

Indian Rhinoceros Foot Care at the Los Angeles Zoo

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The Los Angeles Zoo currently exhibits 2.1 Indian rhinos (*Rhinoceros unicornis*): a 26-year-old male named Herman, a 21-year-old female named Randa, and a five-year-old male named Chandra. The purpose of this paper is to explain the procedure used at the Los Angeles Zoo to trim excess foot pad tissue from the soles of our Indian rhino's feet.

The need for performing this procedure did not arise until Randa and Herman were fully mature; age 9 years for Randa and age 14 years for Herman. We have not yet found it necessary to trim the feet on our five-year-old male. There also seems to be some individual variation in the occurrence of this condition in mature adults. A female named Radha that was housed at the Los Angeles Zoo from 1969 to 1988 never showed any symptoms of this condition even though she was housed in identical facilities and ate the same diet as Randa and Herman.

A Brief History - Why This Procedure is Necessary

In 1978, our male Indian rhino, Herman, developed a severe abscess on his left rear foot and leg due to a thrush-like infection. The infection produced loss of epithelium, pus, and necrotic tissue, as well as swelling of the leg and lameness. At one point, he had a hole that went clear from the sole of his foot up through the top of the foot. Had this condition not been treated, the animal could have possibly died.

The abscess was treated by flushing it three times per day with water and topical antibacterial and anti-inflammatory agents including hydrogen peroxide, Betadine®, Prepodyne®, Kopertox®, Dornase®, scarlet oil, and nitrofurazone solution (DMSO®) for over one month. Luckily, he was tractable enough to allow our vets to work on him. He was also given chlorotetracycline and INH orally, as well as Bicillin® subcutaneously.

Later that same year, Randa had a similar type of infection in her right front foot which was treated in a similar manner, but was not nearly as severe as Herman's infection.

Luckily, both animals fully recovered from these infections. Herman still has a large scar on his left rear foot where the abscess occurred.

In early 1979, our vets began to trim excess foot pad growth from the soles of the rhino's feet in order to try and prevent this type of infection from recurring.

The animal keepers on the Indian rhino string also tried other preventative measures to try and eliminate excessive foot pad growth. For a few months during 1979, they tried putting the two females, Radha and Randa, on exhibit together during the day in an effort to try and get them to be more active. It was hoped that increased activity would help to wear down the pads on their feet. This worked for a few months until the females began fighting and then this practice had to be discontinued.



Randa, 21-year-old female Indian Rhinoceros (*Rhinoceros unicornis*) at the Los Angeles Zoo.
Photo by Neal Johnston.

The amount of food that the rhinos were fed was carefully monitored so that they were not overfed. It was felt that if they were fed more oat hay and herbivore pellets than they needed, that they would lie around too much. This lack of activity would lead to excessive growth of the foot pads.

The animal keeper also checked each exhibit carefully every morning before releasing the animals for the day in order to remove any sharp rocks that were lying on the ground. The reason for this was to reduce the possibility that the rhino might step on a sharp rock and get a puncture wound in its foot which could potentially lead to an infection.

Of course, the importance of keeping the exhibits and night quarters free of fecal matter and urine is essential and cannot be overstated. Every attempt is also made to allow the night quarter's cement floor to thoroughly dry before bringing the animals in at night.

Another preventative measure involved roughening some of the cement floors that the rhinos walk on, once again, to hopefully wear down the foot pads.

A Detailed Description of the Trimming Procedure

Animal Keeper, Gene Noda, worked with the Indian rhinos at the Los Angeles Zoo for twelve years. During this time he performed the vast majority of foot trims done on the rhinos until he left the zoo in 1988. He had initially observed the procedure being done by our zoo vets, Dr. Gary Kuehn and Dr. Jerry Esra, back in the late 1970's. Over time, Gene learned how to perform the procedure himself. He is the person who trained me on the Indian rhino string and showed me how to trim their feet. I was constantly amazed at his knowledge and the rapport he had with these animals. His leaving our zoo was a great loss and I tried to glean as much information about the rhinos as I could from him before he left. Even though it is I who have written this paper, it is based almost exclusively on information that I received from Gene.

As the foot pad becomes overgrown, the problems that arise include cracks in the pad, folds or flaps of overgrown tissue, and the skin where the center toenail attaches to the pad may separate from the nail. These are the conditions that one is trying to prevent by doing this procedure (see Figure 1). The area where the pad attaches to the nail and the resulting crack may become infected if that part of the foot pad becomes too overgrown. Our vets recommended biweekly trimming to try and prevent any thrush-like symptoms from developing. Doing the trimming regularly also meant that the vasculature would not have as much of a chance to drown down into the tissue near the surface of the pad.

With our female, Randa, one could always tell when she needed to have her feet worked on because when they were beginning to get overgrown and sensitive, she would stand with one foot slightly off the ground. Herman, on the other hand, did not display this behavior.

The day that the trim is to be performed it is necessary to keep the animal to be worked on in the night quarters. The trim cannot be performed while the rhino is on exhibit. The noise and distraction from the public would not be conducive to performing this procedure. Also, the animal keeper must be close enough to an exit so that if the rhino begins to stand up, he or she can get away quickly.

The morning ration of oat hay and herbivore pellets are fed to the rhino in the night quarters. We found that it was a good idea to give one extra flake of hay on the morning of the procedure. This helped to fill the rhino up more than usual and made it more likely that the animal would lie down to rest after it had eaten.

We never found a way to get the rhino to lie down on command, basically one had to feed it and then keep checking frequently to see if it had decided to lie down and rest. Sometimes the entire day

would go by and the rhino would not lie down. When this happened, the animal keeper simply had to try again on another day.

We also found that it was best to try and keep extraneous noises to a minimum. Some noises that the rhino was accustomed to were permissible such as the keeper cleaning the barn, the public out in front of the exhibit, or vehicles driving by on the road behind the barn. These were sounds that they heard every day and were accustomed to. We found that it was best, however, if other noises such as loud talking near the rhino be minimized as this might prevent her or him from lying down to rest. Another rhino banging on a gate might also disturb the one you are trying to get to lie down.

Another element that seemed to help was sunshine. The rhinos appeared to be more likely to lie down to rest if there was an area of sun for them to lit in. This was sometimes a problem during the fall and winter months because at our barn, the angle of the sun did not allow for much sunshine to shine into the night quarters during that time of year. During the summer, however, we did get more sun in the night quarters. This seemed to encourage them to lie down more readily, and they also seemed to be more relaxed when they had a nice sunny spot to lie in.

Before the trim can be performed, the animal keeper must repeatedly moisten the rhino's feet with water to soften the tissue. Warm water would probably be best for this, if one has access to it. We did not have any way to get warm water at our barn, so we just used water from a hose and it worked fine.

Applying water to the feet can be done in one of three ways. First, the concrete floor and the rhino's feet can be repeatedly hosed while the animal is standing up and walking around before it lies down to rest. Second, the animal keeper can pour water from a bucket onto the feet after the rhino has laid down (see Figure 2) . This is the method I used most often. The third method consisted of using a slow trickle of water from the hose to moisten the feet after the rhino has laid down. This last method sometimes did not work too well because if the rhino was lying down and very relaxed, the noise from the running water seemed to disturb it. On a few occasions when I tried this, I had the rhino become alert and stand up, apparently from the noise of the water running out of the hose.

It is essential that the foot pad be nice and soft prior to beginning the trim. The hosing or pouring water on the feet generally took about 30 minutes with the water being applied every five to ten minutes.

Other ways to soften the pad could include performing a trim shortly after the rhino comes out of its pool or doing a trim on a rainy day when the rhino has been walking around on wet concrete all day. The best trim I ever did on our male Herman was done on a warm, rainy afternoon after he had been soaking in his pool for over an hour. I brought him in early and gave him his afternoon feeding in the barn thinking that I would use some of my accumulated time off and go home early. As I was about to leave, I looked into his stall and saw that he had finished his food and was lying down under his heat lamp. His feet were very soft from being in the water all that time, so I decided to stay and trim his feet. I was able to remove more tissue on that day than any other time that I worked on Herman's feet.

We found that the best tool to use was a sharp pocket knife. Gene Noda told me that he had tried using various other tools used to trim hooves on horses and other hoofstock, but he found a knife worked the best because it gave him the most maneuverability.

When he and our veterinarians first started trimming the rhino's feet, they used to use large nippers. Gene told me that these tended to take off large chunks of tissue instead of lots of thin layers. He told me that on one occasion when they were using the nippers, they cut too deeply and the rhino kicked. The nippers went flying across the service area with such force that Gene said he was surprised that they weren't embedded in the wall on the opposite side of the service area. This

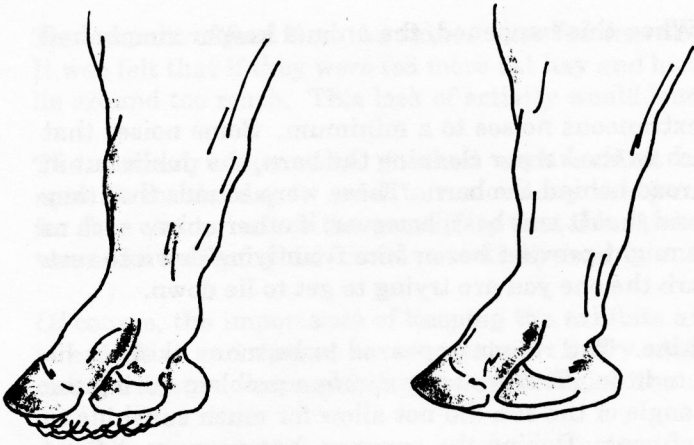


Figure 1: foot on right before being trimmed, foot on the left after the trim.

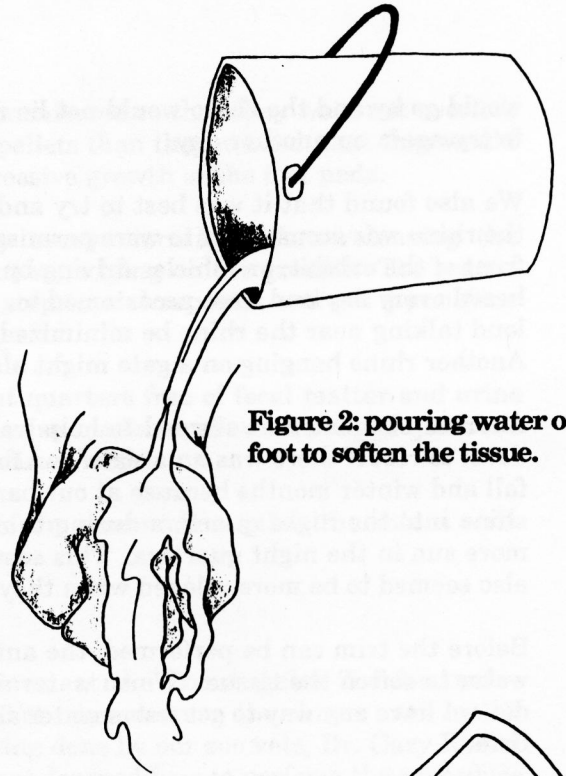


Figure 2: pouring water on the foot to soften the tissue.

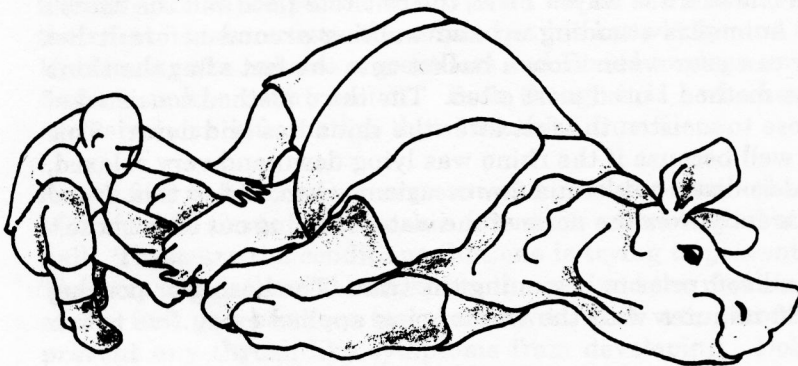


Figure 3: Rubbing the inside of the rhino's thigh.

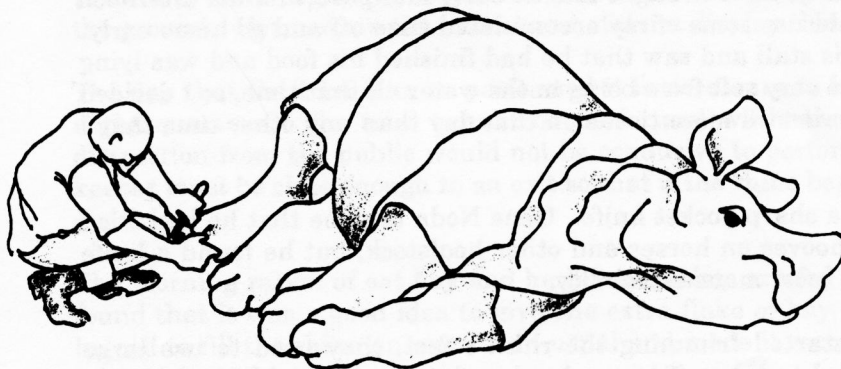


Figure 4: Trimming the rhino's feet.



Figure 5: pouring Kopertox® on the foot following the trimming session.

impressed upon him the rhino's ability to kick with great force. He warned me when he trained me to always stay out of the way of where the rhino might potentially kick.

He also believed in taking off lots of thin layers of tissue slowly and gradually rather than cutting off too much at once. This can be a slow and tedious process, but is necessary in order to avoid cutting too deep and drawing blood, at which time the rhino might kick.

While we are discussing hazards, I might as well mention the other two essential things to remember. We only enter an enclosure with one of our Indian rhinos when it is lying down. If the animal begins to get up, we exit immediately. There are no exceptions to this rule. These animals weigh from 1-2 metric tons and could potentially be quite dangerous. Fortunately, when one is working on their feet, one can fairly easily see their state of relaxation or alertness. If they begin to get up, they generally do it slowly enough so that the animal keeper can easily get out of the animal's way.

Also, while performing the trim, one must keep in mind that these animals are potentially capable of biting. Randa and Herman are both quite tractable and have never bitten anyone, however, I have heard of people being bitten by Indian rhinos at other zoos and in the wild. The potential is always there, and one must never forget it when entering an enclosure to do a foot trim. I never worked on Herman's front feet very much due to my extreme caution about being bitten. I simply did not feel comfortable working that close to his mouth. With our female, I trimmed all four feet although I always exercised great caution while working on the front feet.

Prior to entering the enclosure with the rhino, sharpen the pocket knife and obtain a bottle of Kopertox®, a topical antibacterial agent that will be squirted on the foot at the completion of the trim.

When entering the enclosure with the rhino, one should always let the animal know that you are there. It is best to softly talk to the rhino in order to avoid startling it. One should always move slowly and avoid sudden movements. Once the animal keeper is squatting next to the rhino, the inner part of the thigh and abdomen may be rubbed (see Figure 3). This will help the rhino to relax and fully extend its hind legs. Having the rhino in a state of being half asleep is best before beginning the trim. All during the time that one is working on the feet, the rhino will know that the keeper is there. The animal keeper may talk quietly to it occasionally for reassurance. Throughout the entire procedure the rhino should remain calm and relaxed.

The foot is trimmed by first making a small cut into the pad and tightly grasping the cut edge between the index finger and thumb (see Figure 4). By pulling out with these two fingers as one cuts with the other hand, one can slice off small portions of the foot pad. These slices should be shallow and parallel to the surface of the pad. The idea is to remove layer after layer of tissue, not to cut out large chunks. One must be careful not to cut oneself.

When one begins to see capillaries beneath the skin, it is time to stop because this means that one will be hitting blood soon if one continues cutting and this should be avoided. If one does happen to draw blood, stop cutting on that area of the pad immediately. Additional trimming may be done after the vasculature recedes.

After one has removed as much tissue as possible for that session, topically apply a generous coating of Kopertox® (see Figure 5). On the days following the trim, the animal keeper should watch the rhino's feet carefully to make sure that the animal is not limping or holding one foot up. Also, one should check the floors for potential blood spots. Kopertox® should be applied again for three to five days after the trim if one can catch the rhino lying down.

Conclusion

Indian rhinos in the wild may have a home range of from 2 to over 10 sq. km² (Laurie, 1982). Obviously, it is going to be difficult to try and replicate this in captivity. If a zoo is planning to build a new Indian rhino exhibit, it is important to give these animals as much room as possible in order for them to get the proper exercise they need. A facility such as the San Diego Wild Animal Park is ideal for this but unfortunately few zoos will be able to duplicate their vast expanses for a rhino exhibit.

The Los Angeles Zoo is currently working on a new master plan. When completed, the Indian rhino exhibits will consist of yards that are three times as large as those in which our animals are currently housed. Hopefully, this will afford them the opportunity to get more exercise and, as a result, help to reduce the excess growth on their foot pads.

Other ideas we have considered trying now include roughening up the concrete in the night quarters more, although care would have to be taken to not get the concrete floor so rough that it would cause irritation to the feet. Also, we have discussed the possibility of adding smooth pea-sized gravel to part of one exhibit on an experimental basis to see if that might help.

The foot trimming procedure employed at the Los Angeles Zoo on our Indian rhinos over the past eleven years has helped to prevent further infections like those experienced by our rhinos in 1978. It is a preventative measure made necessary by the inability of our animals to get the amount of exercise that they would if they lived in the wild. We are fortunate that we have rhinos that are docile enough to tolerate this procedure. Despite the potential danger to the animal keepers and the extra time involved, we feel that it is worth our effort if the rhinos live longer and healthier lives as a result.

I would like to thank Michael Dee, Curator of Mammals and Animal Keepers Gene Noda and Dave Smith for their many years of dedicated care of the Indian rhinos and for always being so willing to freely share their knowledge and expertise with me.

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References

Laurie, Andrew, 1982. Behavioral Ecology of the Greater One-horned Rhinoceros (*Rhinoceros unicornis*). Journal of the Zoological Society of London, 196: 307-341.

Products Mentioned in the Text

Betadine® - The Purdue Frederick Company, Norwalk, CT 06856.

Kopertox® - Aveco Company, Inc., 800 5th St., N.W., Fort Dodge, IA 50501

Prepodyne® - Amsco Medical Products Division, Division of American Stenlizer Co.
Erie, PA 16514.

DMSO® - BioMed Laboratories - 355 Sherman, Time Medical Bldg., St. Paul, MN 55102.

Bicillin® - Wyeth-Ayerst Labs, P.O. Box 8299, Philadelphia, PA 19101.

Nitrofurazone solution - TechAmerica Group, Inc., 15th & Oak, P.O. Box 338,
Elwood, KS 66024.