THE USE OF POSITIVE REINFORCEMENT TECHNIQUES IN THE MEDICAL MANAGEMENT OF CAPTIVE ANIMALS

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Abstract

Positive reinforcement training is gaining acceptance as a valuable animal care and management tool to aid in husbandry activities, veterinary procedures, and research protocols. The benefits of such work include less stress on the animal, greater flexibility and reliability in data collection, and a reduced use of anesthesia. This paper presents examples of the use of training techniques to address various medical situations in a number of species in the zoological setting.

Introduction

The comprehensive use of positive reinforcement training has revolutionized the way we care for captive animals (4,6). By using recognized techniques, many tangible results and benefits can be achieved. Animals are desensitized to frightening or painful events, like getting an injection, so the stress associated with these events is significantly reduced (5,7). Animals gain the opportunity to voluntarily cooperate in these procedures, rather than being forced to. With a greater accessibility to more cooperative animals comes the opportunity to initiate preventative medicine practices and to explore techniques previously seen as less practical on a routine basis such as ultrasound or tube insertions for artificial insemination (3). With this cooperation comes a reduction in the use of restraint and anesthesia (1). Many husbandry and veterinary procedures can be implemented with less disruption to all animals, by reducing the need to separate animals from their social groups for many procedures. Finally, experience has shown that trained animals maintain a high degree of reliability in participating in these procedures and are less stressed while doing so (8).

Methods

The training referred to throughout this paper, and recommended as the approach of choice, is positive reinforcement training. Animals are reinforced with pleasurable rewards for the desired behavioral response. Operationally, it means that the positive alternatives are exhausted before any kind of negative reinforcement is used. On the rare occasions when an escape-avoidance technique is necessary, it is kept to a minimum and balanced by positive reinforcement the vast majority of the time. Punishment, which by definition is used to eliminate a behavior, is only appropriate in a life threatening situation for person or animal. To dispel a common misperception, positive reinforcement training does not require any food deprivation. Animals are fed their daily allotment of food, and rewards for training use that diet, or consist of extra treats. Finally, this training relies on voluntary cooperation by the animal to be successful.

Through a process termed desensitization, animals learn to tolerate presumably scary or uncomfortable stimuli. In basic terms, desensitization is a process designed to "train out", or overcome, fear. By pairing positive rewards with any action or object that elicits fear, that fearful entity slowly becomes less negative, less scary, and presumably less stressful. Using this technique, animals have been desensitized to husbandry and veterinary procedures, new enclosures, unfamiliar people, negatively perceived people like the veterinarian, novel objects, strange noises, and other possible aversive stimuli.

In fact, the authors have previously reported that animals being desensitized to specific stimuli can, over time, become generally desensitized to anything novel or unexpected (2).

Voluntary Acceptance of Injections

One of the most useful applications of husbandry training is the conditioning of animals to voluntarily accept injections. When training an animal to accept an injection, the feeling of a needle piercing the skin is a potentially frightening and painful experience. Effective desensitization requires pairing many positive rewards directly with that experience, or with a similar experience. Training may include pairing positive rewards with the experience of being touched with a progression of items, starting with the trainer's finger or a wooden dowel, then to a capped syringe, and then to a needle with the end cut off so it is blunted, and finally the real needle. The animal must experience this over and over again, with the touch slowly moving from very light to the final experience of actually piercing the skin. If desensitization is done well, the animal will voluntarily accept the injection and recognizable signs of stress and fear will be diminished or absent. To date injection training has been successfully implemented with many different species and it continues to be a priority behavior for many zoos.

Husbandry Training of Elephants in Protected Contact

Protected contact, as a system for managing elephants, is based on the use of positive reinforcement techniques. All elephants in protected contact should be trained on a wide range of husbandry behaviors, including skin care, body exam, foot care, tusk trim, blood sampling, vaginal exam, and rectal palpation. Until very recently, many in the zoo community were skeptical of the ability to provide comprehensive medical care for animals functioning in a positive reinforcement-based system where compliance in behaviors is voluntary. That skepticism is eroding away as more examples of successful medical treatment under these conditions are being produced. The following examples illustrate the advances being made in the management of elephants in protected contact.

The Houston Zoo manages 2.4 Asian elephants in a protected contact system. Thailand, the 33-year-old bull, has had chronic nail cracks and abscesses in his front feet for over ten years. Prior to protected contact, Thai was maintained in a no contact system, which meant no routine foot care was being performed. Even as his nail condition worsened, only minimal foot work was possible. With the introduction of protected contact and positive reinforcement techniques, Thai was easily trained to present his feet through an opening in the training wall or the barn door for foot work.

Over the past five years, Thai has tolerated routine trimming as well as deep trimming into the abscessed areas. He has also complied in daily treatment of the abscesses and regular warm water foot soaks with Epsom salts or Nolvasan twice daily. With the expanded access to Thai, his cooperation with diagnostic techniques was now possible. Radiographs were taken to determine the depth of the infected tissues and to see if there was any bony involvement. Radio-opaque dye was injected into the hole in Thai's foot so that the tract could be identified. Thai was trained for the procedure by first teaching him to extend a front leg through the foot hole and place his foot on a custom built foot rest. Next an old radiograph cassette was used to train him to hold steady with the plate in a variety of positions under and around his foot. The final step was to move the large machine in position for the procedure while he placed and held his foot in the proper positions.

Currently, Thai's feet are greatly improved. Granulation beds have formed where the abscesses were and only small holes are visible on each foot. Routine foot care continues. Thai's feet will always be a

concern, but through training the keepers and veterinarians maintain the ability to monitor and treat his condition as necessary.

In another case, Kiba, a young bull, was born at the Zoo in 1987 with an umbilical stump that was excessively long and soon became infected. Although it was treated daily with Betadine, the infection persisted and a cantaloupe sized bulge remained present on Kiba's abdomen. In February 1992, Kiba was sedated and an ultrasound exam on the herniated area was done, specifically, to check the integrity of the abdominal wall and the potential for entrapment of intestinal loops. The ultrasound showed the area to have healed well. In November 1995, Kiba's umbilical area appeared very swollen. The immediate concern was that a loop of bowel had become trapped in a previously undetected defect. An ultrasound was again needed, but this time, the elephant staff had the opportunity to train Kiba for this procedure. Kiba was taught to present his body parallel to the training wall. He was then desensitized to the ultrasound exam including palpation of the area, the close proximity of the equipment, the feeling of the contact gel and pressure of the transducer.

Kiba is an extremely responsive elephant and was ready for the ultrasound within days. Fortunately, the ultrasound showed no loops of bowel or defects; the swelling was likely due to mild trauma. The swelling decreased within two weeks and has not reoccurred.
The Versatility of Husbandry Training

As husbandry training grows in the zoological community, many applications and benefits not initially perceived continue to emerge. Some examples of novel application of husbandry training include:

- training free ranging hoofstock to accept yearly vaccination
- training gorillas to provide saliva samples on cotton balls
- training a female rhinoceros on milking for supplementing of hand raised offspring
- training a female warthog for a vaginal swab
- training female drill baboons on tube insertion for artificial insemination
- training adult chimpanzees on blood draw

Evaluating Husbandry Training

There are methods of measuring the impact of husbandry training. We can use physiological measures like a comparison of cortisol levels in animals that are voluntarily cooperating in veterinary procedures to cortisol levels in animals being restrained or anesthetized for the same procedures. Behavioral data can be collected during the same two conditions and then correlated to specific states. We can compare the amount of time an animal is isolated from its group for medical work, with training and without. Or we can compare the level of compliance and reliability in routine husbandry procedures for animals in both conditions. We can simply count the number of anesthesias an adult chimpanzee used to go through to collect the monthly blood samples necessary to monitor a medical condition (12) and compare it to the number of knock downs required to collect those blood samples now that the animal has been trained to voluntarily cooperate in a blood draw (0). This information, coupled with the initial subjective impressions that drove the actions taken, can not only make a case for husbandry training, but it can be used to begin to build a profile of animal well-being.

Conclusions

In conclusion, positive reinforcement training is gaining stature among animal managers and veterinarians as a useful tool for enhancing animal health care and husbandry needs. It is proving to

be more versatile and multi-functional than was initially perceived. The comprehensive use of positive reinforcement techniques provides the means to pro-actively address a wide range of medical conditions and to develop and implement an effective program of preventative medicine. These benefits make training a valuable part of any animal management program and have significant implications for overall animal care and welfare.

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