

**THE  
KANSAS  
CITY  
ZOO'S**



**ELEPHANT PROGRAM  
MANUAL**

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SECTION 1

**MANAGING ELEPHANTS  
WITH PROTECTED CONTACT**

**Elephant Program Manual**

# ***Protected Contact Elephant Management***

## *AZA Definition:*

Handling of an elephant when the trainer and the elephant do not share the same unrestricted space. Typically in this system, the keeper has contact with the elephant through a protective barrier of some type, while the elephant is not spatially confined and may leave the work area at will.

Protected contact includes confined contact. This is defined as handling of an elephant through a protective barrier where the elephant is spatially confined as in an elephant restraint device.

## ***MANAGING ELEPHANTS WITH PROTECTED CONTACT***

There are four primary components of protected contact elephant management. They are:

### **1. ENHANCED SAFETY BY THE PHYSICAL SHIELDING OF THE KEEPER THROUGH**

- Facility design
- Trainer position
- Animal position

#### *SAFETY:*

Keeper safety is the driving force behind the development of protected contact. It is everyone's responsibility to provide a safe working environment. If a keeper sees a situation that seems unsafe, it is the keeper's responsibility to immediately alert the individual at risk, and then report the incident to the area supervisor. Established safety protocols for operating in protected contact are strictly enforced.

#### *PHYSICAL SHIELDING:*

As the phrase implies, protected contact, refers to a keeper's ability to have contact with the elephant while being shielded. Shielding refers to both the facility, which is designed for the keeper's protection, and to where the animal is standing in relationship to the keeper and the facility. The keeper must

always position him/herself and the animal so as to be shielded, as much as is possible, by the facility.

At no time is unprotected contact with an elephant allowed during a protected contact training set. In protected contact, keepers are not allowed to walk inside the enclosure to assist in the training of the animal. Keepers are to avoid moving within range of physical contact, unless the animal is stationed in such a manner as to make an aggressive act difficult for the elephant to manage. As with all elephant activities, a second person is also required in protected contact training.

## **2. THE EXCLUSIVE USE OF POSITIVE REINFORCEMENT AND OPERANT CONDITIONING TECHNIQUES IN ORDER TO MODIFY ANIMAL BEHAVIOR**

*EXCLUSIVE USE OF POSITIVE REINFORCEMENT-* The positive reward system employs the presentation of a variety of reinforcers including tactile, voice, food, food variety, and social rewards. Reinforcement is delivered when the animal performs correctly in response to a specific signal. If the animal performs a behavior incorrectly or in a manner not up to standard, it is simply given another opportunity to earn the reinforcement. In protected contact, behavior modification will be accomplished exclusively through the established principles of behavioral theory as it applies to operant conditioning.

## **3. NO PHYSICAL DISCIPLINE**

## **4. RE-DIRECTING ANY AGGRESSIVE BEHAVIOR THROUGH STRATEGIES WHICH ARE INCOMPATIBLE WITH THE TOPOGRAPHY OF THE AGGRESSION**

*THE RE-DIRECTION OF AGGRESSION THROUGH STRATEGIES INCOMPATIBLE WITH THE TOPOGRAPHY OF THE AGGRESSION:* We will not risk human life in an attempt to stop fighting elephants. Operant conditioning provides a mechanism that can be used to reinforce an animal's positive attitude. Behavior modification techniques can also be used to reinforce positive social interactions between working members within the herd. Mitigating herd dynamics is a critically important issue for the successful protected contact management of the herd. Operant conditioning provides us with our only safe and positive means to mitigate herd dynamics.

Our primary strategy in the redirection of aggression is to identify where and when aggression is likely to occur and then work to develop strategies and means to prevent the aggression from happening in the first place. Dealing with aggression after the fact always presents greater difficulty and potential danger.

## **DEFINITIONS**

*OPERANT CONDITIONING:* refers to the systematic conditioning process of shaping an animal's behavior toward a desired goal. Operant conditioning comes under the well-established principles of behavior theory. In the protected contact system, behavior modification is accomplished exclusively through the use of positive rewards including food treats, variety, and social reinforcers.

*PROTECTED CONTACT:* refers to a "hands-on" management system that is used to maintain physical contact with our captive elephants while maximizing keeper safety. In protected contact, the needs of the elephants are subordinate only to the safety of the elephant keepers. The elements of protected contact elephant management include a combination of the following; facility design, animal and keeper position relative to protective barriers, and operant conditioning techniques designed to encourage the elephant to voluntarily comply with the keeper's objectives. There are three components to our elephant management strategy. In addition to trained voluntary compliance with husbandry behaviors, we also train the elephants for voluntary restraint, and, in rare cases, veterinary intervention with chemical immobilization in managing the needs of our elephants.

## **CONTRASTING THE FREE AND PROTECTED CONTACT METHODS OF TRAINING**

In protected contact the keeper remains outside both the elephant's enclosure and social structure. The keeper forms a cooperative relationship through the delivery of positive reinforcements in order to gain protected access to the animal. The keeper never uses physical discipline to punish misbehavior.

In the traditional free contact method, in order to accomplish the keeper's objectives relating to animal husbandry, a keeper is free to enter the elephant's enclosure and moves freely among the elephants. Through the delivery of both positive and negative reinforcements, the keeper uses his/her skill to become accepted by the elephant as the dominant member of the elephant's social hierarchy.

## **SOME OPERANT CONTITIONING BASICS**

Training is a creative process, with as many ways to train a given behavior, as there are trainers. Behavioral theory outlines the principles for successful behavior modification. The application of technique in a specific circumstance is left to the trainer's subjective judgment based on past experience and the boundaries of our protocols.

There are many important tools in the trainer's repertoire for shaping behavior and it is beyond the scope of this manual to delve into them all. For the purpose of an introduction to our training methods, we have selected three training tools and applied them, step by step, to three common training problems.

### **TECHNIQUE:**

#### *CONDITIONING BEHAVIOR: THE BRIDGING STIMULUS*

The animal must be healthy and eating well. Elephants are different than most animals in that they always seem to be ready to eat. For most animals, a food base (measured or weighed) must be established. It may sound odd, but the animal best determines the food base. Like people, animals have different metabolic rates and there fore different food needs within the species. The keeper determines quality and type of food. The animal's interest in the food (or lack of it), and in doing what is necessary to obtain it, will tell the keeper if too much food or too little is being offered on a daily basis. This same principle applies to an animal in the wild. An animal would not normally expend energy to hunt or forage if it was not motivated to do so by the need to eat. In a positive reward system, based on food reinforcement, either preferred "treat" food or a food drive must be established with the subject stimulus.

Once a food delivery system, (which minimizes any potential risk to the keeper) has been established for the particular species, conditioning can begin.

A bridging stimulus bridges the gap between the time the animal performs a behavior and the delivery of reinforcement. The "bridge" is a critical component in the operant conditioning process; it gives important information to the animal about what will be reinforced. Conditioning a bridging stimulus is a simple procedure. Begin by pairing any consistent sounding noise, (clicker, whistle, etc.) with food. The noise is to be sounded just prior to the offering of food. Your consistency and timing (latency) are two important keys as you pair the sound with the food. Very quickly (in most species this happens within a few sessions), the animal will begin to associate the sound with the offering of food, something it desires.

Again, the same rules apply in nature. To a wild bear, the sound of bees may, through trial and error, become associated with obtaining honey. Like the clicker, the sound of a swarm of bees could become a conditioned reinforcer or (CR) to a bear.

To test the animal's progress toward auditory conditioning, sound the bridging stimulus and wait a few moments before the food is offered. The animal's anticipatory behavior (or lack of it) will tell you if conditioning has taken place be sure the animal is responding only to the sound of the bridge and not your body language or movement prior to the bridge.

*NOTE:* It is very easy to blur the distinction between a bridging stimulus and a call signal. There is a fundamental difference between the applications of the two. The bridge is used to actually shape behavior through selective reinforcement of desire behaviors, it can terminate the behavior. The call sound is used only to signal an animal to come for a food reward, no shaping of specific behavior other than to come is involved.

## **TECHNIQUE:**

### *SHAPING BEHAVIOR: TARGET TOUCHING*

Almost all higher animals are capable of learning several components of behavior simultaneously. At the same time the bridging stimulus is being conditioned, most animals can learn to target touch in exchange for a food reward.

Target touching in this training system is a very important first step. The shaping of just about every conceivable behavior in this system will have a common origin in the act of target touching. Once the animal is conditioned to touch the target, it can be directed from one place to another at will. Target touching is important too, in that it focuses the animal's attention and minimized the impact of distractions. The target becomes a familiar and reinforcing object to the animal and soon holds the power to offer reassurance when new training situations arise and the animal is unsure of what is expected. The target is a reference point.

The first step in the process is to systematically desensitize the animal to any fear of the target (a novel stimulus). The animal should be reinforced for a relaxed awareness of the target in its immediate area. Always take the opportunity to reinforce the animal for noticing or investigating the target. Remember, the ultimate goal is to encourage the animal to move toward the target, so you must use your food reinforcers to encourage the animal to do so. This is the essence of the shaping process. Shaping consists of taking a very small tendency in the right direction and shifting it, one small step at a time, toward an ultimate goal.

Some of the more timid animals (especially prey animals) may not initially be brave enough to want to investigate the target. In these cases, it may be necessary at first to bring the target to the animal. The animal's behavior will indicate when it is comfortable enough with the target for you to move to this next level.

Always try to touch the animal on the head so it sees the approach of the target and is not startled. The bridging stimulus should be sounded at the exact instant that the animal is actually touched on the nose or face by the target. By pairing target touching with a food reward, a positive association is soon made. Be careful not to stay at this level too long, the animal must learn to touch the target on its own and not wait for the trainer's manipulation. By trying to do too much for the animal the trainer runs the risk of unintentionally conditioning the animal to stand still and wait.

Trainers should always capitalize on opportunities to reinforce the animal for thinking. Well trained animals, fluent in the language of operant conditioning, have also learned how to put complex components of behavior together. These animals have in effect "learned how to learn". Shaping the animal's understanding of this

learning process is where a trainer's skill really shows. Training is creative work.

**TECHNIQUE:**

*SYSTEMATIC DESENSITIZATION BEHAVIOR: VOLUNTARY BLOOD COLLECTION*

As the phrase implies, systematic desensitization is the process where a stimulus, through exposure, loses its influence on the behavior of an animal.

Your friend has developed an annoying habit of whining and complaining to you about certain silly things, each time you are together. You could seek out a new friend, but because you like most of your friend's other qualities, you might respond by letting his/her complaints "go in one ear and out the other". The last choice is an example of desensitization. You have selected to tune out the annoying stimulus of your friend's whining so as to preserve the relationship for the other rewards it may hold.

In animal training, desensitization refers to a systematic series of reinforcements selected so as to reward an animal for ignoring a specific stimulus, (usually a noxious or mildly aversive stimulus such as venipuncture for injections or blood withdrawal). Desensitization is a critical tool in the training process. In the wild most new situations that confront an animal, are treated, by the animal, with caution. Captive exotics, though removed from the wild, are genetically predisposed to respond the same way their wild counterparts do. A trainer must use his/her reinforcements to desensitize the animal to the novelty of every new situation.

Venipuncture for blood withdrawal is a common husbandry training problem. Training an animal is always easier if the animal has no previous negative history associated with the desired behavior. If the animal does have a conditioning history with aversive associations, each of these associations must be identified and then neutralized through desensitization. The sight of veterinarians, white lab jackets, special equipment, the smell or feel of alcohol, could each stand out in the animal's mind as a precursor to a negative event and therefore must be desensitized.

In any event, the first rewards are given as the animal simply relaxes its body posture. Only after the animal is totally relaxed with each stage does the trainer proceed on to the next new stage. Determine

the optimum site for blood withdrawal and begin to reinforce the animal for allowing access to the general region. Begin to focus attention on the specific area where vessels are close to the surface. Desensitizing the animal to the smell and feel of cool alcohol can be done at the same time increased blunt pressure with a thumb is being applied to the region. Again, the animal is reinforced only for relaxation or non-response to the sensation of pressure being applied and the evaporation of the alcohol on the skin.

Once the animal willingly tolerates the application of pressure and alcohol without response, it is ready for the final phase where a mildly painful stimulus is introduced. Only those same relaxed responses are reinforced. Tolerance is gradually established within the paradigm of relaxation. Some trainers use the edge of a fingernail to simulate the prick of a needle while others prefer the snap of a rubber band. The end result should be the same...a willing tolerance to a minor level of pain in exchange for a food or social reward.

SECTION 2

# **PROTOCOLS**

**Elephant Program Manual**

## **CHAINING PROTOCOL**

***Elephants will only be chained for practical management purposes, and chaining will not be used as a disciplinary measure in any instance.***

At the Kansas City Zoo the female elephants will be trained to accept chaining.

- One of the main reasons for this approach is our breeding program. For safety and management reasons, a pregnant elephant will eventually be put on chains in accordance with our current birthing protocol.
- When an elephant is unwilling or unable to go into the restraint chaining could also be helpful when dealing with medical procedures either due to illness, injury or for reproductive purposes, (such as artificial insemination).
- If for any reason the restraint is not operating, we can continue with certain procedures, (as listed above), in a safe manner.

Two qualified elephant handlers will always be present for chaining.

The elephants will be kept on chains only during the training session. The only exception to this is if we have a pregnant cow near delivery time. At that time the cow will have chains on for increasing periods of time to prepare her for delivery.

Usual husbandry routines, such as baths, can be done with the cow on chains.

The current protocols and procedures for chain training and chaining routines must be followed. These may change, but only with the agreement of the elephant keeper staff, the animal manager and the Director of Mammals.

## ***TRAINING STEPS FOR NEW KEEPERS ELEPHANT BARN***

When a new keeper is starting in the elephant barn they will be given a check off list of information and tasks they will be learning and expected to know and accomplish. The following steps are a guideline in the training of the new keeper. With each step will come new information. The area supervisor and the other elephant keepers will evaluate

The new keeper and determine when the new keeper can move to the next step. Written information as well as verbal instruction will be available. New keepers are encouraged to ask questions.

As people have varied backgrounds, some people will move through the steps quicker than others. It is important that the whole staff is comfortable with the progress of the new keepers.

Step 1: For the first couple of weeks new keepers will follow other keepers around, watch and observe the workings of the barn. At this time the new keepers should start learning the layout of the barn. This includes the numbering system of the doors, stalls and yards. They should also be learning the elephants and how to prepare diets.

Step 2: Once new keepers have become familiar with stalls and doors, they can start running doors with no elephants present, with a qualified keeper present.

Step 3: When the keeper has demonstrated a good working knowledge of the doors and all other staff is in agreement, the keeper will be allowed to work doors while moving elephants. At this time there must be two qualified keepers present when the new keeper is running the doors.

Step 4: New keepers should now start concentrating on learning the methods of how the elephants are worked; including being around during feeding, hosing, footwork and any other training that is taking place. Learn the hosing routine and the commands that each elephant knows.

Step 5: When the staff feels a new keeper knows the commands and hosing routines, the keeper will be assigned an elephant to work through. Once a new keeper starts on a cow, they must demonstrate

the ability to have the cow perform all behaviors and the hosing routine smoothly and on a consistent basis. During this time, the keeper will also be allowed to hose cows and feed them during footwork and blood draws. This may or may not include feeding bulls during their treatments, depending on how comfortable the rest of the staff is working around bulls with new keepers.

Step 6: When the new keeper can work their assigned elephant to all staff's satisfaction, they will be permitted to move on the next cow. Working through cows usually takes a couple of weeks per cow. Keep in mind that the more you work with your assigned cow, the faster things move along.

Step 7: Once a keeper has been checked off on a cow, they can then also hold the ear of that cow during blood draws.

Step 8: At the same time the keeper is working through the cows, they will also be learning proper foot care practices and proper techniques for drawing blood.

Step 9: Once the keeper has worked through all the cows and can properly perform blood draws and foot care maintenance and all staff are in agreement, the keeper will become qualified.

Step-10: The newly qualified elephant keeper will now move on to working the bulls and learning how to proficiently run the Elephant Restraint Device.

## ***GUEST VISITS***

A guest is defined as a person who is not directly associated with the elephant program. The following guidelines are to insure the safety of the visitor, staff and the elephants.

- Trainers or keepers are responsible for securing prior approval for their guests. All visits must have the prior approval of either an Animal Director or Animal Manager before entering the elephant facilities.
- Once a guest visit has been approved, it is the responsibility of the keeper (or other elephant staff member) conducting the tour to instruct the guests as to where they can safely stand and all safety policies relating to them.
- All guests must access the elephant facilities by appropriate gates and follow normal organizational procedures in and around the elephant facilities.
- All guests must stay in safe viewing areas.
- While visiting the elephant facilities, all guests must be accompanied by a qualified elephant staff member. QUALIFIED ELEPHANT STAFF ARE: THE ELEPHANT KEEPER STAFF, THE ELEPHANT AREA ANIMAL MANAGER, AND THE DIRECTOR OF MAMMALS.

SECTION 3

**MUSTH IN BULL ELEPHANTS**

**Elephant Program Manual**

# **MUSTH IN BULL ELEPHANTS**

*By Gary Priest*

Although male elephants make up only 20 percent of approximately 600 captive elephants in North America, they were involved in nearly 50 percent (7 of 15) of the fatalities in the U.S. and Canada since 1976 (Lehnhardt, 1991). This fact, by itself, should be sufficient motivation for professional keepers working with male elephants to learn about musth and how it may influence a bull's behavior.

## ***WHAT IS MUSTH?***

Musth is both a behavioral syndrome and physiological condition. It is temporary behavioral change in the male elephant that is related to sudden increases (up to 50 times normal levels) of the testosterone (a hormone) level in the blood. Because of the sudden spike in testosterone, an elephant in musth usually displays a heightened awareness of everything around them (Roocroft, pers. Comm.) The signs of musth can vary tremendously from one male elephant to another, depending on age, personality, and physical condition. Like buffalo, sea lions, and a host of other animals, elephants are a tournament species. As a natural part of their breeding biology, mature males routinely challenge each other for the right to mate with estrous cows. Through natural selection, this aggressive breeding behavior insures a strong gene pool and favors stronger and more aggressive males.

Several species of mammals go through what is known as rut. The males become very aggressive and advertise their state and location through scent marking and loud vocalizations. The ancients of India coined a very descriptive term for this condition in elephants. Musth is a derivation of the Hindi word "mast," which means intoxication. The word describes the seemingly drunken, disoriented behavior of a male elephant in musth.

The first record of musth in western scientific literature was documented by Charles Darwin (Darwin, 1871 and Sanderson, 1882). Of the Asian bull elephant Darwin wrote, "No animal in the world is as dangerous as an elephant in musth." Although musth in the Asian elephant has been widely recognized in the scientific literature for more than 100 years, as recently as 1984 (Rasmussen, 1984) the occurrence of musth in African elephants was still being disputed.

### **WHAT DOES MUSTH LOOK LIKE?**

The danger to keepers is greatest just prior to the manifestation of any physical signs of musth. The only warning signs a keeper may see during this dangerous period is the animal becoming reluctant to cooperate, having wider than normal eyes, or beginning to blow on the temporal gland area. There are three stages of musth: pre-musth, full musth, and post-musth.

The most obvious manifestations of musth in either species are a sharp rise in aggressive behavior, copious secretions from and enlargement of the temporal glands (primarily Asians), and the continuous discharge of urine (Poole, 1981). In the Asian elephant, these signs of full musth are generally well defined.

In African elephants, the signs of musth can be far more subtle and variable. Musth in wild African elephants has only been scientifically described within the past decade (Poole, 1981). Drainage from the temporal glands is an unreliable sign in African elephants, because drainage can occur in females as well as males and can be due to any type of excitement. Dribbling urine may in fact be the only reliable physical sign of musth in the African elephant. African elephants differ from Asian elephants in that two types of secretion may be observed from their temporal glands. Both male and female African elephants produce a watery discharge that evaporates quickly. However, only older males produce the sticky, viscous discharge associated with musth.

Like many other rutting mammals, male elephants mark themselves and the area they use with a strong-smelling urinary discharge. Urine dribbling marks a path that serves to identify individuals and may also provide a measure of their rank. It is very likely that the urine trail also helps the males keep track of each other's location.

In the wild, males in musth will shift habitat to places used predominantly by females (African: Poole, 1982; Asian: Eisenberg and Lockhart, 1972). Other behaviors noted are increased irritability, ears extended, rhythmic swinging of the head, swelling of the temporal glands, dark oily liquid exuding from the temporal glands, dribbling urine, strong smelling urine, and tusking the ground.

In captivity, only 4.5 percent of African bulls over 30 years of age have a musth period associated with temporal gland secretion, compared to 90 percent of the Asian bulls (Rasmussen, 1984). It is perhaps for this

reason that many workers erroneously concluded that musth does not occur in the African elephant (Poole, 1981).

### ***WHEN DOES MUSTH OCCUR?***

In the wild, musth in both African and Asian elephants have been observed throughout the year, with peak occurrences during and following the rainy season when vegetation was abundant (African: Poole, 1989; Asian: Eisenberg et al, 1971).

Musth periods of different males are asynchronous, and each male usually comes into musth at a specific time every year (Poole, 1989). In the wild, African males have been observed in musth throughout the year, with the highest occurrences in the first seven months of the year, during and following the two rainy periods. Peak numbers of musth males coincided with the months when the number of estrous females was also the highest (Poole, 1989). Musth males may locate receptive females by listening for their loud, low-frequency calls.

Several captive male African elephants in their teens have been observed exhibiting the signs of musth (Eisenberg, pers. Comm. in Poole, 1989). Asian elephants experience the first musth at an earlier age than do African elephants. Among captive Asian elephants, males as young as 11 years have been observed in musth (Eisenberg et al, 1971).

In captivity, musth in either species may be seen at an earlier age, a result of better nutrition and reduction of the stress that life in the wild may impose on the animal. The duration of musth is highly variable and is age-related; wild males in their early 30s may only stay in musth for a week, while males in their late 40s may be in musth for three or four months (Poole, 1987). In both species, duration of musth can be from one day up to several months.

### ***HOW DO ELEPHANTS IN MUSTH GENERALLY BEHAVE?***

An obvious behavioral change in the musth elephant is the heightened awareness to everything around them. A bull in musth will almost always react to anyone in close proximity or any sudden movement. Musth elephants of both species frequently blow on their temporal glands with their trunks. Aggressive behavior is fundamental to a musth elephant. Although no two elephants are alike, the following key should be a helpful guide to the three stages of musth.

*PRE-MUSTH:* The most dangerous period for keepers. At this stage, there are no visual cues yet as to the animal's impending condition.

There may be some very subtle behavioral cues that will indicate the onset of musth. These cues include: a refusal to cooperate, attention paid to the temporal gland with the trunk, and general irritability.

*MUSTH:* While there are several general indicators of musth, the only reliable sign of an elephant in "full musth" is a constant, uncontrollable dribbling of urine. Less reliable than dribbling urine as an indicator is temporal drainage.

*POST-MUSTH:* Dribbling urine ceases while temporal drainage may continue.

### ***WHAT IS THE BIOLOGICAL PURPOSE FOR MUSTH?***

Increased aggression associated with musth appears to be the driving force to motivate young bulls to challenge an older male for dominance and the right to breed estrous females. Musth appears to announce that a male is prepared to aggressively defend or gain access to an estrous female. It is a period of heightened sexual awareness and aggressive activity experienced once a year by mature males in peak condition (Poole, 1987).

Elephant biologist Joyce Poole first observed musth in African elephants. From her field notes she writes,

"...Small musth males were able to dominate larger, normally higher-ranking, non-musth males. Large non-musth males who were apparently in peak condition often fled for several kilometers from much smaller, musth males who were in visibly poorer condition...The behavior of male elephants suggests that musth males are indeed signaling aggressive intent."

Like other rutting mammals, male elephants advertise their state and their location by marking and vocalizing. Rubbing the temporal glands, located behind the eyes, and ear waving may serve to advertise the scent associated with musth. It is also speculated that ear waving is used by musth males to modulate the sound of their musth rumbles, which are loud, low-frequency sounds (Payne et al, 1986 and Poole, 1989).

### ***A POTENTIAL TECHNIQUE FOR CONDITIONING AGGRESSION IN MUSTH BULLS.***

For years, marine mammal trainers have successfully used behavioral strategies to minimize the impact sea lion rut has on show and aggression directed at trainers and other animals. Now, it has been

demonstrated with at least one African bull elephant that a significant positive impact on the level of aggression can be made through the application of behavior modification techniques (Antrim, 1992).

The reinforcement strategy for controlling an animal's aggressive behavior is to reinforce only those behaviors that are incompatible with the topography of the aggression. Aggression is learned. Compliance and cooperation can also be learned through the selective reinforcement of incompatible behaviors. While this technique may represent a useful strategy for minimizing aggression during musth, it is not likely to eliminate the chemically induced aggression associated with musth elephants.

### ***DIET CAN IMPACT MUSTH***

Nutritional restriction in the Asian bull elephant influenced the timing and intensity of musth and the temporal relationship between the testosterone rise and the onset of temporal gland flow (Cooper, 1990). Jainudeen observes musth to be more predictable and intense in well-nourished bulls.

Roocroft notes that the appetite of the elephant drops dramatically, with some males losing as much as 1,000 pounds during the musth period. Poole (1989) notes that in Africa, musth males drink water more frequently than do non-musth males.

### ***CAN NON-MUSTH MALES BREED SUCCESSFULLY?***

Non-musth males can and do mate successfully, but their success during the peak of estrus is severely restricted by the presence of a musth male and by female preferences for musth males (Poole, 1989). In the African genus, temporal gland secretions of short duration often occur in both immature and mature elephants of both sexes. Previous studies have shown that there is no relationship between such secretions and sexual activity (Hanks, 1973). The secretions are often a response to stress or excitement, such as social interactions, separation, and reunion (Poole, 1989 and Cooper, 1990).

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SECTION 4

**GLOSSARY OF TRAINING  
TERMS**

**Elephant Program Manual**

## ***GLOSSARY OF TRAINING TERMS***

### **ADAPTATION:**

Adjustment to new surrounding; characterized by a decrease in excitability.

### **ANXIETY:**

A descriptive term which refers to changes in behavior produced by the onset of an aversive or pre-aversive stimulus.

### **APPROXIMATION:**

The process of approximation is the reinforcement of partial or preliminary responses on the way to the animal's emitting the complete form of the desired response.

### **AVERSION:**

A dislike or avoidance of something.

### **AVERSIVE STIMULUS:**

A stimulus whose termination or avoidance increases the frequency of a response it precedes, is called an aversive stimulus. An increase in the frequency of a behavior to terminate an aversive stimulus is said to have been negatively reinforced, where a decrease in frequency is said to have been punished.

### **AVOIDANCE BEHAVIOR:**

Behavior which increases in frequency because it postpones the onset of an aversive stimulus, (and is thus negatively reinforced).

### **BEHAVIOR:**

A broad term to connote all the responses,

### **BEHAVIOR MODIFICATION:**

Refers to the differential reinforcement of successive approximations leading toward a target behavior pattern.

### **BRIDGING STIMULUS:**

A stimulus which signals the delivery of a reinforcer. Often called a secondary or conditioned reinforcer, because it acquires its effectiveness through a history of being paired with primary reinforcement. It permits instantaneous reinforcement after a response, and after conditioning becomes a secondary reinforcer.

#### CLASSICAL CONDITIONING:

A cause and effect event where the stimulus is an adequate explanation for the response. The response is elicited reflexively where the animal exercises no control in the situation and the animal's action produces no change in its environment.

#### CHAINING:

The process of learning a sequence of behaviors that proceeds semiautomatically in a determinate order; the last previous response provides the necessary cue that determines which behavior comes next. An (SD) or command, takes on the characteristics of a conditioned reinforcer. A chain consists of two or more behaviors linked by a common stimulus.

#### CONDITIONED RESPONSE:

A new or modified response that is elicited only by a given stimulus after conditioning has occurred.

#### CONDITIONED REINFORCER:

A previously neutral stimulus which has become reinforcing because of its association with a primary reinforcer.

#### CONDITIONING:

Conditioning refers to a change in the frequency and form of a behavior due to influences of the environment. It can be brought about by the application of reinforcers or punishers. The process by which a response is made stronger (increasing the probability of its recurrence in a similar situation) by pairing a reinforcement with the response.

#### CONTINUOUS REINFORCEMENT:

A schedule of reinforcement in which each correct response is followed by a primary reinforcer.

#### DEPRIVATION:

Occurs when a primary reinforcer or strongly conditioned secondary response is withheld for a period of time.

#### DIFFERENTIAL REINFORCEMENT:

The selective reinforcement of one aspect of a behavior pattern to the exclusion of other aspects.

**DISCRIMINATIVE STIMULUS (SD):**

A stimulus which consistently elicits a particular response because previous experience with the stimulus has led to reinforcement. Unless a differential response can be shown, the stimulus is not an SD.

**DISCRIMINATION:**

The ability of an animal to distinguish and respond to differences in various aspects of its environment.

**DISPLACEMENT ACTIVITY:**

An indicator of a state of conflict existing in an animal. An animal having difficulty with conflict resolution will often perform a trivial or abbreviated action in an attempt to break the stalemate in which it finds itself.

**EXTINCTION:**

The process of presenting the conditioned stimulus unaccompanied by the usual reinforcement, which results in a gradual decline in the performance of the behavior to zero.

**EXTINCTION BURST:**

An increase in responses or performance which is brought about by the withdrawal of reinforcement. Extinction bursts occur just prior to the declines of behavior (due to lack of reinforcement) prior to extinction.

**ELICIT:**

To draw a response out. A trainer elicits a response from an animal.

**EMIT:**

To send out. An animal emits a response to a stimulus.

**FADING PROCEDURE:**

A technique for gradually changing one stimulus controlling an animal's behavior to another stimulus.

**FIXED-INTERVAL SCHEDULE OF REINFORCEMENT:**

A schedule in which reinforcement occurs for the first correct response after a consistent amount of time has passed following the preceding reinforcement. This schedule of reinforcement produces a scalloped response curve and is a poor motivator.

**FIXED-RATIO SCHEDULE OF REINFORCEMENT:**

A schedule in which reinforcement occurs regularly.

#### GENERALIZATION:

The reciprocal of stimulus discrimination, the animal will increase in the strength of responses to a variety of stimuli. An adaptive learning process. To the extent that stimuli generalization occurs, stimulus control is lost.

#### INCOMPATIBLE BEHAVIOR:

A behavior is said to be incompatible with another when it is impossible for both behaviors to occur at the same time. The term used when referring to a kind or type of behavior that would tend to conflict or be contradictory to that behavior's antithesis.

#### INTERMITTENT / PARTIAL REINFORCEMENT:

Any schedule of reinforcement which does not provide reinforcement following each correct response (partial reinforcement).

#### INTERVAL SCHEDULE OF REINFORCEMENT:

Reinforcement based on the passage of time.

#### LATENCY:

The time between a signal (SD) and the animal's response to it (the performance of a behavior).

#### LEARNING:

A relatively permanent change in response patterns which occurs as a result of reinforced practice.

#### MAGNITUDE OF REINFORCEMENT:

Refers to the size, strength of duration or a reward following a behavior.

#### MOTIVATION:

The non-stimulus variables controlling behavior; the general name for the fact that an organism's acts are partly determined in direction and strength by its own nature and/or internal state.

#### NEGATIVE REINFORCEMENT:

An animal is said to be negatively reinforced when the performance of a behavior serves to terminate an aversive stimulus or event. Negative reinforcement has occurred when the frequency of a behavior increases to avoid the onset of, or to terminate, an aversive stimulus.

#### OPERANT:

Operating or producing an effect or effects on the environment.

**OPERANT CONDITIONING:**

Is the term used for the procedure of presenting the organism with a reinforcing stimulus immediately following the occurrence of a desired response. In this method of conditioning the organism obtains reinforcement by operating on the environment in some fashion.

**PARADIGM:**

A pattern, example, or model.

**PROBABILITY:**

The likelihood that a given behavior will occur.

**PERFORMANCE:**

Measures of observed behavior and is genetically referred to as the form and frequency of behavior.

**POSITIVE REINFORCEMENT:**

A favorable event that strengthens the response which preceded it. There are two types of positive reinforcement, primary (unconditioned) and secondary (conditional).

**PRIMARY REINFORCER:**

An unconditioned reinforcer. Anything of intrinsic value to an organism, examples are biological needs for food, water, sex, or social needs.

**PUNISHMENT:**

Occurs when the frequency of a behavior declines due to the onset of an aversive stimulus immediately following its performance.

**REGRESSION:**

An animal is said to have regressed when its previously conditioned behavior has dropped back to a lower stage of development.

**REINFORCER OR REINFORCEMENT:**

The strengthening of something by adding to it. Any condition or the total circumstances that strengthen a stimulus-response connection; any circumstances or event that increases the probability that a response will occur again in a situation like that in which the reinforcing condition originally occurred. Generally, any condition strengthening learning.

**REINFORCEMENT STIMULUS:**

Any stimulus which, when presented immediately following a response, tends to increase the frequency of the response.

**RESPONSE:**

An identifiable unit of behavior, (can be muscle movement or a gland).

**REWARD:**

A satisfaction-yielding stimulus or stimulus object that is obtained upon the successful performance of a task.

**REPERTOIRE:**

The term repertoire is used to indicate the total number of latent responses which the organism may emit under the various conditions present in its environment and as a result of its past conditioning history.

**SATIATION:**

Satiation occurs when a normally positive stimulus is repeatedly offered until it loses its reinforcing properties.

**SCHEDULE OF REINFORCEMENT:**

Refers to the conditions under which reinforcement is delivered. Continuous reinforcement and variable reinforcement are the schedules most important to animal training.

**SECONDARY REINFORCER:**

A stimulus which derives its reinforcing value from prior conditioning in which it has been associated with a primary reward; when behavior is being shaped with operant conditioning the BRIDGING STIMULUS becomes a secondary reinforcer when paired with reinforcement. Once conditioning has taken place the distinction between primary and secondary reinforcers becomes less clearly defined.

**SHAPING:** The differential reinforcement of successive approximations of some desired behavior in order to increase the probability of the occurrence of a response.

**STIMULUS:**

An external or internal object or event which occasions an alteration in the behavior of the organism. An animal must be able to perceive the stimulus.

#### STIMULUS CONTROL:

A different form or frequency of behavior in the presence of one stimulus (SD) which does not occur in the presence of other stimuli.

#### SUPERSTITIOUS BEHAVIOR:

Behaviors offered by an animal which are not required for reinforcement, but nonetheless, become an integral part of the response pattern.

#### SUCCESSIVE APPROXIMATION:

The stair step process where behavior is made to approach a desired act by means of selectively reinforcing those behaviors which lead towards the desired act.

#### SYSTEMATIC DESENSITIZATION:

A procedure by which an animal is allowed to gradually become comfortable with an unusual or frightening stimulus.

#### TIME OUT:

Withholding all reinforcement including personal contact with the intent of extinguishing an undesirable behavior.

#### THRESHOLD:

The point at which a stimulus is just strong enough to be perceived or produce a response.

#### VARIABLE INTERVAL REINFORCEMENT SCHEDULE:

An irregular schedule in which reinforcement occurs for the first correct response after a variable period of time. A variable interval schedule produces a very uniform rate of responding and is useful in providing a good benchmark against which to test the effects upon behavior of various factors like reward size. In higher animal, this has been demonstrated as being by far the most motivating schedule of reinforcement.

#### VARIABLE RATIO REINFORCEMENT SCHEDULE:

A schedule in which reinforcement occurs irregularly after a number of responses. This is similar to reinforcement schedules found in nature. An organism is not usually reinforced 100% of the time in nature even though it may have performed correctly those behaviors that usually lead to reinforcement.

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