of our Constitution which reads as follows:

Article 95: Promotion of the Welfare of the People

The State shall actively promote and maintain the welfare of the people by adopting, inter alia, policies aimed at the following:

(I) maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilisation of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future;

Mapping out a future is more problematic for some species than for others, and these include specifically the large carnivores. These species are not easily confined to protected areas, and are responsible for major damage and irritation in farming areas. Protected areas are seldom large enough to contain viable populations of large predators such as lion and cheetah, and it appears inevitable that some new management options will have to be developed in order to maintain such species through the next century.

At first glance, the odds that any wild cheetah and lion will be left on the farming areas of Southern Africa in the next century are very small indeed. Everywhere people are encroaching on wildlife habitat in a way that leads to the exclusion of wildlife - with the dangerous large cats amongst the first to disappear. Everywhere, that is, except where a new

set of rules are followed. I refer here to a knowledge of simple economics, a basic understanding of costs and benefits and what motivates people. Many of us today believe that conservation is not exempt from human nature or economics and indeed is just one more alternative form of land management! This sounds cruel and cold, but in Southern Africa we have seen a form of land management develop where the value of wildlife, including the large carnivores, has been found to exceed the damage that they cause. The growth in eco-tourism and sport hunting as well as the commercial demand for live specimens have made it possible for us to become somewhat more optimistic over the future of cheetah in particular.

Few people can afford to conserve animals such as lion and cheetah purely for the sake of conservation or some deep ethical or moral imperative. Most of the citizens of our region have to make do with the resources available to them - and these are often not in great abundance. As a consequence, people cannot easily absorb the damage done by the large predators as well as other depredations on their livelihoods caused by drought, disease, market fluctuations, stock theft, and all the other imbalances. I was shocked to learn that cheetah are not even welcome or tolerated on most of the game ranches in Namibia, as they prey on expensive re-introduced rare antelopes, etc. In the large parks, they are apparently suppressed by lion and hyenas.

Where will they then survive? On the cattle ranches? We have a great deal of problems ahead, which will require our best efforts, or else lion and cheetah might only survive as semi-tame tourist habituated relics in a few game reserves.

This workshop has therefore come at an opportune moment for three reasons:

First: Namibia is a co-proponent of a down-listing petition for cheetah in the U.S. Endangered Species Act. Both the petition and the Act are currently under review and are controversial. I feel that the commitments made by our landowners and hunting community towards cheetah conservation deserves recognition, including the opening of the U.S. market for sport-hunting. We already have an export quota from CITES, and there is no reason why any market should remain closed arbitrarily. We also believe that we as Namibians are in the best position to evaluate conservation options for our species.

Second: I have just recently obtained Cabinet approval to increase the status of lion (and wild dogs) in Namibia to protected species - meaning that landholders may only legally destroy these species where there is a real and immediate threat against the lives of people and livestock, and must then report such a killing within a set period of time. We know that it is difficult to prove whether or not lives were actually threatened by wild animals, and if the killing of lion on a farm was justified. But we hope that the legal requirement to report such incidents will at least give us new insight into the scale of the problem. This is not all that we need to do to secure the future of lion in Namibia. More needs to be done, and I hope that

you will come up with new ideas.

Third: My Ministry has launched an initiative to draft a national cheetah conservation plan, hopefully something that all the various organisations involved with cheetah issues in Namibia can subscribe to, and we will make use of all the information and ideas generated at this workshop. We are happy that so many people and organisations are involved, as Government alone cannot deal with the complex problems at hand. However, we need to work together rather than against each other, and each party needs to know what everybody else is planning to do. I hope this initiative will be supported by all the organisations present here.

Although a major focus this week will be the Namibian populations of lion and cheetah, we are not alone, and our populations are not isolated. In the past year, we have had incursions of lion from South Africa, Angola, and Botswana, and who knows where our lion and cheetah have been. We need to expand the excellent level of co-operation that we have achieved within the region on rhino and elephant management to include other species, such as the large carnivores.

I trust that with these few introductory remarks, I have started the ball rolling. I hope that you will have fruitful discussions of this very interesting and very important programme and I hope that all visitors to Namibia will enjoy their stay and that they will come again. You are most welcome.

I thank you.

The Honourable Gert Hanekom

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11-16 February 1996, Otjiwarongo, Namibia
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Appendix IV

Ode to the Otjiwarongo Cheetah and Lion PHVA Workshop by *Frans Ferrera*

For me the week's conversations have come to an end.
I want to conclude with a few words, my friend.

The farmers say "Please kill them - keep the numbers down"
My spouse and her daughter want a new dressing gown.
My bank manager says "Please stop my friend,
there is no money for a new holiday tent."

The conservationists say "We want more land!!"
In that way the numbers will expand.

The scientists say "We will take the semen,
and x-ray it with lots of venom
to make them vigorous and highly fertile,
let them grow and catch the eye
of people who love them and don't want them to die!!"

The government says "What is the matter?
We will keep going on with lots of chatter.
Money is the big problem today;
what can we do anyway?
We must keep the people happy
and distribute the lot.
For so many spoons, we need a bigger money pot."

The cause of the problem is visible and clear.
There are too many people on earth, my dear.
The solution is, I would say, intervene in mans' reproductive way.
Sterilize the women
Castrate the men
Then we can try for a better balance again.

Appendix V

Development of a Genome Resource Bank for Cheetah and Lion in Namibia

The cheetah and lion stand as symbols for the importance of African wildlife conservation. These felids have extraordinary charisma and, as a result, serve as models for why humans should care about and conserve nature. Almost all school-age children can imitate the lion's roar and tell you that the cheetah is the speediest creature on earth. But more importantly, these species are large carnivores at the top of nature's food chain. Their survival is vital to the entire ecosystem; their extinction would most likely create a catastrophic "domino" effect on other species, ultimately decreasing biodiversity.

Of all African countries, Namibia has a unique challenge to conserving wildlife, largely because most wild animals live on farmlands. The cheetah and lion are no exception, and therein lies the problem because these species can prey on livestock. Ways to circumvent this human-animal conflict are discussed in other parts of this document. Nonetheless, it is a general conclusion of this workshop that productive farming can be sustained in conjunction with an integrated and intensive management plan for wild felids. For the cheetah, solutions will involve the frequent capture of cheetah on farmlands for translocation and re-release. Because these animals represent an extraordinarily valuable resource of genes and Namibian heritage, it is recommended that a National Genome Resource Bank be established for the cheetah and lion.

Justification for Genome Resource Banks

A Genome Resource Bank, or GRB, is the organized collection, storage and use of biomaterials, especially sperm, embryos, tissues, blood products, and DNA. The cryopreservation of such materials is an emerging "tool" that has enormous implications for the assessment, conservation, and sustainable use of natural resources. A GRB is not established for the purpose of replacing living animals in nature or in zoos. The mission of a GRB is to support existing efforts to preserve species and all currently available genetic diversity within those species.

There are many practical advantages of a GRB for facilitating cheetah and lion conservation. For example, 1. An organized GRB could provide a repository of frozen gametes, embryos, tissues, blood products, and DNA. The value of a GRB for a wild population could be enormous by helping to provide 'insurance' against catastrophes, especially emerging diseases, natural disasters, and social/political upheaval. The cheetah and lion populations may suddenly become infected with sinister viruses, similar to the recent canine distemper epidemic

that decimated the East African lion population. Availability of frozen serum and tissue that have been collected over time could be used to retrospectively identify the onset and cause of diseases. Pathogen-free gametes and even embryos could be made available to re-derive disease-free populations.

2. A GRB would not be merely a static warehouse of biological materials, but would serve a vital, interactive role between free-living populations and captive populations. Germ plasm from wild stocks could be incorporated into captive breeding programs without removing animals from the wild. Breeding programs in captivity are especially important as a (a)reservoir of genetic diversity, (b) source for studying cheetah and lion biology, and (c) tool to educate the public about the need for wild cheetah and lion to co-exist with humans. There also is the potential of augmenting genetic diversity in free-living (fragmented) populations through the periodic capture and artificial insemination of wild females that are captured briefly and then returned pregnant to the native habitat.
3. The combination of frozen gametes and embryos and reproductive techniques such as artificial insemination, *in vitro* fertilization, and embryo transfer offers unique opportunities for improving breeding efficiency. Cryopreservation of germ plasm extends the generation interval of founder animals indefinitely by allowing cross-generational propagation. The genetic diversity of the founder animals does not die with the animal, but remains viable and available for future generations.
4. Germ plasm banking has the effect of reducing the number of animals needed to ensure that high levels of genetic diversity are retained within a population. This reduces capital and operating costs of captive breeding programs and provides space for other species at extinction risk.
5. Transporting frozen sperm or embryos eliminates the considerable risks associated with the transport or exchange of live animals.
6. A GRB would not be limited to animal germ plasm (i.e., sperm) but would include other biomaterials like serum, plasma, white blood cells, red blood cells, tissues, and DNA useful for addressing subspecies, hybridization, and parentage questions. These biomaterials also would be useful for molecular and systematic forensics and disease surveillance.
7. The systematic use of germ plasm for intercrossing subspecies (such as South African and East African cheetah) may provide avenues for assessing the impact of intercrossing on genetic diversity and population viability.

Cheetah GRB

Almost 20 years of research have resulted in a huge biological database for the cheetah. This massive amount of information is available not simply on the ecology of the species, but also on its unique genetics and fascinating reproductive characteristics. All of this information has been integrated to allow successful artificial insemination to become fairly predictable in the cheetah. This is especially important in captive breeding programs because it eliminates the need to move animals from one location to another. More importantly, the ability to use cryopreserved sperm from Namibian cheetah precludes the need to remove more cheetah from the wild for zoos. Cheetah can remain in the wild where their presence helps maintain habitat for other species and the ecosystem.

The value of artificial insemination already has been demonstrated by a collaborative relationship among the Namibian Ministry of the Environment and Tourism, the Cheetah Conservation Fund, and a group of North American zoos. In 1994, these organizations assessed the feasibility of using cryopreserved sperm transported internationally to produce cheetah by artificial insemination. Sperm samples were collected from captive-held or recently-caught wild cheetah in Namibia. These samples were cryopreserved, imported into the U.S., and used on a selective basis to artificially inseminate known genetically-valuable females that had never reproduced. To date, two litters and four cheetah cubs have been produced. One cub, a female, survives and is healthy. She represents a milestone - the first demonstration of the use of cryopreserved sperm shipped transcontinentally to produce an endangered species.

Lion GRB

The lion also has been the focus of intensive research on genetic analysis, reproductive/endocrine studies, and health assessments of both African and Asian lion. An extensive world-wide survey on the incidence of feline immunodeficiency virus (FIV) in lion has demonstrated that the lion population in Namibia is FIV negative. Because the prevalence of FIV in lion is extremely high in surrounding countries (>90% in South African lion), Namibian lion are unique and represent one of the few remaining FIV-free populations in Africa. Techniques for cryopreserving lion sperm have been established. Therefore, the initiation of a GRB for lion would allow the immediate capture of a valuable, disease-free resource. Also, the Namibian lion population (~300 individuals) is becoming increasingly fragmented. Since the largest population consists of only ~200 lion in Etosha National Park, a GRB could preserve existing genetic diversity.

A foundation of basic knowledge on assisted reproduction techniques, including *in vitro* fertilization and artificial insemination, exists for lion. Hormonal induction of estrus and ovulation has been attempted in lion; however, further study is needed on ovulation induction

protocols. To date, no offspring have been produced in lion using assisted reproduction. Because it has been demonstrated that frozen cheetah sperm can be used to produce offspring, it is anticipated that cryopreserved lion sperm (using the same cryopreservation technique as in cheetah) will be viable for producing *in vitro* and/or *in vivo* embryos once hormone protocols are further refined.

Recommendations for Establishing Genome Resource Banks

It is recommended that:

1. A Genome Resource Banking Action Plan should be developed in accordance with guidelines established by the IUCN-World Conservation Union's Conservation Breeding Specialist Group. An action plan is a highly detailed document that deals with the need for establishing a GRB and the important issues related to collection, storage, ownership, accessibility, and use of biomaterials. Because a GRB Action Plan is being developed in North America under the umbrella of the Cheetah Species Survival Plan (SSP), it is recommended that the Action Plan incorporate both regions. This formal cooperative plan will be established within 1 year with the initial primary partners being the Namibian Ministry of Environment and Tourism, the Cheetah Conservation Fund, the North American Cheetah SSP and Lion SSP, and other relevant conservation organizations.
2. The biomaterials collected from cheetah and lion living on private or public lands should be the property of the government (country) of Namibia. The Ministry of Environment and Tourism-Directorate of Resource Management shall make the final decision about the disposition of biomaterials. This will be controlled, in part, through the export permit process. Details will be set forth in the action planning document to be developed.
3. The scientific collection and storage of all biomaterials for cheetah should be coordinated by the Cheetah Conservation Fund in collaboration with Namibian State Veterinarians of the Ministry of Agriculture. Biomaterials from lion will be coordinated by the Namibian Ministry of Environment and Tourism and the Namibian State Veterinarians of the Ministry of Agriculture. This will be accomplished by establishing and securing a Cheetah GRB and Lion GRB, including a site for secondary storage (as a second insurance site). The coordinators will distribute the material by acting as a liaison between the Ministry of Environment and Tourism, local veterinarians, interested scientists, zoos, and other relevant organizations world-wide.
4. No monetary value should be placed on any biomaterials to discourage the commercialization, or worse, the capture and exploitation of cheetah and lion. The cost of establishing and operating the GRB should be supported by institutions throughout the world interested in conserving cheetah and lion. One example is that workshop participants from

North American zoos are confident in their ability to secure some funding to support the GRB program. Additionally, it is recommended that the Ministry of Environment and Tourism consider accepting 'in-kind' support for such a program in the form of donated equipment.

5. Further research is needed to enhance the efficiency of assisted reproduction in lion using cryopreserved sperm. Studies should be conducted on hormonal stimulation of estrus and ovulation, time of ovulation, and optimal time of insemination using frozen-thawed spermatozoa.
6. As the GRB Action Plan is prepared, the distribution of and accessibility to biomaterials in the GRB will be more readily available to organizations that are contributing to conservation programs in Namibia, either through direct monetary support of the Cheetah Conservation Fund (or other high priority programs) or through providing in-kind support and training.
7. The Ministry of Environment and Tourism-Directorate of Resource Management, the Cheetah Conservation Fund and other relevant national organizations will receive full acknowledgment by any individual or organization that uses biomaterials from the GRB. Furthermore, any offspring produced from the use of cryopreserved gametes or embryos would remain the sole property of Namibia, largely for the purpose of documenting and advertising the contributions of Namibia to conserving one of its most precious natural resources.

Appendix VI

Development of a Management Plan for Captive Cheetah and Lion in Namibia: preliminary discussions *

For the holistic conservation of cheetah and lion within Namibia, the development of a coordinated adaptive management plan for all animals in captivity should be considered. Captive programs for these species may be integrated into the global zoo network, thus, work to contributing to the worldwide conservation of these species.

Suggested Minimum Captive Management Guidelines

The following are husbandry guidelines for consideration. A major component for the care and management of the captive lion and cheetah is the design of the area in which the animal is housed. When designing enclosures, husbandry needs, veterinary concerns, and the biological requirements of the species should be considered. Important factors include dimensions, substrate, shelter, transfer areas, and climate, all of which can influence both animal health and reproduction.

Enclosure Design: Basic enclosure design is of the utmost importance. Size must be adequate for movement and exercise to decrease boredom, stimulate activity, and give a feeling of security and comfort. Naturalistic areas may be created by using areas of varied topography such as a combination of elevated areas, dead-fall trees, rocks, and mounds. Logs or timbers allow the natural behavior of scratching for claw wear and maintenance.

The enclosure area should be subdivided into a main and holding area for animals temporarily isolated/separated from the main enclosure. Holding areas in an enclosure are essential to proper management and health care and include additional working, maternity, holding, and quarantine areas. Holding areas provide treatment areas out of view and seclusion for a stressed or ill animal. Within this area, squeeze or restraint cages permit an alternative method of handling for procedures normally requiring anesthesia.

A minimum enclosure area for a single lion or cheetah should measure at least 10 m x 6 m deep (60 sq. m); areas should be 50% larger per additional animal. Although adults do not climb well, their leaping ability should not be underestimated. Holding areas should measure at least 2.4 m x 2.4 m per animal. Owners not wanting young or who are unable to use birth control implants or neutering, should build separate cages to separate adults.

Introduction and Breeding: Flexibility is the key to successful introductions of individuals unknown to each other. Individual personalities and animal characteristics must be considered. For any introduction, adequate personnel should be available to intervene,

keeping in mind that severe aggression may occur. Methods for intervention and separation include transferring one or more of the animals to another area, or using of a jet of water from a hose.

If breeding is a consideration, mate selection is an important factor. Consideration should be given to broaden genetic representation of the individuals. It is important to have a separate maternity area to isolate a female before impending birth. This area can be adjacent to the main holding area, but should have a small gauge fence near the bottom to prevent any injuries to cubs. The area should be sufficiently large enough so that the female can move her cubs away from the main holding area if needed.

General Husbandry: Although cheetah and lion normally live in a warm climate year round, most are tolerant of wide temperature extremes. Animals always should have access to shade and, if housed indoors even temporarily, should be protected from extreme temperatures. If held indoors, animals should have adequate light. Fresh clean water for drinking should be available at all times. Watering sources either should be built into the enclosure area or be sturdy containers fastened to prevent over-turning. Water containers should be cleaned and disinfected daily. Some lion enjoy bathing or swimming, and pools may be incorporated.

Enclosure size usually will dictate cleaning frequency. Smaller enclosures will become soiled more often and, thus, require regular cleaning. Concrete areas and the areas where animals are fed should be cleaned daily. Dirt substrates should be raked and spot-cleaned daily.

Nutrition: Whole animal carcasses (ungulate, rabbits, fowl) may be alternated to vary the diet. Healthy cheetah or lion of optimum weight may be fasted one to two times per week. It is important to feed the carcass intact because skin, bone, and organ meat are important components of overall health and oral hygiene.

Caution must be taken if feeding only muscle meat from freshly butchered livestock because vitamin/mineral needs may not be met (calcium is the most critical). The supplement Calsup should be used in these cases. Owners should be wary of carcasses obtained from road kills or donations because of contamination potential. Living animals selected as food sources for cheetah and lion should be inspected to ensure they are disease-free. Diets containing high percentages of fowl must be supplemented with calcium.

Health: Services of a veterinarian should be available. Specific guidelines for health monitoring of captive cheetah in Namibia are being developed by the Namibian Veterinary Association.

All animals in captivity should be identified by one or more permanent methods at the first opportunity. It is recommended that each animal be tattooed (inner aspect of the thigh) and/or

receive a subdermal, electronic transponder (base of tail). Transponders have a 5% failure rate. If resources allow, a second transponder should be placed at the dorsal base of the ear. It is customary to tattoo or ear-implant females left, males right. When available, studbook numbers should be used to identify each specimen.

Special Requirements: Lion

Lion are the largest predator in Africa, and males achieve weights of 150 to 250 kg. Females are somewhat smaller at 120 to 160 kg.. The lion has a gestation of approximately 105 days, and produces a litter of 2 to 5 cubs.

Lion are the most social cat species. Lion may be kept singly, although it is recommended they be maintained in pairs or prides. Only one adult male should be mixed with a female, or group of females, at any one time to ensure accurate recording of parentage. It may be possible for a number of single sex groups to be established, particularly in game parks. These groups can act as a reservoir that can be utilized should a particular individual be needed.

Special Requirements: Cheetah

The cheetah is morphologically and behaviorally unlike the lion. A diurnal species, the cheetah is physically adapted for running at high speeds over short distances. Although approximately the same length as most large felids, cheetah are much lighter in build and weigh only 35 to 57 kg. Like other large felids, males are larger. Gestation is 90-95 days and litter sizes are 3-5.

In the wild, cheetah tend to be solitary or live in coalitions. Adults may be maintained as pairs or in large groups with little difficulty.

* see also *Cheetah Husbandry Manual*, American Zoo & Aquarium Association, Bethesda, MD.

Appendix VII. Quarantine and Translocation Guidelines

At the PHVA workshop and subsequent Veterinary committee meetings, veterinarians most involved with cheetah/leopard capture and translocations, plus Cheetah Conservation Fund (CCF) representatives, discussed standards and recommendations for quarantine and translocations for cheetah and lion. The following protocols are based on these discussions and existing protocols from the American Association of Zoo Veterinarians (AAZV) Universal Veterinary Procedures Manual and CCF protocols. The recommendations are subject to modification. Protocols for Genome Resource Banking/Sample Handling and Captive Management still need to be finalized, as they require more extensive work and review. Furthermore, Namibian veterinarians will provide input to the Ministry of Environment and Tourism for strengthening the requirements for holding captive animals.

1. Most animals coming into a holding facility are wild-caught and may be disease-free. Namibian farmland cheetah are considered FeLV- and FIV-free, based on results of blood tests carried out by CCF on captured cheetah over the past 5 years. There probably is a greater risk of a cheetah contracting a disease while in captivity than the risk of a cheetah introducing a disease into a facility. Even so, it is strongly recommended that newly-arrived animals be isolated in a pen separate from all other animals, where their bodily secretions, food, water, aerosols, etc. will not come into contact with each other. Also, personnel handling these animals should take precautions to ensure that contaminated materials are not carried from one cage to another. We recognise that strict quarantine procedures, as practiced in zoos and veterinary hospitals, are not really feasible in most situations in Namibia.
2. It is very important to keep cats, dogs and domestic animals away from wild-caught animals. Any pets kept by facilities handling wild animals must be vaccinated against infectious diseases which can be transmitted to wild animals (e.g., for dogs - rabies, canine distemper, parvovirus, parainfluenza; for cats - rabies, feline leukemia, viral rhinotracheitis, calicivirus and panleukopenia).
3. Animals should be examined and samples taken as indicated on the Namibian Predator Examination form (see below). A portion of the samples will be banked in the Namibian Predator Genome Resource Bank coordinated by Dr. H. Scherer.
4. Blood should be sampled for the following: corona virus (FIP); FeLV; and FIV. The most important is FIP; an animal with any titre should not be moved and one of the following veterinarians should be contacted to decide measures to be taken: Dr. H. Scherer or Dr. M. Jago. Test results can be obtained quickly through Golden Vet Lab in Johannesburg, South Africa. FeLV and FIV tests, which must be done using Western Blot for monitoring/research purposes, can be done later through the CCF. Serum for these tests can be sent to Dr. H.

Scherer. If an animal is to be moved out of Namibia, the CITE-Combo test for FIV can be quickly used, but it is not reliable for a definitive diagnosis.

ID# _____ / _____ / _____ **

species ID no. initials

**NAMIBIAN
PREDATOR EXAMINATION**

Date: (D/M/Y) _____ 174

Sex: M F

Weight _____ kg lb

Farmer's Name: _____

Farm Name: _____ Farm Number _____

REGION WHERE CAUGHT A. Gobabis B. Grootfontein C. Karabib D. Okahandja E. Omaruru
 F. Otjiwarongo G. Outjo H. Windhoek I. Unknown J. Other _____

CAPTURE DATA

Date of Capture (D/M/Y): _____ First Capture Re-capture Re-exam Permanent Captive

Number of days captive: 1 (catch day, 1st 24 hrs.) 2 3 4 5 Other _____

(If exact day is not known for a long-term captive, then use first day of the month caught.)

Describe Capture Area: _____

Why Captured: _____

Other Animals Captured at Same Time (give ID#'s if known): _____

Group Size in Wild: _____

HOLDING FACILITY:

1. Good to excellent (>25X 40 m) 2. Fair (<25X40 m, but >2.5X2 m) 3. Capture cage (or <2.5X2 m)

DEGREE OF HUMAN CONTACT:

1. Little (fed 1Xday, held away from humans with adequate privacy)

2. High (exposure in addition to feeding, and/or housed near human activity or other animals)

HAND-RAISED

Yes

No

DIET

A. Meat: None < 1.5 kg/day/female; <2.0 kg/day/male 1.5 kg/day/female; 2.0 kg/day/male

B. Calcium Source (supplement, milk or bone): None _____ mg/kg/day, Product Name: _____

C. Other dietary components: Type: _____ Amount/day: _____

Last time fed: < 8 hrs ago 8-24 hrs ago 24-48 hrs ago > 48 hrs ago

APPROX. AGE

0-6 mo.

>12-18 mo.

>2.5 - 4 yr.

8 - 12 yr.

>6-12 mo.

>18mo.-2.5 yr.

>4 - 8 yr.

> 12 yrs

PHYSICAL STATUS

1. Excellent (robust, good hair coat) 2. Excellent with capture trauma

3. Good (no specific problem, but not robust)

4. Fair (poor hair coat, sores, abscesses, urine/faeces scald, other medical problems)

5. Poor (severe medical problems, questionable survival)

BODY CONDITION

1. Obese/Fat

2. Well Muscled/Lean

3. Abnormally Thin

4. Emaciated

HEALTH EXAM

Demeanor: Depressed Alert Aggressive

Hydration: Well-hydrated Dehydrated, % _____

Cage/Capture Trauma Wounds Lacerations Fractures Punctures Bite Wounds

describe (indicate self trauma or management-induced trauma): _____

Coat Condition: Good Fair Poor, comment: _____

Hair Loss (areas and extent): _____

Skin Condition: Good Warts Abscesses Dermatitis, comment: _____

Claw Condition: Good Broken, describe: _____

Pad Condition: Good Injured, describe: _____

Eye Condition: Normal Abnormal, comment: _____

Ear Condition: Normal Abnormal, comment: _____

Teeth/Gum Condition (indicate crowded incisors): _____

Respiratory System: _____

Digestive System: _____

Nervous System: _____

Cardiovascular System: _____

Ectoparasites: Cheetah Flies Lice Ticks, comment: _____

Vaccination History (indicate killed or MLV, and date): _____

IDENTIFICATION (Give ID Number): Ear Tag: _____ (Metal Plastic) Tattoo: _____

Transponder: _____ Radio Collar: _____ Other Marks, Notches, Scars (describe): _____

(Anaesthesia/Drugs, Samples and Lab Results on Back)

ANAESTHETICS/DRUGS GIVEN

DRUG	DOSE	ROUTE	EFFECT	COMMENTS

SIGNIFICANT LAB RESULTS AND INTERPRETATIONS

ADDITIONAL COMMENTS

SAMPLES

MINIMAL REQUESTED SAMPLES

BLOOD: 20 ml clotted (red top) separate serum; 10 ml clotted (red top) frozen whole; 2 X 10 ml heparinized (green top) separate plasma; 4 ml EDTA, 6 methanol-fixed smears; 10 ml whole blood (red top) frozen
 FAECES: Frozen sample and 2 formalin-fixed smears
 HAIR: Pulled out by roots with follicles, fill one film canister or similar container
 SEMEN: Please contact Cheetah Conservation Fund for collection of semen

Lab Work Requested: Chemistry WBC Serology, type _____
 Faecal Skin Scrape Other: _____
 Samples Banked: Serum Plasma Other _____ Banking Location: _____

LABORATORIES FOR STANDARDISED TESTING

Golden Vet Lab in Johannesburg- General Medical Profile and FIP (send 2 ml serum, 2 fixed smears)
 Other Tests coordinated by Namibian Predator Genome Resource Bank

****CODES FOR ID#**

Species (Identification Codes): AJU-Cheetah, PL-Lion, PPA-Leopard, HB-Brown Hyaena, CC-Spotted Hyaena, FC-Caracal, FL-African Wild Cat, FS-Serval, FN-Black Footed Cat.
ID No.: Four digit identification number assigned to this animal
Initials: Three initials of clinic, organization or clinician

RESPIRATORY SYSTEM (Nasal cavity, larynx, trachea, lungs, regional lymph nodes)

177

CARDIOVASCULAR SYSTEM (Heart, pericardium, great vessels)

DIGESTIVE SYSTEM (Mouth, teeth, esophagus, stomach, intestines, liver, pancreas, mesenteric lymph nodes)

URINARY SYSTEM (Kidneys, ureters, urinary bladder, urethra)

REPRODUCTIVE SYSTEM (Testis/ovary, uterus, vagina, penis, prepuce, accessory glands, mammary glands)

ENDOCRINE SYSTEM (Adrenals, thyroid, parathyroids, pituitary)

NERVOUS SYSTEM (Brain, spinal cord, peripheral nerves)

SENSORY ORGANS (Eyes, ears)

PRELIMINARY DIAGNOSIS

LABORATORY STUDIES (List samples submitted and attach results, if available)

2
8

es

FIXED TISSUES

Take duplicate sets of tissues, one set for the National Pathologist and one for the International Pathologist. Preserve the following tissues and any lesions in 10% buffered formalin at a rate of 1 part tissue to 10 parts formalin. Tissues should be no thicker than 1 cm.

- Salivary gland
- Tongue
- Lung
- Trachea
- Thyroid/parathyroids
- Lymph nodes
- Thymus
- Heart
- Liver - one section from each lobe
- Spleen
- Stomach -multiple sections from cardia, fundus (body) and pylorus
- Small intestines
- Large intestines
- Pancreas including central ducts
- Adrenal
- Kidney - cortex and medulla from each kidney
- Urinary bladder
- Testis/ovary
- Uterus
- Eye
- Brain
- Spinal cord (if neurologic disease)
- Diaphragm and skeletal muscle
- Rib or 1/2 femur with marrow
- Skin

FROZEN TISSUE IF POSSIBLE

If poisoning or toxicity is suspected, please store 10 g of liver, brain, and kidney, plus antemortem serum and plasma at - 70° C.

ADDITIONAL TISSUES/SAMPLES IF AVAILABLE

- Hair (pulled out by the roots-one film canister full)
- Faeces (Frozen)
- Faeces (Smear, fixed in 10% formalin)
- Whole Blood (20 ml frozen)
- Blood Smears (four fixed in methanol)
- Skin (approx. 5 cm square, dried in paper envelope, not fixed or frozen)
- ***Testes if animal is freshly dead or euthanized: collect whole testicles including epididymis and place in saline soaked paper towels and place in refrigerator, not directly on ice. Call Cheetah Conservation Fund immediately to arrange transport.

NEONATAL NECROPSY PROTOCOL

Please follow the adult protocol in addition to the following:

- Fix umbilical stump and surrounding tissues
- Examine for malformations (cleft palate, deformed limbs)
- Assess hydration (tissue moistness) and evidence of nursing (milk in stomach)
- Determine if breathing occurred (lungs float in formalin)

Please send samples and this checklist to one of the following Namibian Predator Genome Resource Banks:

Dr. H. Scherer
Otjiwarongo
Phone: 0651-2801
Fax: 0651-2823

Dr. M. Jago
Otjiwarongo Vet Clinic
Phone: 0651-3242
Fax: 0651-4382

Cheetah Conservation Fund
Otjiwarongo
Phone/Fax: 0658-11812
Fax: 0651-3607

Note: Do not wash any samples. Remove large blood clots or ingesta, etc. by hand.

ADRENAL GLANDS: Entire gland with transverse incision

BRAIN: Sliced longitudinally along the midline submit all

EYE: Leave intact

FECES: Preferably collect from descending colon

GASTROINTESTINAL TRACT: 3 cm long section of esophagus, stomach (cardia, undus, pylorus), duodenum, jejunum, ileum, cecum, colon, and omentum. Open carefully along the long axis. Do not wash, shake off excess digesta.

HAIR: Pulled out with roots and follicles (pack a 16 X 50 mm, i.e. 35 mm film canister)

HEART: Longitudinal section including atrium, ventricle and valves from both right and left heart

KIDNEYS: Section from both kidneys (cortex, medulla, and pelvis)

LIVER: Sections from 3 lobes with capsule and gall bladder

LONG BONE: Submit 1/2 of a femur

LUNGS: Sections from several lobes including a major bronchus

LYMPH NODES: Cervical, anterior mediastinal, bronchial, mesenteric, and lumbar with a transverse cut.

PANCREAS: Representative sections from two areas

REPRODUCTIVE TRACT: Entire uterus and ovaries with longitudinal cut into lumen. Entire testis with transverse cut. Entire prostate with transverse cut.

SKELETAL MUSCLE: Cross section of thigh muscles

SKIN: Full thickness of abdominal skin and lip

SPINAL CORD: Sections from cervical, thoracic and lumbar cord

SPLEEN: Cross sections including capsule

THYMUS: Representative section

THYROID/PARATHYROIDS AND PITUITARY GLAND: Leave glands intact

TONGUE: Cross section near tip including both mucosal surfaces

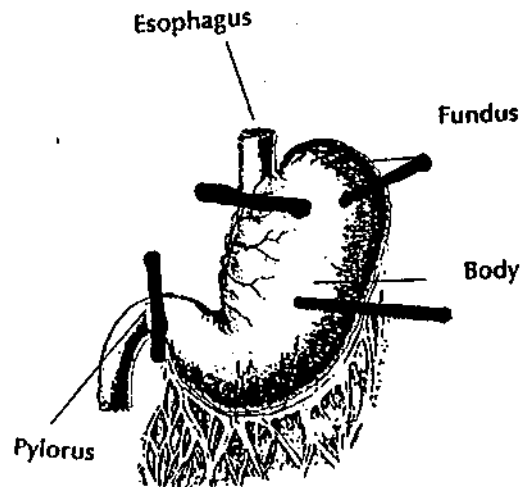
URINARY BLADDER/URETER/URETHRA: Cross section of bladder and 2 cm sections of tubular structures

CHEETAH NECROPSY PROTOCOL

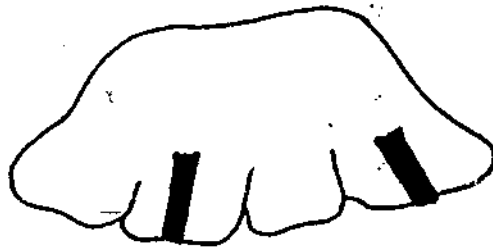
All animals should be laid on their right side. The carcass should be opened on the underside with a cut running the length of the body. The cut should start at the chin and go all the way to the rectum. The cut should be along the midline of the body, not to one side. Once the skin and muscles of the body wall are opened up, you will be looking down on the rib cage and the intestines. If you gently lift the intestines and associated tissues and move them aside (without cutting anything), you will see the stomach and the liver, which lie against the base of the rib cage. You will also need to open the rib cage to expose the heart and lungs. Take the tissue samples as illustrated by the heavy black lines.

Essential:

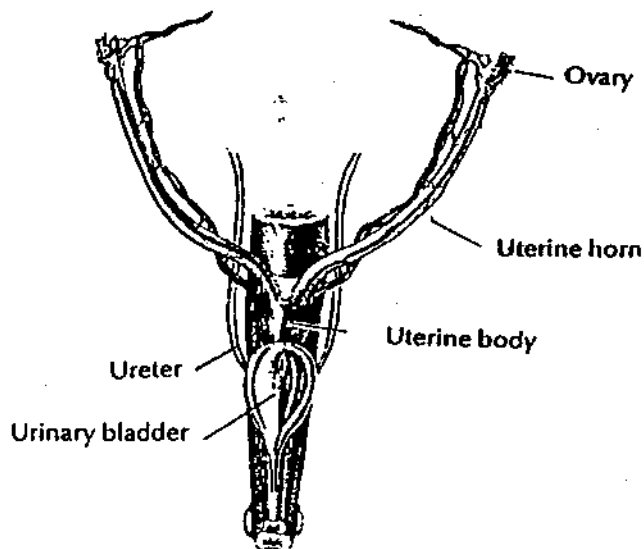
1. **Stomach**--Full thickness sections from the fundus/body, the pylorus, and the region near the entrance of the esophagus.



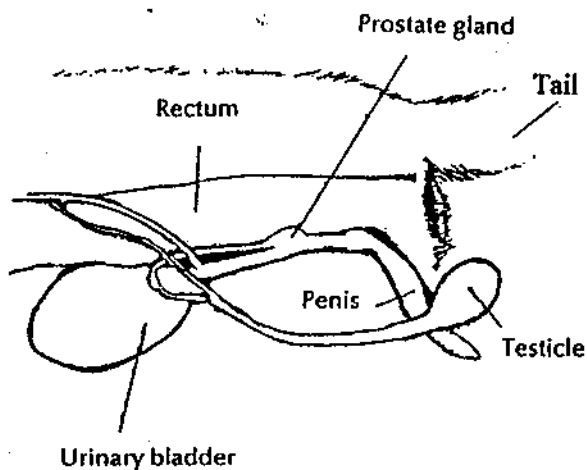
2. **Liver**--Sections from three different lobes. Include outer sheath..



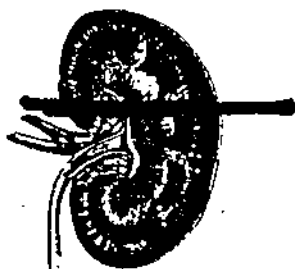
3. **Reproductive Tract--Female:** As you look down on the animal the body of the uterus lies on top of the rectum. Follow it up along the horns of the uterus to the ovaries. Take the entire uterus (body and horn) and ovaries. Make a longitudinal cut through the body.



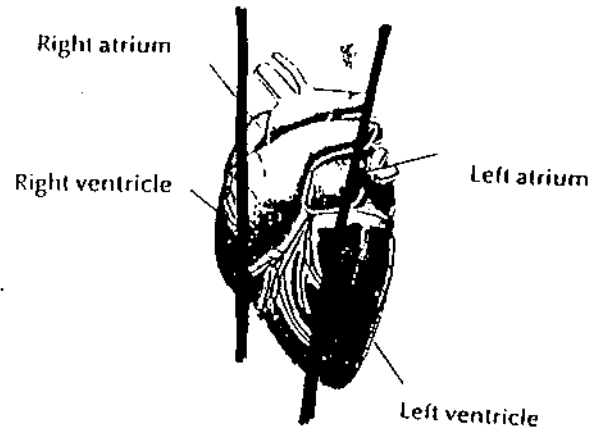
Male: Entire testis with associated structures and prostate gland.



4. **Kidney--**The kidneys are found deep, against the animal's back. Take a full thickness section across both kidneys as illustrated.



5. **Heart**--Two full thickness sections, one through the right atrium and ventricle and one through left atrium and ventricle.

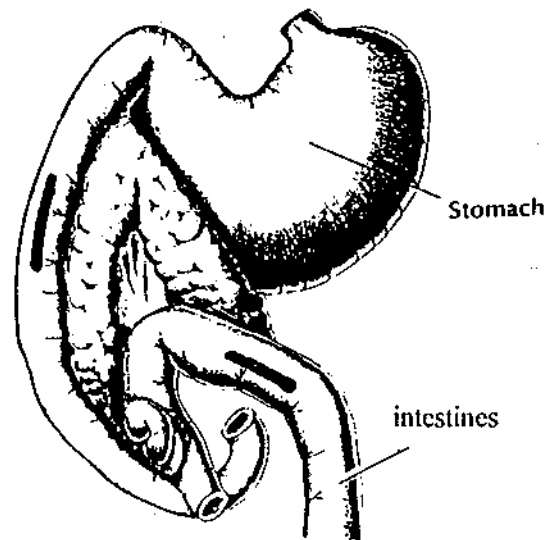


6. **Muscle**--Section through thigh muscles.

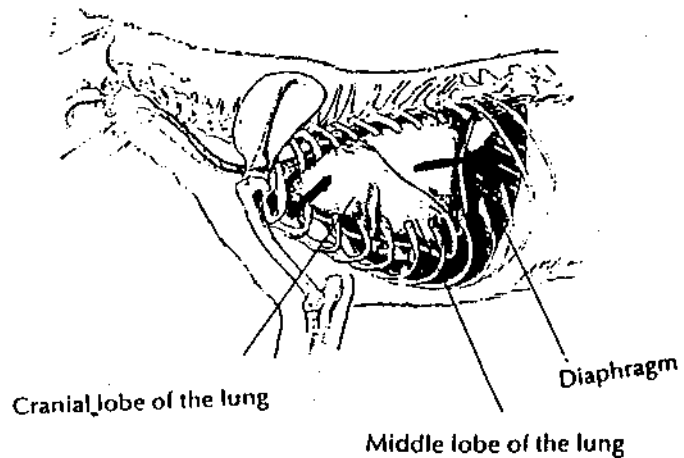
7. **Skin**--Full thickness section through skin on abdomen.

Nonessential:

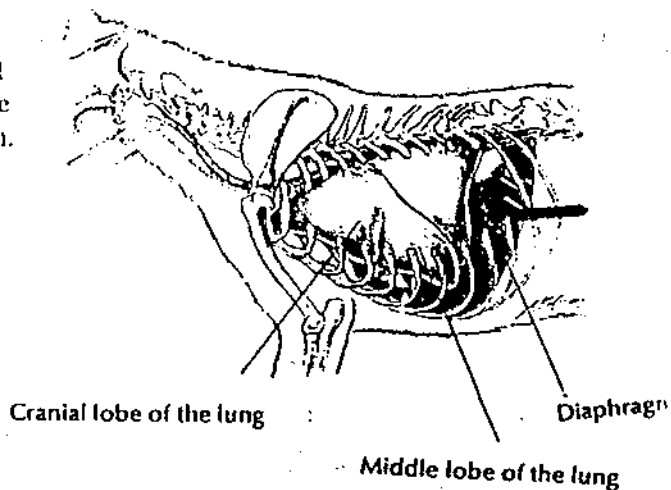
1. **Intestines**--Follow the intestines from the stomach all the way to the rectum. Open along long axis and take several 3 cm long sections along the length of the intestines as illustrated.



2. **Lungs**--Sections from several lobes.

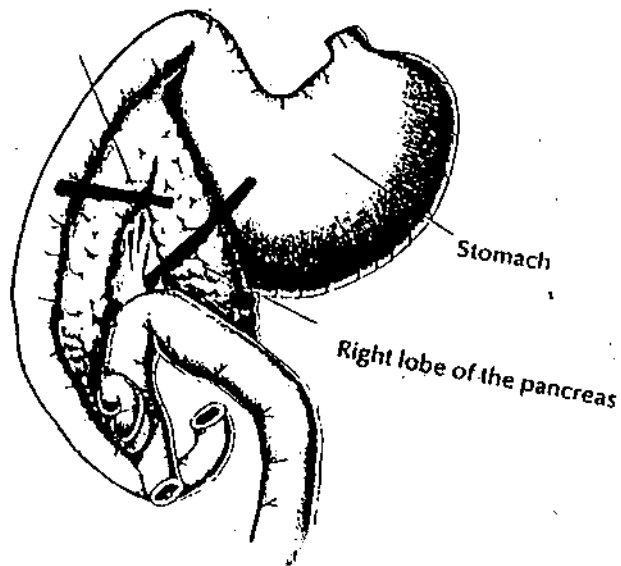


3. **Diaphragm**--The diaphragm is the large sheet of muscle that lies under the ribs and separates the chest from the belly. Take a full thickness section.



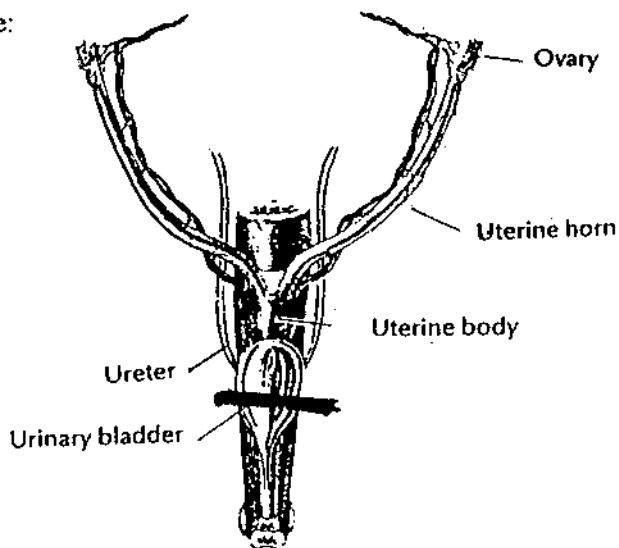
4. **Pancreas**--The pancreas lies alongside the beginning part of the intestines. It is a pale organ, generally found on the right side of the animal's body. Take two sections from different areas.

Left lobe of the pancreas

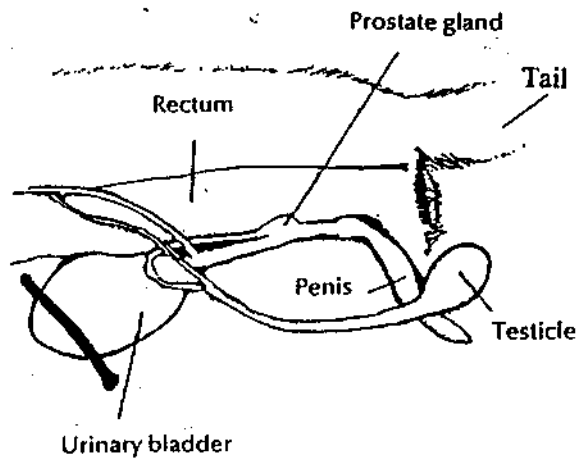


5. **Urinary bladder**--Full thickness section through the bladder.

Female:



Male:



6. **Tongue**--Full thickness section near the tip.

7. **Spleen**--The spleen is a dark red organ, usually found on the animal's left side near the stomach. Take a section that includes the outer sheath.