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TRAINING ATLANTIC BOTTLENOSE DOLPHINS (Tursiops truncatus) FOR ARTIFICIAL INSEMINATION

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INTRODUCTION

The Naval Ocean Systems Center, Hawaii Laboratory, for the past eight years has maintained an artificial insemination (AI) program for Atlantic bottlenose dolphins. Both male and female dolphins are trained for blood collection from vessels in the flukes. In addition, male dolphins are trained for semen collection, while females are trained for AI. All behaviors were trained using operant conditioning with fish as reinforcements. All test animals are kept in floating pens 20' x 20' x 12' deep.

BLOOD COLLECTION FROM FLUKES

Both male and female dolphins are trained to present their flukes for blood sampling to measure the seasonal fluctuations of testosterone and progesterone levels. This training is difficult because the animal must remain motionless during venipuncture. Initial training began with basic handling of the animal in the water. While the animal was stationed near the side of the pen, we reinforced the animal for allowing us to manipulate its flukes. In time, we paired manipulation of this area with a simple hand cue. After we established stimulus control, we gradually raised the flukes from the water and placed them on the pen deck while the animal remained on its side. With the flukes resting on a pad on the deck, we gradually increased manipulation of the flukes to simulate the actual blood sampling procedure. Throughout most of the training a second person observed the training and eventually assisted during the blood collection. Once good

stimulus control was established, we held the flukes about 4 minutes for actual blood collection. Initial blood sampling was short, lasting about one to two minutes; it was gradually increased over several days to the desired time interval. A consistent body position for fluke bleeding was important. Having the animal on its side and parallel to the pen with its ventral surface facing the pen deck is the best position for bleeding. If the animal's head is farther away from the pen deck, the animal twists, resulting in more fluke movement. With its ventral surface parallel to the pen deck, the animal appears to be comfortable and can see the trainers. Because the animal can breathe easily in this position, it can hold the position longer. The dolphin can be bled from either the dorsal or ventral side by changing the angle of the flukes.

To maintain the behavior over time, we practiced imitating the actual bleeding process without the venipuncture. We varied the length of holding the flukes so the animal did not anticipate the end of the behavior. We ended the fluke-holding behavior when the animal was quiet and relaxed.

SEMEN COLLECTION

Because this procedure has not previously been performed on dolphins, we developed a new process. The training steps consisted of correct body position, penis erection, and semen collection. It took about 49 days to train two captive males.

Initially, the animal was trained to station horizontally with its ventrum facing the water's surface. After the proper body orientation was under stimulus control, the next phase began.

The initiation of penis erection was difficult to convey to the animal. The training sessions were about 20 minutes per day. The animal was rewarded for its movement of the genital slit opening and exposure of the penis tip. Once the exposure of the penis tip was consistent, we reinforced

this behavior after every other response. Partial erections were reinforced immediately with fish.

The erection behavior was shaped by reinforcing greater and greater exposure in a step-like manner and by using intermittent reinforcement. First, partial erections of one inch were reinforced after every other response. Partial erections greater than one inch were reinforced immediately. Then partial erections to two inches were reinforced on about every seventh response, with greater erections reinforced immediately. Finally, when partial erections of greater than two inches were consistently performed, the behavior was reinforced on about every seventh response. Full erections were reinforced immediately.

After penis erection was controlled, the animal's position with respect to the pen deck was shaped to allow the trainer easy access to the genital slit area.

The final stage in this training was collection of the ejaculate. The samples were collected in glass test tubes with an attached clear plastic sleeve. The clear plastic sleeve was slipped over the tip of the penis. The trainer applied slight pressure and massage and funneled the ejaculate into the collection tube. Using these techniques semen was collected reliably for three years, adding to knowledge of the dolphin reproductive biology (Schroeder, et al., 1983).

ARTIFICIAL INSEMINATION

The process of AI has been used with many species of terrestrial mammals, e.g., horses, cows, dogs (Gomes, 1977; Watson, 1978). At Naval Ocean Systems Center we have made the first attempts to use AI procedures in the dolphin (Schroeder, 1984). The reproductive system of the female bottlenose dolphin includes a pseudocervix with muscular folds in the

vaginal wall. In T. truncatus there are at least two of these folds, and there can be as many as 6 to 12 in certain balaenopterids (Harrison, 1969). This pseudocervix is within the spermathecal recess, where sperm is deposited during copulation. In the AI process, semen collected from a male dolphin is placed in the spermathecal recess with the aid of a fiber-optic laryngoscope (Schroeder, 1985).

Female dolphins were conditioned to handling with simulated AI procedures. The dolphins were caught by a stranding device. The animal was placed in a fleece-lined stretcher with openings for the flippers and a slit for the genital area, then laid on its side on a pen deck padded with foam rubber. After 15 minutes of occasional manipulation of the genital area, the animal was returned to the floating pen and rewarded.

During the actual AI procedure, we used a speculum and a fiber-optic laryngoscope to locate the mouth of the pseudocervix and direct the laryngoscope tip into the spermathecal recess. Three milliliters of semen were deposited in the spermathecal recess using the laryngoscope's internal channel.

SUMMARY

This paper has described some basic training techniques for AI of Atlantic bottlenose dolphins. Both male and female dolphins, after training, voluntarily submitted to blood collection via fluke bleeding. Male dolphins were trained for semen collection, while females were trained to submit for AI procedures.

Similar AI programs of other species of small cetaceans, if successful, could decrease our reliance on acquiring mammals from the wild. A marine mammal sperm bank also could ensure genetic variability and preserve gene pools of endangered species.

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