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Improving parental care of a female bottlenose dolphin (*Tursiops truncatus*) by training

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Introduction

Reproductive success of toothed whales kept in oceanaria has improved greatly over the last decade (Asper *et al.*, 1990). This is probably due to advances in water quality, food quality, pool design and safety, medical treatment, husbandry training, knowledge of behaviour and social needs, observation techniques, pregnancy monitoring by blood progesterone levels and ultrasound scanning (Schroeder, 1989), and most recently, the advent of artificial dolphin milk, and advances in artificial suckling techniques and calf care (Houck & Otten, 1992; Bottaro, 1992).

A proportion of bottlenose dolphin (*Tursiops truncatus*) calves die in the wild (Hersh *et al.*, 1989; Harzen & Dos Santos, 1992), and despite recent improvements in dolphin husbandry, a proportion of dolphin calves born in oceanaria is also lost. Although the survival rate will undoubtedly increase due to future technical advances, problems related to the behaviour of mothers and calves will always remain.

One female bottlenose dolphin at the Harderwijk Marine Mammal Park drowned 3 successive calves soon after birth. Instead of nosing her calf away from a dangerous situation such as entrapment in the corner of a pool, she tried to carry the calf to the centre of the pool in her mouth. The calf was usually drowned (Kastelein *et al.*, 1990). Because this behaviour returned during 3 post-partum periods, a training program was launched with a dolphin calf model to extinguish the abnormal rescue behaviour of this female bottlenose dolphin. A 'no–signal' was used to train the mother to keep her calf away from the pool walls in the correct manner. The model was also used to habituate the mother to her mammae being touched. This paper emphasizes training techniques.

Materials and methods

Dolphin calf model

A life-sized bottlenose dolphin calf model was made by Orla Hedegaard, Storgade 71, Faarvang, 8882, Denmark, from fibreglass (Fig. 1). The morphological measurements were derived from a new-born bottlenose dolphin calf which had died soon after birth. The model was partially filled with epoxy so that it floated upright on the surface. Through a valve, water could be added to ensure that the model was submerged to the base of the dorsal fin. This was necessary because the degree of submergence depends on the salinity of the water. Without water, the model weighed 18 kg. It was painted pale grey, the colour of a bottlenose dolphin.

Training

Judging from increased blood progesterone levels and ultrasound images, a calf was expected mid-October. Training started 12 September 1991 and 2 behaviours dealing with calf care were taught during 2 or 3 training sessions each day, each lasting about 10 min. The 28-year-old female (TtZH008), was housed in a rectangular pool (21 m × 7.5 m; depth: 3 m).

Suckling the calf

The following training steps were used to habituate the female to her mammae being touched: (1) The animal was trained to present her mammae to a trainer on the side of the pool. (2) The trainer touched the mammae from the side of the pool. (3) The trainer entered the water and touched the mammae with her fists during nipple presentation. (4) Because the dolphin stopped swimming when she was asked to present her nipples, the trainer used fins, to swim fast while touching the nipples. This way the animal had to keep moving to keep her nipples in contact with the hands of the trainer. The slipstream was felt by the trainer. (5) The trainer used light SCUBA equipment in order to swim underwater for a longer period, while asking for nipple presentations. (6) The trainer entered the water with the dolphin model, asked the dolphin to present her nipples, and pushed the model's rostrum against the mammae. (7) The time and

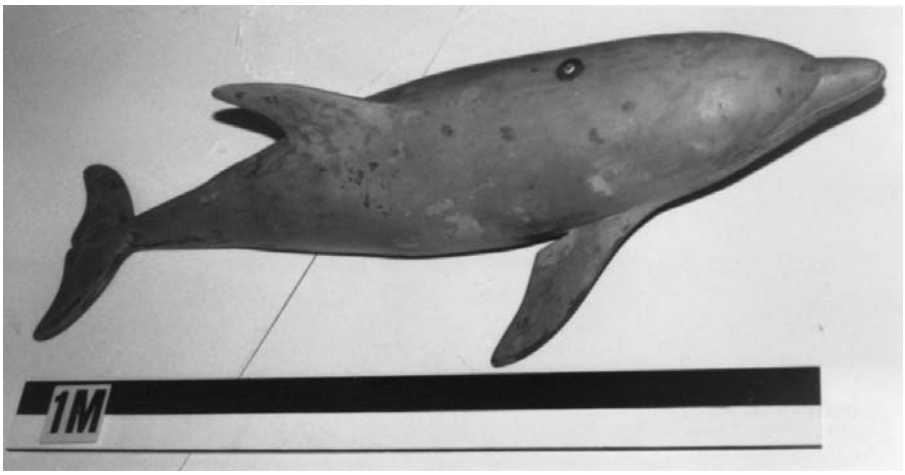

Figure 1. The 18 kg bottlenose dolphin calf model used to habituate the bottlenose dolphin female to her mammae being touched and to teach her the 'no-signal' (Photo: Ron Kastelein).

Figure 2. Suckling, training stage 6. Model dolphin touching the mammae of the pregnant female (Photo: Henk Merjenburgh).

distance that the dolphin swam with the model touching her nipples was increased (Fig. 2).

Rescuing the calf

The following training steps were used to teach the female to react to the 'no-signal' by nosing instead of biting her calf when rescuing it from swimming near the pool walls: (1) The trainer remained in the water about 1.5 m from the pool wall and slapped her wall-side hand on the water surface, to station the dolphin between the trainer and the pool wall. (2) The trainer used fins to increase swimming speed, and swam clockwise circles while sometimes holding the dorsal fin, to make sure that the dolphin remained on the outside. (3) Short, repetitive whistles with a high pitch dog whistle were used to encourage the animal to continue doing what it was doing ('continue signals'). These whistles were eventually followed by a long whistle after which the animal received a fish reward. This sequence of

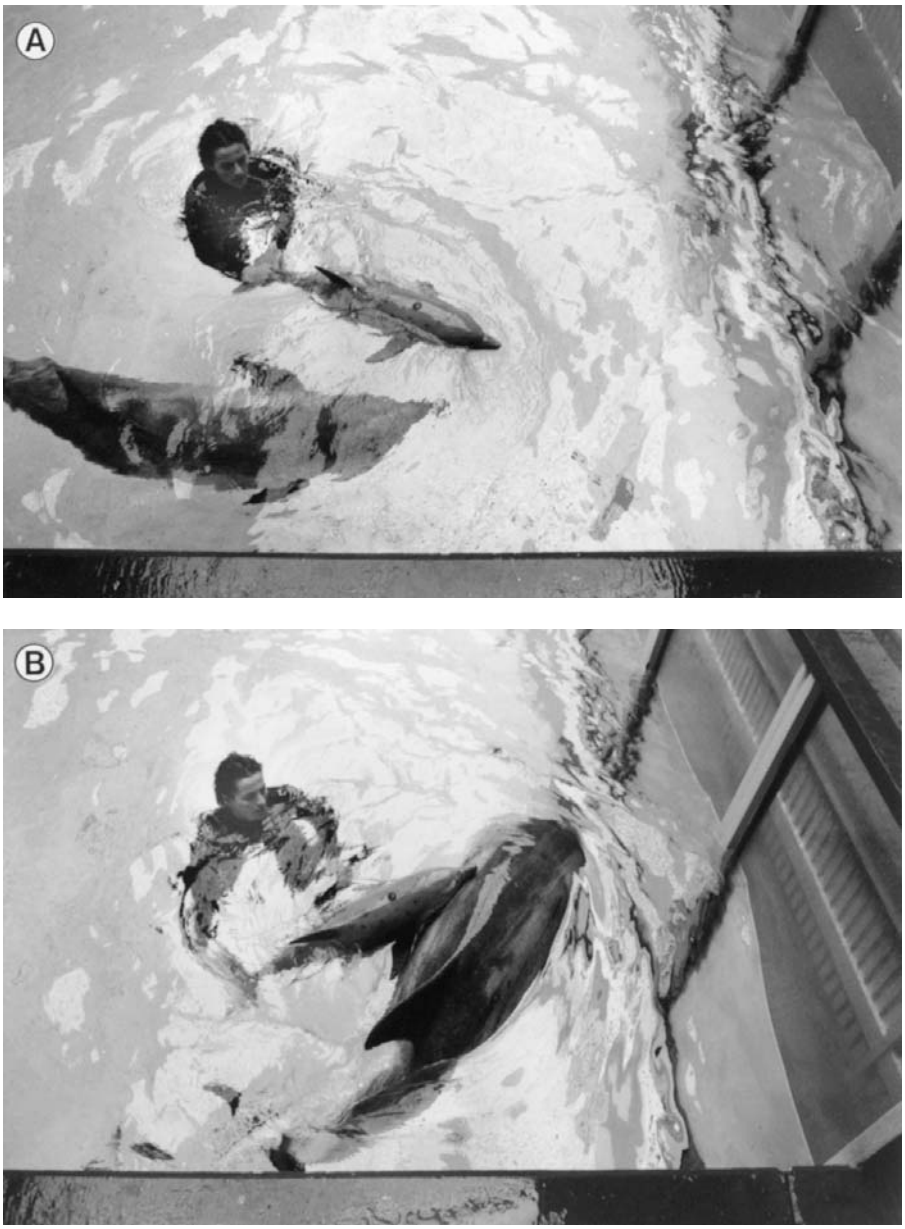

Figure 3. Rescuing, training stage 14. The trainer pushing the model into the corner of the pool (A), and later the dolphin swimming into the corner and pushing the model away from it (B) (Photos: Henk Merjenburgh).

events was known to the dolphin through normal training. A soccer whistle indicated incorrect behaviour, and was followed by the trainer ignoring the animal. To teach this no-signal, the animal was asked to station on a trainer's hand, and another trainer tried to attract her attention with various objects (on land and later also in the water). When she left her station, the no-signal was given. After several sessions she immediately returned to her station after hearing the no-signal. This training continued to the day of birth. Both signals were used during the remaining training steps. (4) The trainer continued to swim clockwise with the animal, slowly reducing the touch on the dorsal fin to

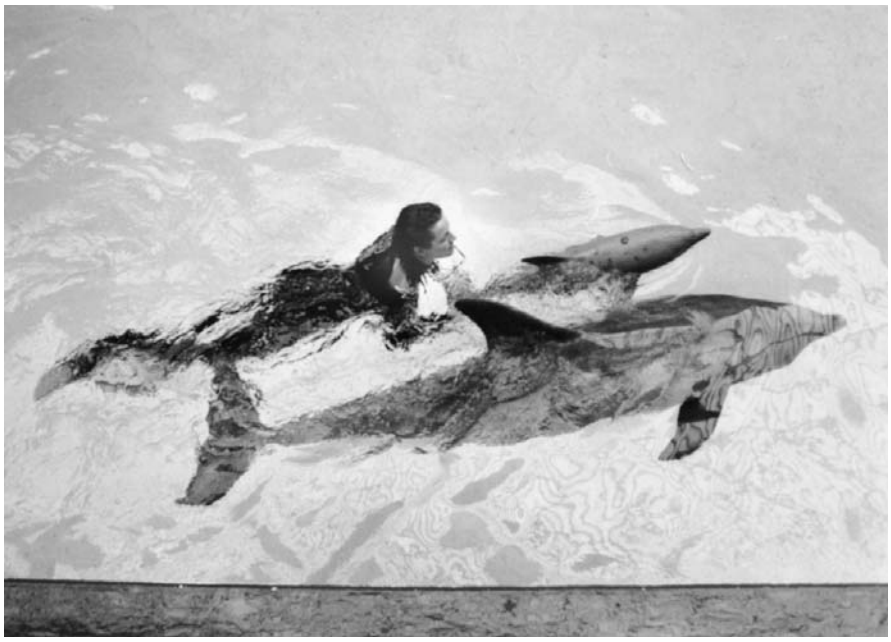

Figure 4. Rescuing, training stage 17. The dolphin being trained to stay between the model and the pool wall (Photo: Henk Merjenburgh).

zero, and frequently sounding short whistles to encourage the animal to continue with what it was doing. (5) The trainer increased body contact while swimming. (6) The dolphin was pushed to the perimeter of the pool, to make the circles bigger. (7) Training with the no-signal continued, not only when the animal was stationed on a hand, but also when she lay upside-down in the water. She would stop the behaviour she was carrying out when she heard the no-signal, and watch the trainer. (8) The trainer started to swim towards the pool wall, and the dolphin was trained (with the no-signal and the continue-signal) to push her away from the wall using her flippers and rostrum. (9) The trainer would suddenly change her swimming course, and quickly swim towards the wall. The animal was trained to intercept the trainer with her nose before she reached the wall. She was sometimes helped to choose her position by another trainer who slapped a hand on the water surface where she was expected. (10) The trainer progressed to wearing light SCUBA gear, and could thus stay underwater longer. She tried to swim towards walls and corners, and the dolphin had to keep her away from them. (11) The calf model was introduced. The trainer swam with the model under her arm, and trained the dolphin to swim between it and the walls. (12) The trainer started to swim anticlockwise with the model and trained the dolphin to stay between the model and the walls. The swimming course was controlled by throwing fish on certain spots in the pool. (13) The dolphin was trained only to touch the model when it was cornering. (14) The model was placed in the water in a corner, and the dolphin was trained to go to it quickly and nose it out of the corner (Fig. 3). (15) The trainer touched the model only on the pectoral fin or tailfluke, and pushed it through the water, the dolphin had to stay between the model from the bottom of the pool while staying on the right side of the trainer. (17) By throwing fish onto the water surface, the animal was trained to swim figure eight tracks. During such courses, she had to keep the model on her right side which was the inside (Fig. 4).

Results

A male calf (TtZH107) was born on 16 October 1991 at 02.45 hrs. Some minutes after birth the mother took the calf in her mouth. The trainer used the no-signal, and the mother released her calf. After this, the mother did not carry the calf in her mouth again. At 08.10 hrs, about $5\frac{1}{2}$ hrs after the birth of the calf, the placenta was delivered. Mother and calf were observed around the clock. On day 2 the mother opened her mouth a few times towards her calf, but this behaviour was quickly corrected with the no-signal. During the first 2 days, the breathing rates of mother and calf were similar, between 15 and 19 breaths per 5 min. On day 3 the

breathing rate of the calf increased to between 19 and 32 breaths per 5 min when it swam alone, which it did often. During the following 5 days the calf's breathing increased further to a maximum of 40 breaths per 5 min and the calf swam increasingly without its mother. While swimming alone, the calf hit the pool wall on several occasions. From day 12 after birth the calf was taken from the water and an antibiotic (Ceftriaxon, Rocephin®, 20 mg/kg, once a day for 3 days) was administered intramuscularly. It was 109 cm long and weighed 18.7 kg. Despite the antibiotic, the breathing rate increased further during the following days until the calf died of pneumonia on 31 October (day 15). The necropsy revealed old wounds on the back, caused immediately after birth, and a serious abrasion on the rostrum which had probably been caused by hitting the pool wall. Blubber thickness middorsal was 9 mm, and midventral 10 mm. During its life suckling sessions had occurred every half to 1 h consisting of 3 to 6 attachments of between 4 and 10 s each.

Discussion and conclusions

Training maternal behaviour as described in the present study is very labour-intensive. Before birth the pregnant cow has to be trained for weeks to months, and after birth 24 h observations are needed at least for some weeks. This training programme was only partially successful. The female showed no fear when the calf approached her nipples, and the suckling behaviour seemed normal and similar to that of a successfully raised bottlenose dolphin calf in another oceanarium (Cockcroft & Ross, 1989). The no-signal helped to correct the mother's behaviour several times during the suckling period. Unfortunately the calf's wounds, which were inflicted by the mother soon after birth, combined with its not yet fully competent immune system, probably led to pneumonia. After day 3, calf 107's breathing rate was high compared to a calf described by Cockcroft & Ross (1989). This was at first probably caused by the calf swimming alone soon after birth, and later increased by the pneumonia.

Clearly, it is possible to correct abnormal maternal behaviour in bottlenose dolphins to at least some degree. Better observation techniques using underwater windows and/or cameras may have allowed better preventative measures. Perhaps the no-signal could have been given before the mother took her calf into her mouth.

It is hoped that this report will encourage other oceanaria to publish their experiences with training maternal behaviours to some of their female dolphins, and to describe in more detail what goes wrong after birth of a calf. Perhaps eventually the survival rate of cetacean calves will be higher in oceanaria than in the wild.

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