



ONE ORPHANED MARINE MANATEE CALF'S FEEDING, BREEDING AND BEHAVIOR IN CAPTIVITY (*Trichechus manatus*, Linnaeus, 1758)

In Brazil, although there are records of marine manatee in captivity, few information report the management of this species. As a way of reducing this gap, this work aims to report the obtained results through the feeding control, the behavior observation and the monitoring of a female orphaned *Trichechus manatus* and compare with similar studies conducted on animals in captivity of the same species, populations Florida (USA). The specimen of manatee, female, was captured in a fishing corral and transferred to a coastal lagoon of fresh water and subsequently kept in a pool. During the period in captivity, the food provided was given using bottles composed of dried milk and vitamin complex, and at times tested the addition of vegetable oil. Furthermore, there was an attempt to enter the food items of plant origin, such as reed (*Eleocharis* spp.), rush (*Eichhornia crassipes*), lettuce, cabbage, marine algae (*Gracilaria* sp. *Vidalia* sp. *Hippaea* sp. *Laurencia* sp.) and marine phanerogamic (*Halodule* sp.). The records of the behavior of the calf on the shifts in the nursery, body position and dive time observations were made using specific "ad libitum" with the aid of binoculars and a digital stopwatch. For growth studies, morphometric measures and weight were taken. About the food supply, it was recorded gradual increase in milk consumption, but the calf did not show active interest in any item of plant origin that was offered. Except the behavior conditioned to the signals for feeding, or when it was captured for the biometrical tests (when it swam quickly), the calf was extremely docile and slow, spending many hours a day resting, floating passively, or submerged at the bottom of the bed, coming to surface only to breathe. We observed the use of the pectoral fins to direct the movements and perform small displacements along the bottom, while the caudal fin was the main cause of long strokes and fast. Two typical positions of rest were observed, as well as calling on the occasions of management. During the period in captivity, the calf grew in 33 cm total length and gained 46 kg, which can be regarded as a normal growth pattern. As a result of a process congestive visceral, the calf died approximately one year of life.

KEYWORDS: Aquatic Mammals; Diet; Breastfeeding; Rehabilitation; Growth Curve.

ALIMENTAÇÃO, CRESCIMENTO E COMPORTAMENTO EM CATIVEIRO DE UM FILHOTE ÓRFÃO DE PEIXE-BOI MARINHO (*Trichechus manatus*, Linnaeus, 1758)

RESUMO

No Brasil, embora existam registros de peixe-boi marinho em cativeiro, poucas informações relatam o manejo com esta espécie. Como forma de diminuir esta lacuna, este trabalho visa relatar os resultados obtidos através do controle de alimentação, observação de comportamento e acompanhamento do crescimento de uma fêmea órfã de *Trichechus manatus* e comparar com estudos similares realizados com animais em cativeiro da mesma espécie, de populações da Flórida (EUA). O espécime de peixe-boi marinho, fêmea, foi capturado em um curral de pesca e transferido para uma lagoa costeira de água doce e posteriormente mantida em uma piscina. Durante o período em cativeiro, ocorreu a oferta de alimentação através de mamadeiras composta por leite em pó integral e complexo vitamínico, sendo em algumas ocasiões testado a adição de óleo vegetal. Além disto, ocorreu a tentativa de introduzir itens alimentares de origem vegetal, tais como o junco (*Eleocharis* sp.), aguapé (*Eichhornia crassipes*), alface, couve, algas marinhas (*Gracilaria* sp., *Vidalia* sp., *Hippaea* sp., *Laurencia* sp.) e fanerógama marinha (*Halodule* sp.). Os registros do comportamento do filhote relativo aos deslocamentos no viveiro, posição corporal e tempo de mergulho foram feitos através de observações específicas "ad libitum" com auxílio de um binóculo e cronômetro digital. Para os estudos de crescimento, foram realizadas medidas morfométricas e a pesagem. Com relação a oferta alimentar foi registrado o incremento gradativo no consumo de leite, porém o filhote não demonstrou interesse efetivo por nenhum item de origem vegetal que lhe foi oferecido. Exceto o comportamento condicionado aos sinais de alimentação ou a sua captura para a biometria, o filhote era extremamente dócil e lento, passando várias horas por dia descansando, boiando ou submerso, vindo à tona apenas para respirar. Foi observado o uso das nadadeiras peitorais para direcionar os movimentos e realizar pequenos deslocamentos junto ao fundo, enquanto que a nadadeira caudal era a principal responsável pelos movimentos longos e rápidos. Duas posições típicas de descanso foram observadas, bem como a vocalização nas ocasiões de manejo. Durante o período em cativeiro, o filhote cresceu 33 cm em comprimento total e engordou 46 Kg, o que pode ser considerado como um padrão de crescimento normal. Em decorrência de um processo congestivo visceral, o filhote morreu com aproximadamente um ano de vida.

PALAVRAS-CHAVE: Mamíferos aquáticos; Dieta; Alimentação; Reabilitação; Curva de crescimento.

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INTRODUCTION

Sporadically, *Trichechus manatus* calves ground accidentally or are captured by fishermen in the beaches of the northeast coastal of Brazil. When this occurs, it is necessary that the calves are adopted to prevent deaths, because they have a long period for breastfeeding and stay dependents of their mothers for a period of one year and a half (Hartman, 1971).

Several tries to recover *T. manatus* orphaned calves were taken, since the last century, with no success, (Crane, 1881; Zeiller, 1978; Oddel, 1978; Asper and Searles, 1978; Cardeilhac et al, 1978; Irvine et al, 1980).

O' Keefe (1982) reports that the orphaned manatees' breeding using artificial food, even under good conditions, is never easy.

Best et al (1982) describe the first results about recovering, management and feeding of the *Trichechus inunguis* manatees' orphan calves.

In Brazil, although there are records of several samples of marine manatees kept in captivity for visiting, only Silveira (1975) described some information about the two samples management in the Recife Zoo, in Pernambuco State.

The success of the management of the Antillean manatee in captivity, including the weakened animals' treatment, the reproduction in captivity and the orphan calves' recovering can contribute decisively to avoid this mammal extinction.

This present work aims to report the results obtained through the feeding control, behavior observing and growing following of one *T. manatus* orphan female and to compare them with similar studies done with animals in captivity of the same species, from populations in Florida EUA.

METODOLOGY

Iracema (name suggested by the children from the fishermen community of Bar of Mamanguape was captured through a fishing "curral" in the Pau Amarelo Beach, in Pernambuco State, Brazil (7° 54S; 34° 49E), and was transferred to the Base de Proteção e Pesquisa do Peixe-Boi Marinho, located at the margin of the estuary of the Mamanguape River, in the Paraíba State, on May 11th, 1989.

The orphaned female was put inside one freshwater coastal lagoon, with approximately 1.000m², average depth of 0,80m and maximum of 1,20m. On October, 1989, with the rainfall reduction in the region and the increased evaporation, the lagoon began to dry. The water was pumped from the estuary to the lagoon to maintain its level. On December, 1989, the lagoon faced a process of salinization, reaching 40‰ by one micro-algae bloom, what forced the calf's transference to a provisory pool, aiming to correct the natural bed problems. The pool measured 3,30 m in diameter and 0,90 m deep. The 100% volume of the water was exchanged every two days.

The calf's feeding control was done by a standard sheet which recorded the following items: daily milk consumption, addition of food items of plant origin, supplementary feed, schedule and behavior related to feeding.

During its staying in captivity (241 days), the calf was fed through one nursing bottle (a plastic bottle with a capacity of one liter, coupled to a long rubber spout). The basic feeding formula used was compounded of 135 g of powdered milk (Nestlé®) for one liter of boiled water and the 5 ml daily dosage of vitamin complex (Poliplex®). The addition of 35 ml/liter of vegetal oil in the formula was tested but the idea was abandoned due to the diarrhea suffered by the animal. On the first four months, the food was supplied three times a day (7:30/12:00/17:30 h). The calf began to be fed four times (7:30/11:00/14:00/17:30 h) a day due to the gradual dosage increase.

Several tries to introduce food items of plant origin in the calf's diet were made. Besides the vegetation presented in the bed, predominantly the rush (*Eichhornia crassipes*), the following items were checked: lettuce, cabbage, marine algae (*Gracilaria* sp, *Vidalia* sp, *Hipnaeae* sp and *laurência* sp) and the marine phanerogamic *Halodule* sp.

The calf's behavior records, related to their displacements inside the bed, body position and diving time were written by specific observations "ad libitum" with the support of the Bausch Lomb (8x50) binoculars and one digital stopwatch.

Morphometric measures adapted from Oddel (1978) and Bonde et al. (1983) were regularly taken for the breeding studies; initially, they were done weekly. After two months, it was decided to use the biometrics every fifteen days, because of the non-significant length weekly variations and the stress caused to the animal due to the handling. The calf was captured and put into a contention net where dynamometers were attached to (Solingen, 50 kg) and the animal was weighed. The manatee was, then, put on a foam mattress and had their body measures taken.

For the calculations of the equations and growth curves, was used the statistical package Statigraphics, which applied the simple regression model ($Y = a + bx$) to the growths in length and weight and the multiplicative model ($Y = ax$) to the length-weight relationship.

RESULTS AND ARGUMENTS

The quantity of the milk daily supplied to the calf was gradually increased insofar it gained weight and accepted the food spontaneously. The average daily consumption varied from 1,1 l/day on May, 1989 and reached the maximum consumption of 4,4 l/day on December, 1989 (Table 1).

The young manatee did not show effective interest for any item of plant origin which was offered. Rarely it was observed chewing leaves of *Eichhornia crassipes*, *Fleocharis* sp, and the two feces samples checked proved that vegetal items had not been effectively inserted in its diet.

Considering that the food items of plant origin did not contribute to the increasing of the animals' weight, during the period the weight gain was controlled (213 days), the calf

consumed 769,4 milk liters, gaining 46 kilograms and presenting one index of 0,06 in the food conversion rate.

Table 1: The milk consumption increase related to the months the animal stayed in captivity.

Months	Monthly consumption (l)	Daily average consumption (l)
May	23,7	1,1
Jun	71,3	2,4
Jul	96,5	3,1
Aug	96,2	3,1
Sept	110,5	3,7
Oct	126,3	4,1
Nov	123,8	4,1
Dec	139,2	4,4
Jan	19,0	3,2

On the first months, the calf showed reluctance to the feeding contacts, being necessary to capture it with a net support, and to hold it steady, forcing it to breastfeed. After the second month, Iracema learned the signal conditioned to its feeding (successive hits in the water), coming closer to the place in the bed where it was fed.

Except the behavior conditioned to the signals for feeding, or when it was captured for the biometrical tests (when it swam quickly), the calf was extremely docile and slow, spending many hours a day resting, floating passively, or submerged at the bottom of the bed, coming to surface only to breathe.

The pectoral flipper were used to lead the movements and for short displacements at the bottom. The caudal fluke was the more responsible for the displacements in the water column (long and fast movements). Curved body, head and tail submerged and the back out of the water and when it stayed floating on the surface, in back decubitus position, presenting the pectoral flippers stand on the ventral region were its rest two typical positions verified.

Sporadically, the calf turned around its own body axis, at the water surface, apparently joking.

The average time when the calf remained submerged, without breathing, was from 2 to 3 minutes, with the longest apnea interval recorded from 6 minutes to 20 minutes. All the respiratory process (nostrils open, breathing out, breathing in and nostrils closure) lasted about 3 seconds.

It was verified that the manatee did one vocalization when handled (feeding or biometrical tests), emitting some squeaks of small intensity and duration.

Iracema arrived in the Base de Proteção e Pesquisa do Centro Peixe-Boi on May 11th 1989. It was weighed and measured, for the first time, on June 8th, 1989. On this date, the animal measured 1,38 cm in length and weighed 43 kg.

The Table 2 shows the results of the morphometric tests done during the period the animal was in captivity.

Table 2: Body measures (cm) and weight of the manatee calf kept in captivity in the year 1989.

Measures	13	22	05	19	26	02	09	23	06	20	05	18	04	16	30	14	29
Dates	6	6	7	7	7	8	8	8	9	9	10	10	11	11	11	12	12
Total length	130	140	146	145	146	144	150	150	154	154	155	158	159	163	166	166	171
Dorsal stature	144	144	-	149	150	150	153	153	155	-	158	163	169	170	175	-	181
Ventral stature	138	144	-	149	150	150	153	153	155	-	158	163	169	170	175	-	181
Girth at axilar	74	-	76	80	-	77	78	-	-	85	86	86	87	90	-	91	92
Girth at umbilicus	-	-	-	-	-	-	-	-	-	-	-	104	106	108	110	110	114
Dist. eye-muzzle	9	9	-	10	10	10	10	10	10	10	10	10	10	10	11	11	11
Flipper length, anterior insertion to tip	9	9	-	9	9	9	9	9	10	10	10	10	10	11	11	11	11
Flipper length, axila to tip	25	27	-	26	25	26	26	25	26	-	-	27	27	-	27	-	27
Girth flipper	-	-	-	19	19	19	19	19	19	19	20	20	20	21	22	22	23
Axillary girth	-	-	-	22	-	25	-	25	25	26	27	29	30	-	30	31	33
Girth at fluke base	52	-	53	53	53	53	53	54	55	54	57	60	62	-	66	64	69
Base of fluke to posterior tip	-	-	-	35	34	34	34	34	34	34	35	36	37	-	38	48	41
Body weight (kg)	-	-	-	-	42	42	42	43	43	43	43	45	46	47	49	49	51
Body weight (kg)	43	44	46	48	45	48	50	51,5	55	59	64,5	66	72	76	78	80	89

The period the animal had its breeding controlled (213 days), the calf grew 33 cm in total length and fattened up 46 kg, having one average growth of 0,15 cm/day in total length and 0,216 kg/day in weight.

The equations obtained for the size growth during a time EQ1; increasing of the weight during a time EQ2 and the weight x length relation EQ3 for Iracema, are described below:

EQ1	GT(cm) = 138,7 + 0,15 (days)	r ² = 0,96
EQ2	WT(kg) = 37,30 + 0,23 (days)	r ² = 0,96
EQ3	WL(kg) = 4 x 10 x CT (cm)	r ² = 0,96

ARGUMENTS

Best et al (1982) verified that the dried milk food presented better results, when tested different kinds of milk in the *Trichechus inunguis* manatees' calves' diet. Feeding efficiency tests for the same species, comparing three formulas with dried milk in their compositions, suggest the use of 125 grams of dried milk more 25 ml of vegetal oil for each liter of water for animals weighing more than 25 kg (Colares et al, 1987).

The formula used in the marine manatee calf's diet, adapted to Best's et al (1982) and Colares' et al (1987) experiments resulted efficient in terms of the animal's breeding, proved by its weight increase and size growing. On the other hand, there is the need of this formula implementation, through tests of other feeding items that increase the calves' immunological resistance.

The lack of interest presented by the calf in terms of vegetal origin feeding items addition in its diet brings down the observations which show that manatees' calves, in natural environment and captivity, begin to eat smooth leaves in few weeks after birth (Hartman, 1979 and Best et al, 1982). In this case, it can be supposed that this fact is related to the feeding preference for milk in this stage (1° year) and to the milk availability and easiness to supply the calf.

Almost all the verifications done about the calf's motor behavior (fins use and displacements) and the body position to rest coincide with the results of the behavior studies taken by Hartman (1979), with animals in natural environment.

According to Best et al (1982), *T. inunguis* calves weakened due to bad nutrition, assume a behavior where the animal stays bent, with head and tail submerged, floating on the surface of the tank, apparently with a volunteer behavior to conserve energy. It is also reported that the calves return to normal state with an adequate feeding diet, and rarely float.

Iracema frequently showed that body position while all the period in captivity. In this case, this behavior was classified as resting not related to bad nutrition, because the calf presented a general good condition and an increasing weight gain, comparable to the growing standards established for this species.

Oddel (1978) affirms that the newborn *T. manatus* average size is between 120 cm and 140 cm. Considering the record of 6 newborn calves, ran grounded in the beaches of the northeast in Brazil, on January, December and February (non-published Manatee Center data), and applying the size of Iracema (138 cm), when captured, in the equation proposed by Oddel for a calf of this species born in captivity, it was obtained an estimated age of 140 days for the young calf when rescued.

Comparing the equations of length in weight and total length established by Oddel for the first year of life of one calf in captivity with the respective equations obtained for Iracema, very proximate values among the growing standards were obtained.

The size and weight growing average recorded for Iracema (0,15 cm/day; 0,216 kg/day; 213 days) was higher than the one cited by Oddel for Lorelei, an orphaned female calf kept in captivity in Florida (0,069 cm/day; 0,133 kg/day; 1006 days) – (Oddel, op. cit.), and of one *T. manatus* male calf that stayed five months in captivity in the tanks of Sea World, which had an average weight gain between 100 and 200g/day (Asper e Searles, 1978).

Comparing the relation length x weight proposed by Oddel (1978), obtained by the data from several *T. manatus* female calves, added to Lorelei's data, with the same relationship from Iracema, it is verified that Iracema presented a higher weight in terms of size. This can be explained due to an individual variation and also the fact of that captive animals spend less energy than animals in natural environment, and this extra energy can be reflected in weight (Oddel, op. cit.).

Robin Best (com. pes. In Oddel, 1978) examined the relationship weight x length for the Sirenian Order and derived one simple allometric equation, which exponent size is 3,54. One second equation derived from a great sample (n=22) of dead manatees has exponent 3,14, $r^2=0,98$ (Oddel, 1977). The same author, in 1978, considers that, unless the calves own a relationship weight x length comparable to that two equations, it can be considered normal. Considering these comparisons, it can be concluded that Iracema had a normal breeding.

On 03/01/90, Iracema presented a state of apathy, refusing food. 3 ml of Pentabiótico (broad-spectrum antibiotic) were diluted into a bottle of Mercepton® (antitoxical), 1 ml of this solution was drunk and applied by intramuscular form. 1ml of Sulfinjex, sulfa based medication (according to Colares, F. A. P., com. pes.) The animal presented an improvement in the clinical state and returned to feed, but died on January 07th, 1990, with approximately 1 year. The appraisal report detected the presence of an enterobacterium *Edwardsiella* sp in the heart, liver, intestine and kidneys, concluding that the animal suffered a visceral congestive universal process.

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