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## ARTICLES

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### **The First Hand-Rearing of Larger Hairy Armadillos (*Chaetophractus villosus*) at the Temaikèn Foundation**

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#### **Introduction**

The genus *Chaetophractus*, the hairy armadillos, consists of three species in the family Dasypodidae, which together are distributed from Bolivia to the Straits of Magellan. The larger hairy armadillo, *Chaetophractus villosus*, inhabits southern Bolivia, northern Paraguay and the length of Argentina, excluding the Andes mountains (Parera, 2002). Mating takes place during the spring, and according to Merrett (1983) the gestation period lasts 60-75 days; the litter usually consists of two young, often one male and one female. The young weigh about 155 g at birth and are covered with a soft leathery skin that gradually hardens with age. At birth the ear pinnae are not yet present, and the mouth is closed except for the terminal portion. The nails are usually soft, and they are able to crawl and root in search of milk. They open their eyes after 16-30 days, are weaned at 50-60 days, and reach sexual maturity at nine months. Hairy armadillos are systematically hunted in areas where they burrow extensively in loose farm soil; their flesh is thought to be good and is frequently eaten by people (Nowak, 1999).

As of December 2002, the Temaikèn Foundation had a total of four adult *Chaetophractus villosus* (2.2.0) in their captive facility. On December 28, 2002, a primiparous female delivered two infant males in the exhibition area. Nervous and inexperienced, the mother mistreated her pups and seriously injured one of them, and so the decision was made to remove them for hand-rearing in the Temaikèn nursery. On arrival, the injured

infant showed almost no vital signs. It had been strongly tossed around, and presented various bruises throughout the body; it also had been bitten on the head and its lower mandible was dislocated. It was revived by means of CPR and placed in a human isolette with oxygen. Wounds were disinfected with iodine solution (Pervinox<sup>®</sup> 10%).

#### **Materials and Methods**

As soon as the pups arrived at the nursery, they were put into an incubator (human isolette) at 33°C (91.4°F) in order to increase their body temperature, as both were suffering from hypothermia. At birth they weighed 118.53 g and 108.33 g. They were put inside the same plastic container and covered with a warm cotton cloth. The following day, as the pups began to thermoregulate on their own, the isolette temperature was decreased until it reached room temperature (26°C / 78.8°F). At this point they were put inside a hard plastic box (120 x 100 x 60 cm) with wheat straw as a bedding substrate and a heat lamp at one of the corners, giving the pups the option of moving away or towards the heat source. After day 39, the pups were taken outside for sunbathing and exercising when weather permitted.

Nursery logs were set up to record date, time of day, weight (precision scale used: Model Moretti<sup>®</sup> OAC-2.4: max. weight: 2.4 kg, accuracy: 0.2 g), formula offered, amount offered, amount consumed, stool and urine (characteristics and frequency) and overall behaviour of the animal at feeding. The pups were weighed before each feeding.

Initially the pups were syringe-fed with an artificial nipple adapted to the tip of the syringe. These nipples were custom-made from latex by nursery staff to approximate the shape and size of the dam's nipple. After finding the pups showed a good suckle reflex, they were fed using the same nipples but with a small plastic eyedropper instead of a syringe.

The young were fed a commercially prepared powdered milk replacer (Esbilac<sup>®</sup> powder,

PetAg, Inc.). The formula was diluted 1:2 with water and warmed to 36°C (96.8°F). The formula averaged 35% protein (DMB) and 44.33% fat (DMB). Initially the pups were given twelve feedings daily, one every two hours around the clock. From day 4 to day 18 they were receiving just eight feedings around the clock. From day 18 onwards, feedings began at 6:00 am and ended at midnight. By approximately day 48, the pups were receiving chopped apples and bananas, and

by day 56 they were eating complete feed for adult dogs (PRO PAC® Mini-Chunk) mixed with banana and milk replacer. They were taking formula every four hours, and from day 66 to day 72 they received milk every six hours, until 10:00 pm. At day 74 they had just two daily milk feedings, and by day 76 they were weaned.

### Results

The newborn pups weighed 113.43 g on average. Their mean milk consumption during the first month was 15.22% of body weight on an as-fed basis and they gained 11.52 g/day. During the second month the milk consumption was 8.48% of body weight on an as-fed basis and they gained 18.54 g/day. During the fifteen days prior to weaning, this consumption dropped to 4.05% of body weight on an as-fed basis and they gained 13.56 g/day.

The following events were recorded during the hand-rearing process (see numbered reference points in Fig. 2):



FIGURE 1. Hand-feeding an infant *Chaetophractus villosus*.

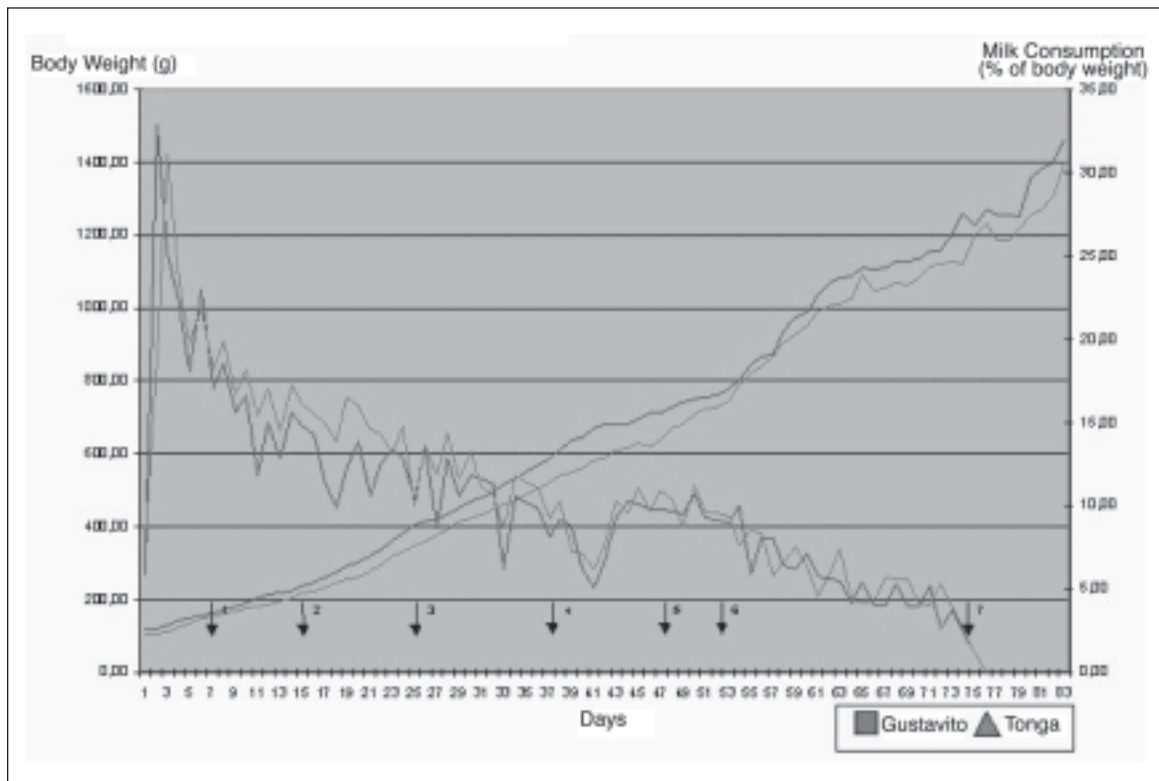


FIGURE 2. Daily weight gain and milk consumption in two hand-reared *Chaetophractus villosus*.

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Day 08 – hairs begin to grow on body <sup>1</sup>  
Day 15 – stools are found in between feedings without stimulation <sup>2</sup>  
Day 26 – they begin to open their eyes <sup>3</sup>  
Day 39 – they are taken outdoors for the first time <sup>4</sup>  
Day 48 – they begin eating solids <sup>5</sup>  
Day 56 – they begin eating complete feed for dogs <sup>6</sup>  
Day 76 – they are weaned <sup>7</sup>

### Discussion

In most mammals there may be little or no weight gain in the first 48 hours after birth, and it is not uncommon for infants to present even a significant loss of weight, up to 10% of total body weight (Gage, 2002). In this case there was a small loss (2.5%) in just one of the young.

Once the pups adjusted to their diets and sleeping arrangements over their first few days, they began to show a daily weight gain, steady for all but a few days. The logs of milk consumption show an irregular pattern (Fig. 2), which was probably due to an uneven number of feedings per day, caused by delays and confusion in the schedule of the caretakers, as well as their inexperience with raising infant armadillos.

According to records of the Poznan Zoo in Poland (Ratajszczak and Trzesowska, 1997) young start moving outside the nest at the age of 30 days, and take solid food from day 35 onwards. Even though Tamaikèn's hand-reared pups began sunbathing at day 39, they did not begin taking solid food until day 48. This delay in the solid consumption was due to the inexperience of the staff that developed the armadillo hand-rearing program, and affected the growth rate of the infants around their fortieth day (Fig. 2).

Meritt (1994) commented that edentates in captivity have an especially difficult time making the transition from a liquid to solid adult diet, more so than any other mammal he has worked with. In this case the young had a very slow transition, and were weaned at the comparatively late age of 76 days. Merrett (1983) stated that weaning

in hairy armadillos should be between 50 to 60 days of age.

In April 2003, the same female delivered two male pups which were parent-reared. At 16 days of age, the two pups weighed an average of 318.5 g. In general, hand-reared offspring develop more slowly than those which are parent-reared (Beekman *et al.*, 1999; Gage, 2002), and our hand-reared infants were 26% lighter at the same age, averaging 234.95 g.

Our first attempt to hand-raise armadillo pups was successful, but we have had no other cases to streamline our protocol. We recommend that husbandry information should be shared among zoos to improve the hand-rearing of edentates.

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## Crianza en Cautiverio de Perezoso de Dos Dedos (*Choloepus didactylus*)

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### Introducción

Los Xenarthra son considerados como el orden más variado de mamíferos ya que agrupa animales de morfologías, comportamientos y hábitats completamente diferentes. Se conocen tres morfologías distintas que corresponden a los armadillos, hormigueros y perezosos distribuidos en 4 familias, 13 géneros y 29 especies (Tirira S., 1999). Los Xenarthra radiaron en Sudamérica durante el Terciario cuando este continente se encontraba aislado de los otros; esto dio lugar a la existencia de formas gigantes extintas, como gliptodontes y los perezosos gigantes (Delsuc *et al.*, 2002). Muchos grupos de Xenarthra se desarrollaron satisfactoriamente en América Central y Norteamérica después de su migración durante el Plioceno, en la actualidad podemos encontrar una sola especie que llega hasta Norteamérica, el armadillo de nueve bandas (*Dasypos novemcinctus*).

Los perezosos de dos dedos están restringidos a América Central y Sudamérica y pertenecen a la familia Megalonychidae que incluye un solo género con dos especies, *Choloepus didactylus* y *Choloepus hoffmanni* (Nowak, 1997), ambas presentes en el Perú. El rasgo característico de esta familia es la presencia de dos fuertes garras en los miembros anteriores y tres en las posteriores. El pelaje es denso y largo, aproximadamente 100 mm en el dorso (Tirira S., 1999), con presencia de algas en las épocas húmedas. La fórmula dental es 5/4 en un lado, con un total de 18 dientes (Nowak, 1997). Mayormente se alimentan de hojas pero también incluyen frutos, brotes y algu-

nos pequeños vertebrados en su dieta (Esbérard, 2001). Son de hábitos nocturnos y solitarios, uniéndose únicamente con su pareja durante la época de apareamiento (Tirira S., 1999). Estos animales poseen la mayor variación de temperatura que cualquier otro mamífero, en rangos que oscilan entre los 24°C a los 33°C (Nowak, 1997). *Choloepus didactylus* puede ser distinguido de *C. hoffmanni* por la coloración del pelaje, presentando el primero un color homogéneo en el dorso y pecho. En el Perú existe una gran cantidad de crías de perezosos que son entregados en custodia por el Instituto Natural de Recursos Naturales – INRENA a instituciones como zocriaderos y zoológicos. La mayoría de estos individuos son extraídos de la selva amazónica para ser criados en la capital como mascotas. Sin embargo, el poco conocimiento de la especie y la falta de información provoca que la crianza en cautiverio sea poco exitosa provocando la muerte de las crías.

### Materiales y Métodos

En este trabajo se monitoreó el crecimiento de dos crías hembras de perezoso de dos dedos (*Choloepus didactylus*) de dos y cuatro meses de edad. Ambos animales llegaron al zoológico “Parque de las Leyendas” rescatados por el Instituto de Recursos Naturales – INRENA, procedentes del tráfico de animales silvestres. En el año 2001 el zoológico recibió a “Wendy,” con aproximadamente cuatro meses de edad, originaria de Pucallpa y en el año 2002 se recibió a “Pelusa,” con aproximadamente dos meses de edad, originaria de Tingo María. “Wendy” llegó con un peso de 900 g y con 29.5 cm de longitud corporal, mientras que “Pelusa” ingresó con un peso de 766.5 g y con 22 cm de longitud corporal. Ambos animales fueron alojados en un área denominada “crianza” y mantenidos en una incubadora a 37°C con 98% de humedad; posteriormente fueron transferidos a una caja de material aislante térmico, dentro de un recinto con temperatura media de 30°C. Durante los primeros meses ambos animales fueron llevados a casa para su alimentación durante la noche y regresados al día siguiente en la mañana. Se colectaron datos de peso (después de que el animal miccionaba y defecaba), así como