

---

*Tolypeutes tricinctus* (Linnaeus, 1758), Tatu-bola  
*Status:* IUCN (1996) – Vulnerável

*Piauí:* Mangueira do João Paulo, Parque Nacional da Serra da Capivara (MNRJ 30393)

*Ceará:* Serra dos Cariris Velhos (MNRJ 1503)

*Bahia:* Bom Jesus da Lapa (MNRJ 4257, 4292, 4294); Barra, rio São Francisco (MZUSP 2654, 3134, 3135, 3136, 3137); Juazeiro, rio São Francisco (MZUSP 2655, 2656, 2657); Santa Rita de Cássia, rio Preto (MZUSP 8576); Central (MNRJ 29404, 51651); Fazenda Boa Vista, Palmas de Monte Alto (MPEG 22026); “Sul da Bahia” (MNRJ 32440)

*Procedência desconhecida:* 5 espécimes

**TOTAL:** 23 espécimes

#### Família: Myrmecophagidae

*Myrmecophaga tridactyla* Linnaeus, 1758,  
Tamanduá-bandeira

*Status:* IUCN (1996) – Vulnerável

*Roraima:* Caracará, baixo rio Mucajaí (MPEG 1741); Rio Catrimani (MZUSP 13682); Lagoa do Pacú, Surumú, Pacaraima (MNRJ 59103); Fazenda União, Surumú, Pacaraima (MNRJ 59104)

*Amazonas:* Canaçari, rio Amazonas (MZUSP 5273)

*Rondônia:* Matas do Piroculuina, rio Guaporé (MNRJ 2684)

*Pará:* Fazenda Pascoal dos Melo, Ilha de Marajó (MPEG 596); Soure, Ilha de Marajó (MPEG 1454); Ilha de Marajó (MPEG 413, 565, 1246, 1455, 4234); Taperinha, Santarém (MPEG 4658, 4659, 4660); Caracoal Grande (MPEG 4661); Cachoeira Porteira, Oriximiná, alto rio Trombetas (MPEG 10211); Foz do Curuá (MZUSP 5454), Fordlândia (MZUSP 19958); Posto Indígena Aukre (MPEG 22834); Posto Indígena Kô Kraimôrô, Gorotire, rio Xingu (MPEG 22828)

*Amapá:* Seringal Boa Fortuna, igarapé Rio Branco, afluente direito do rio Maracá, Mazagão (MPEG 1652, 1662)

*Maranhão:* Barra do Corda (MZUSP 8002)

*Mato Grosso:* Porto Jacaré, alto rio Xingú (MNRJ 23945); Serra Tapirapoa (MNRJ 2332)

*Mato Grosso do Sul:* Porto do Sapé, rio Pardo (MZUSP 3727); Rio Pardo (MZUSP 7484, 7485, 7486, 7487); Fazenda Leblon, Aquidauana (MZUSP 7789); Maracaju (MNRJ 5073, 24828); Fazenda Paredão (MZUSP 6893)

*Goiás:* Cana Brava (MZUSP 4132); Proximidades de Jataí (MNRJ 28801); Proximidades da Usina Hidrelétrica de Corumbá, Caldas Novas (MNRJ 37561); Proximidades do Parque Nacional das Emas (MNRJ 53699)

*Minas Gerais:* Cambuquira (MNRJ 1586)

*Espírito Santo:* Rio Doce (MZUSP 2415, 2416)

*São Paulo:* Itararé (MZUSP 1170, 1172, 1173);

São João da Boa Vista (MZUSP 4064);

Mirandópolis (MZUSP 7480); Itapura

(MZUSP 24255); “São Paulo” (MZUSP 3337)

*Rio Grande do Sul:* São Lourenço (MZUSP 24254)

*Procedência desconhecida:* 40 espécimes

**TOTAL:** 91 espécimes

#### Agradecimentos

Aos doutores Suely A. Marques Aguiar (MPEG) e Mário de Vivo (MZUSP) pelas facilidades para examinar o material conservado nas respectivas instituições.

---

## Giant Anteater (*Myrmecophaga tridactyla*) Health Care Survey

Scott Morford<sup>1</sup> and Mary Ann Meyers<sup>2</sup>

*Santa Barbara Zoological Gardens, 500 Ninos Drive, Santa Barbara, California 93103, USA.*

#### Introduction

The Giant Anteater Survey is comprised of four separate sections designed to target specific questions and issues involved in the overall care and management of the giant anteater (*Myrmecophaga tridactyla*). The four sections of this survey and their status in terms of completion are as follows: 1) Health Care – results compiled;

---

<sup>1</sup> Now at the San Diego Zoo, 2920 Zoo Drive, San Diego, California 92101.

<sup>2</sup> Now in the program for Pre-Veterinary Medicine at the University of California, Santa Barbara.

2) Diet – results compiled; 3) Housing – survey questionnaire to be distributed by September 2001; and 4) Neonatal Care – survey questionnaire to be distributed by December 2001. Due to the shortage of published information on these topics, the Giant Anteater Survey is an opportunity to share valuable information and experiences among institutions that maintain giant anteaters in their collections.

The primary purpose of the Health Care section was to catalogue medical problems faced by the giant anteater in captivity and to list their corresponding treatment strategies. This first survey section was sent to 24 institutions (22 in the United States and two in Europe) in January 2001. Of the 24 institutions, 19 responded with a plethora of medical records and necropsy reports. The living population of giant anteaters represented in this sample consisted of 25 males, 24 females, and two unsexed individuals. The population of deceased giant anteaters consisted of 20 males, 27 females, and 11 unsexed individuals.

It is important to note that the Health Care survey results should not be mistaken for a comprehensive list of every medical problem/treatment strategy experienced by each responding institution. In many cases medical records

and necropsy reports were incomplete or unclear. Every attempt was made on our part to ensure that the data were presented as accurately as possible with the information provided by the 19 responding institutions. It is our hope that the results of the survey will help create a greater awareness and better understanding of some of the medical challenges and treatment strategies giant anteaters experience in captivity.

### Graphs Explained

A series of seven graphs were created to illustrate the survey results for the following four topics: 1) Current ages of living male/female anteaters; 2) Anteater ages at time of death; 3) Body weights of living male and female anteaters; and 4) Frequencies of occurrence for 40 separate medical problems. All the information is current up to 15 February, 2001 when compilation of the survey data was begun.

Figure 1 illustrates the ages of 25 male and 24 female anteaters housed in 19 separate institutions at the time. The graph shows a population with ages covering a wide spectrum, from neonates and juveniles to adults. The majority of the represented population was under 10 years of age. Of the 49 individuals, only 18% were over 10 years old.

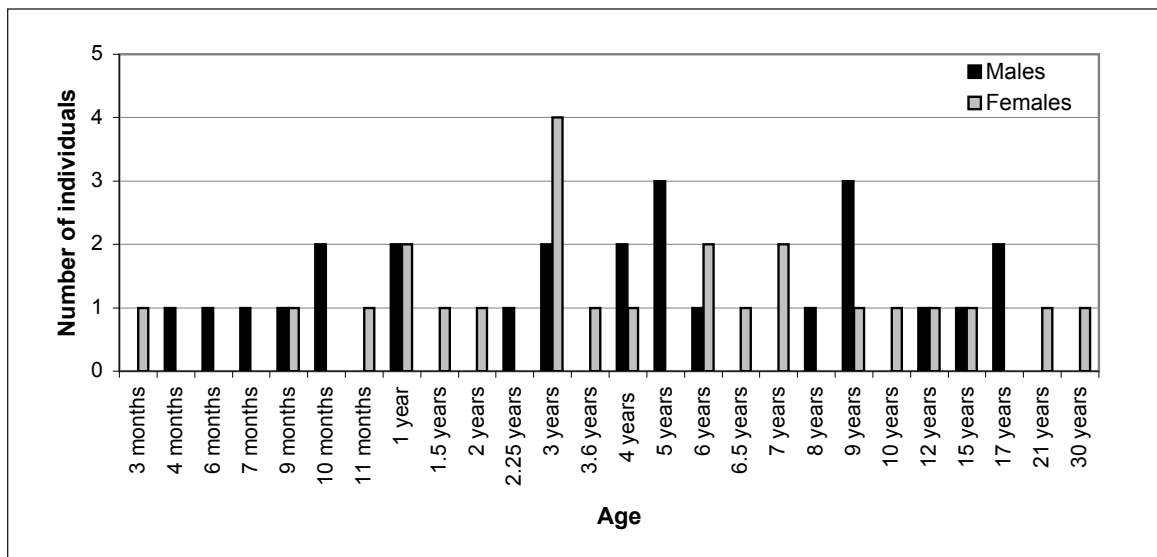


FIGURE 1. Live anteater ages: 25 males / 24 females.

Figure 2 displays of all the known ages at death of the 20 males, 27 females, and 11 unsexed individuals that died at the 19 responding institutions. (The ages of five males and five females at time of death were not provided and thus were not included.) The graph indicates a high infant

mortality rate, with 22 individuals (46% of the deceased population) dying within the first six days of birth. Of those that died in the first six days, 68% died in less than 24 hours. The infant mortality rate is therefore highest on the first day of life.

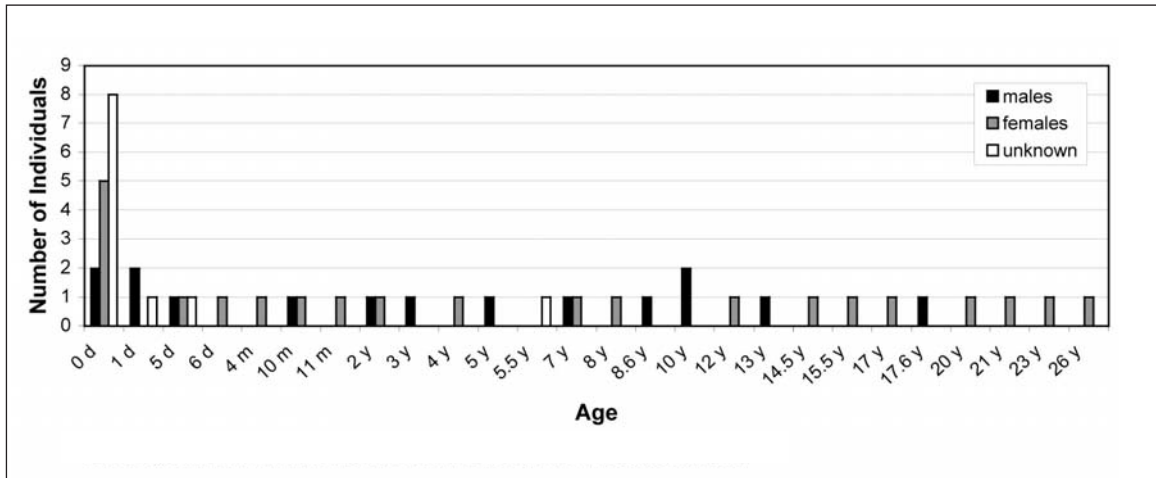


FIGURE 2. Anteater ages at death: 15 males / 22 females / 11 unknown.

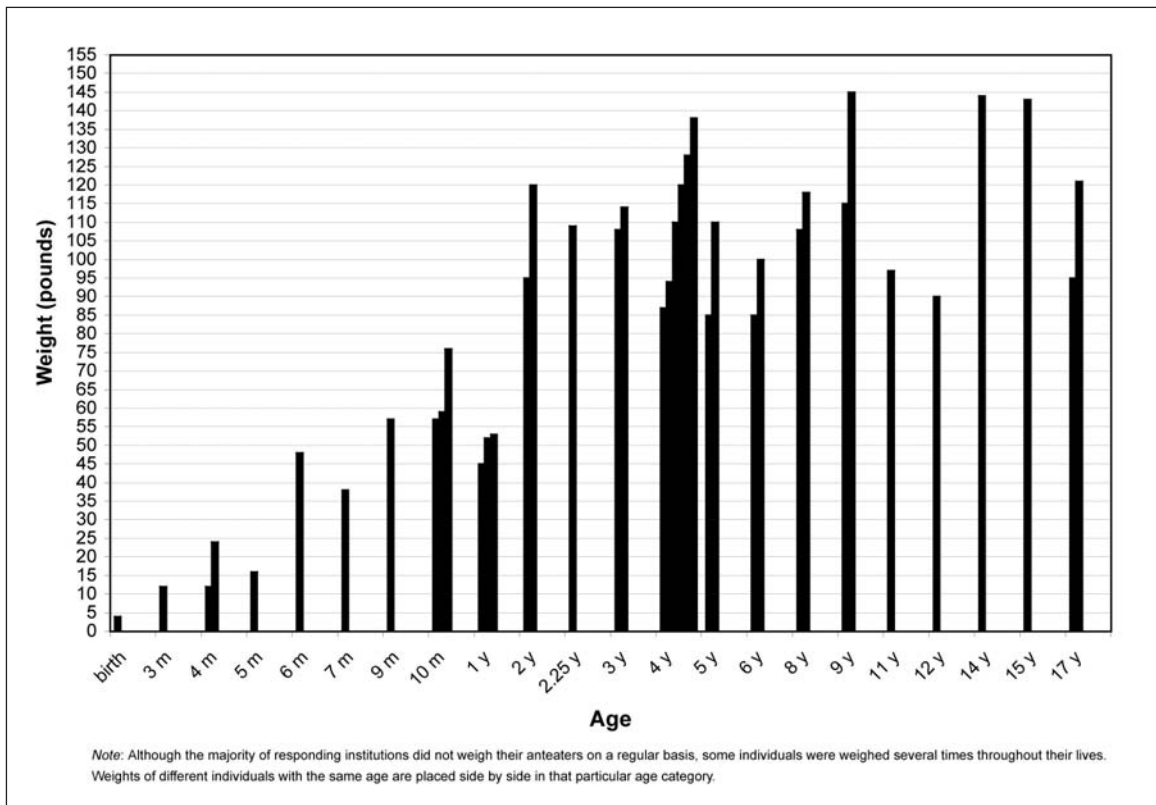


FIGURE 3. Body weights (n = 39) by age of the 25 living males represented in this survey.

Figure 3 illustrates the body weights by age of the 25 living males represented in this survey, and displays how individual body weights may vary dramatically even when the individuals are the same age. For example, it depicts six individual males that are each four years old, yet their body weights range from 138 to 87 pounds. In fact, in the 11 instances where two or more male anteaters shared the same age, their weights varied from seven pounds to 51 pounds. The reasons for these large weight variations of same-aged individual males remain undetermined, due in part to a lack of consistent individual weights over a significant period of time. In most reported cases, the health of the individuals at the time of weighing was not recorded or provided.

Figure 4 displays the body weights by age of 23 of the 24 living females in the survey. Overall

female body weights are quite similar to those of the males. Comparing the males and females that share the same age (three months, four months, nine months, one year to six years, eight years) we see that in many cases the females are heavier than the males by five to 15 pounds.

There are significant weight fluctuations between same-aged females just as there were between same-aged males. The largest female weight deviation is seen in the two-year-old category, with one female weighing 84 pounds and another weighing 141 pounds. Of the nine age categories where two or more females shared the same age, four contained individuals that varied in weight between five and 60 pounds. Unfortunately, as with the males, the reasons for these weight variations in same-aged females remain undetermined because of a lack of consistent measurements of individual body weights over

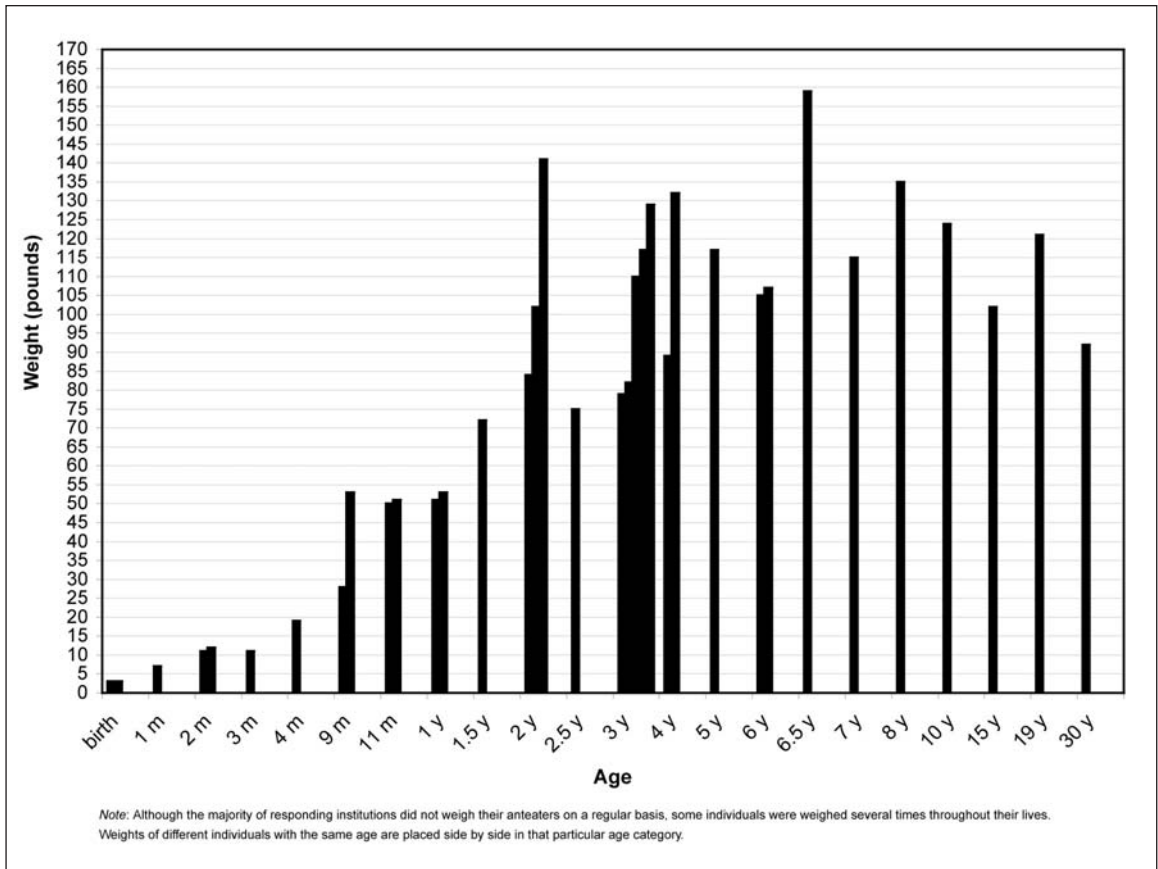


FIGURE 4. Body weights (n = 35) by age of the 24 living females represented in this survey.

time, as well as a scarcity of data concerning the health issues of specific individuals at the time of weighing.

From the survey of medical problems we produced a series of three graphs (Figures 5a, -b, and -c), representing 45 males, 51 females, and 11 unsexed individuals. They are based entirely on the medical records and necropsy reports provided by the 19 responding institutions. The population of giant anteaters represented in these graphs consists of a total of 107 living and dead individuals. Forty medical problems are presented, along with their corresponding frequencies of occurrence. The section "Medical Problems Interpreted" provides additional information regarding each medical problem, including the number of individuals affected, the percentage of the surveyed population (107 individuals) affected, age trends, causes, symptoms, and treatment strategies. The number in parentheses next to the medical problem in the graph corresponds to its number in the list. It is important to remember that this information is based strictly on the data provided by the 19 responding institutions. In several instances the medical records and necropsy reports were

incomplete or unclear. We have tried to be as accurate as possible with the data provided.

### Medical Problems Interpreted

*Surveyed Population: 107 individuals*

#### 1. Vitamin K Deficiency

*Number of individuals reported:* 9.10 (18% of population). The average age of these vitamin K-deficient anteaters was five and a half years. Six individuals were over the age of 10 years when this deficiency was noted. The remaining 13 individuals were under four years old when diagnosed.

*Causes:* Most commonly a result of a lack of vitamin K in the diet. This results in decreased ability for blood to clot.

*Symptoms:* Spontaneous bleeding is observed either from the nose, genitalia, or rectum. Blood may also be found in the urine and/or stool. Typically, only one or two of these symptoms is observed in any one individual.

*Treatment Strategies:* a) Supplement vitamin K in the diet in either powder (K-SOL) or liquid form on a daily basis. b) Add Yunnan

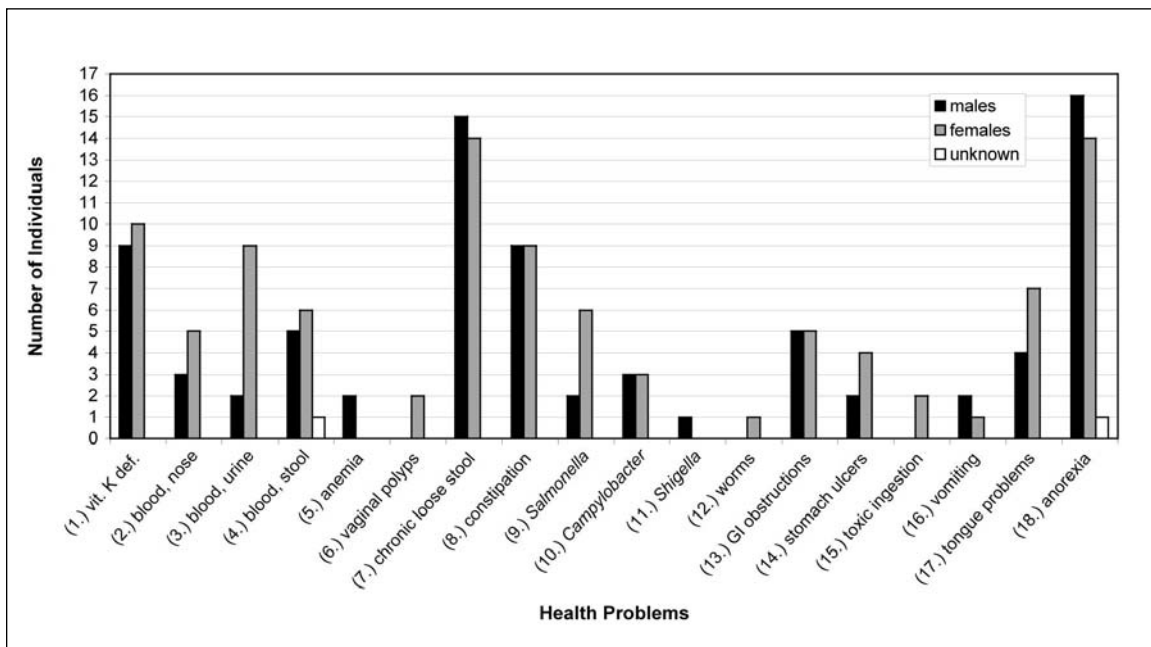


FIGURE 5A. Medical Problems: 45 males / 51 females / 11 unknown.

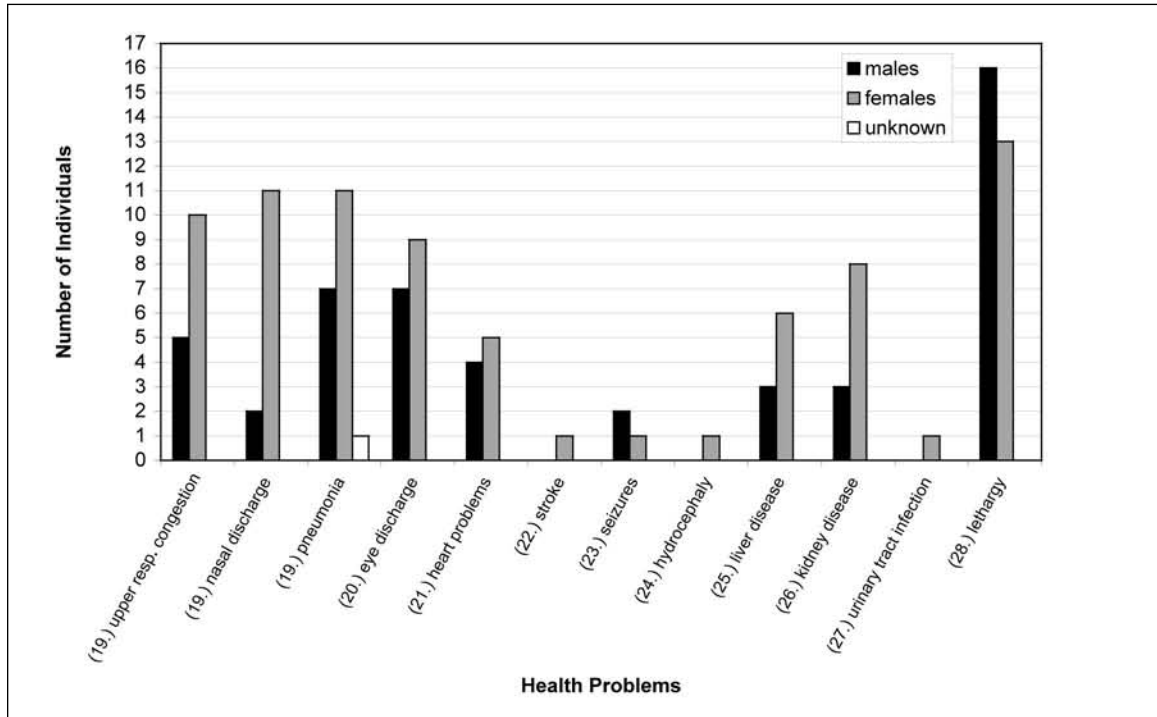


FIGURE 5B. Medical Problems, continued: 45 males / 51 females / 11 unknown.

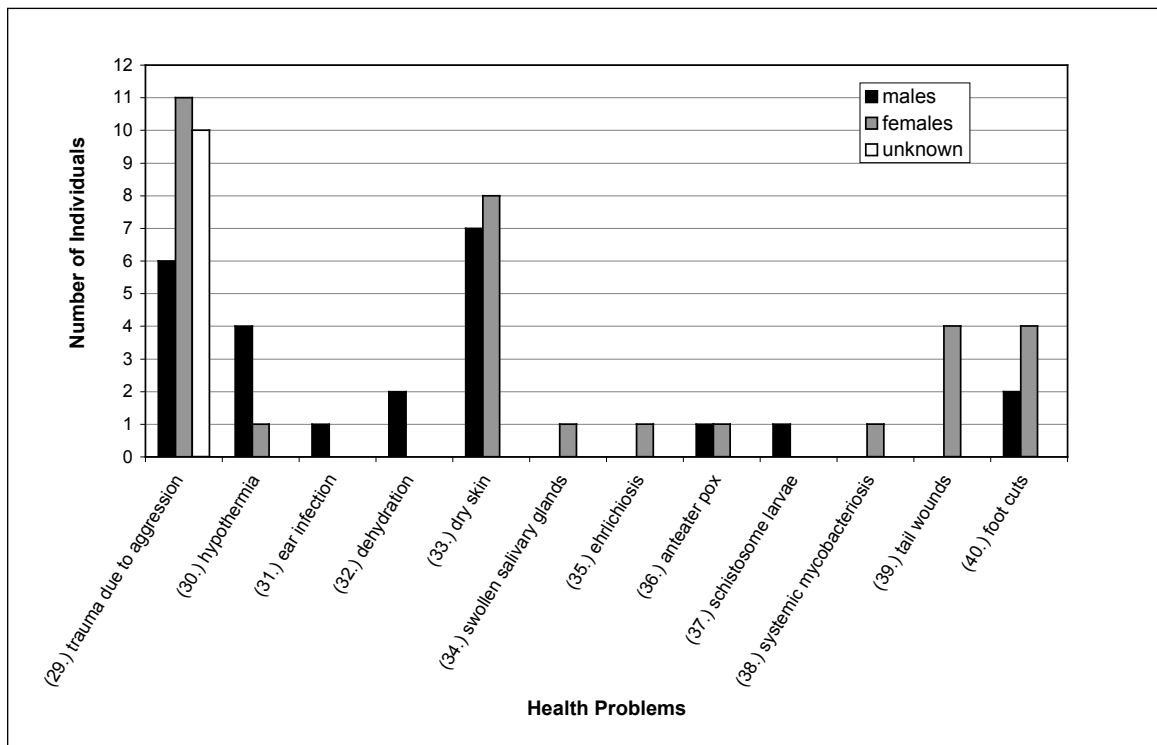


FIGURE 5C. Medical Problems, continued: 45 males / 51 females / 11 unknown.

---

Paiyao, a Chinese herb, to the diet in addition to vitamin K supplements to promote blood clotting. c) Change food components of vitamin K-deficient diet and include Leaf-Eater biscuits, which are high in vitamin K.

## 2. Nosebleeds

*Number of individuals reported:* 3.5 (7% of population). The average age of these individuals was 11 years. Only two were one year old. The other six were between eight years and 27 years old.

*Causes:* a) Vitamin K deficiency. b) Trauma to nasal region either through aggression or contact with electrified wire.

*Symptoms:* Bleeding from nose.

*Treatment Strategies:* a) If diagnosed as vitamin K deficiency – see “Vitamin K deficiency treatment strategies.” b) Trauma – no treatment administered.

## 3. Blood in Urine

*Number of individuals reported:* 2.9 (10% of population). Nine of these individuals were between the ages of two and four years. The other two individuals were over 12 years old.

*Causes:* a) Vitamin K deficiency. b) Estrus cycle. c) Urinary tract infection.

*Symptoms:* Urine has a reddish-brown tinge.

*Treatment Strategies:* a) If diagnosed as vitamin K deficiency – see “Vitamin K deficiency treatment strategies.” b) Estrus cycle – no treatment. Typically occurs every four to seven weeks and may last five to 10 days. c) Urinary tract infection – antibiotic treatment.

## 4. Blood in Stool

*Number of individuals reported:* 5.6.1 (11% of population). Of the ages provided, six individuals were between five and 12 years old and three were between one and two years old.

*Causes:* a) Vitamin K deficiency. b) GI tract obstruction. c) GI tract infection.

*Symptoms:* Stools are darker than usual and are tarrier in appearance.

*Treatment Strategies:* a) If diagnosed as vitamin K deficiency – see “Vitamin K deficiency treatment strategies.” b) If diagnosed as GI tract obstruction – see “GI tract obstruction treatment strategy.” c) GI tract infection – antibiotic therapy.

## 5. Anemia

*Number of individuals reported:* 2.0 (2% of population). Ages: One year and 11 years old.

*Causes:* a) Excessive bleeding due to vitamin K deficiency. b) Internal bleeding from stomach ulcer(s).

*Symptoms:* Lethargy.

*Treatment Strategies:* a) If diagnosed as vitamin K deficiency – see “Vitamin K deficiency treatment strategies.” b) Stomach ulcer(s) – no treatment listed.

## 6. Vaginal Polyps

*Number of individuals reported:* 0.2 (2% of population). Ages: 12 years and 29 years.

*Causes:* Undetermined.

*Symptoms:* Small polyps visible on perimeter of vulva. The 29-year-old female’s polyps increased slightly over the span of one year.

*Treatment Strategy:* No treatments listed.

## 7. Chronic Loose Stool

*Number of individuals reported:* 15.14 (27% of population). The average age of these individuals at onset of symptoms was four years. Of the ages provided, only three were between eight and 14 years of age. The other 16 individuals were between the ages of one and four years.

*Causes:* a) Diet – A diet high in cereal grains (dog kibble) along with lactose (milk products) can create osmotic changes in the lower gut, thus promoting loose stool. b) Bacterial/parasitic infection in GI tract – *Salmonella*, *Campylobacter*, *Shigella*, worms. c) Ingestion of toxic substance.

*Symptoms:* Stool is consistently pasty to liquid in consistency.

*Treatment Strategies:* a) Diet – change diet ingredients to Leaf-Eater/dry cat food. Leaf-

---

Eater is high in cellulose, which mimics the chitin ingested by free-ranging giant anteaters. Cellulose/chitin provides gut fill and promotes fecal consistency. Dry cat food is meat-based and is easier to digest than products like dog kibble, which are high in cereal grains. Eliminate lactose (milk products) from diet. b) One institution reported adding peat dust to the diet to promote fecal consistency. c) Bacterial/parasitic infection of GI tract – eliminate meat products in diet to prevent bacterial infections such as *Salmonella*. Antibiotic treatment was necessary in most cases. d) Ingestion of toxic substance – see “Ingestion of toxic substances treatment strategies.”

#### 8. Constipation

*Number of individuals reported:* 9.9 (17% of population). The average age of these individuals was four and a half years. Nine individuals were between one and three years old.

*Causes:* a) GI tract obstruction. b) Lack of fiber in diet.

*Symptoms:* Absence of stool. Lethargy reported on occasion.

*Treatment Strategies:* Several institutions reported cases of constipation that lasted two or three days and then corrected themselves without treatment. a) Provide a pool – this encourages defecation. b) Enema. c) Add supplements to diet – mineral oil, laxatone, cat lax, Metamucil, psyllium fiber. d) Alter substrate in exhibit – sand and woodchips caused more impaction problems than dirt substrate. e) Provide more enrichment – this may encourage individuals not to ingest as much substrate.

#### 9. *Salmonella*

*Number of individuals reported:* 2.6 (7% of population). The average age of these individuals was approximately 10 years. Only two individuals were under four years of age.

*Causes:* Contaminated food products – any meat in the diet is a potential risk. Occasionally found on unwashed fruit.

*Symptoms:* Diarrhea/dehydration/abdominal pain.

*Treatment Strategies:* a) Administer antibiotic therapy in most cases. b) In two cases diarrhea subsided in a couple of days and individuals no longer tested positive for *Salmonella*. c) Remove meat from diet and wash all fruit before feeding.

#### 10. *Campylobacter*

*Number of individuals reported:* 3.3 (6% of population). The average age of these individuals was six years, with the youngest being one year old and the oldest reported at 14 years.

*Causes:* Contaminated substrate – infected fecal material gets into the soil.

*Symptoms:* Chronic diarrhea.

*Treatment Strategies:* a) Administer antibiotic therapy. b) UV light kills these bacteria if the top layers of soil are repeatedly turned over and exposed.

#### 11. *Shigella*

*Number of individuals reported:* 1.0 (1% of population). Age: Five years.

*Cause:* Not listed.

*Symptoms:* Diarrhea, blood in stool, decreased appetite, lethargy.

*Treatment Strategy:* No treatment listed – symptoms persisted for two months but the anteater improved on its own.

#### 12. Worms

*Number of individuals reported:* 0.1 (1% of population). Age: Five years.

*Cause:* Undetermined.

*Symptoms:* Diarrhea.

*Treatment Strategy:* Administer Nemex Wormer.

#### 13. GI Tract Obstructions

*Number of individuals reported:* 5.5 (10% of population). The average age of these individuals was six years old. Four individuals were between one and three years old with the remaining between seven and 15 years of age.

*Causes:* Ingestion of foreign body – hairball, sand, wood chips, 2 x 6 cm piece of plastic, gauze, string.



---

*Symptoms:* Extreme lethargy, acute anorexia for more than a few days, abdominal pain, dehydration, constipation. One report indicated that the stool was still passing but feces were much smaller than normal and consisted of green, mucoid strings.

*Treatment Strategies:* a) Obstructions were fatal for six out of the 10 reported cases. b) Sand and wood chip impactions were successfully treated with repeated enemas and laxatives added to the diet. c) Surgery to remove obstruction.

#### 14. Stomach Ulcers

*Number of individuals reported:* 2.4 (6% of population). The average age of these individuals was seven, with the youngest at one year and the oldest at 12 years.

*Causes:* a) Parasites. b) Weak immune system due to other medical problems.

*Symptoms:* Prolonged anorexia, abdominal pain, lethargy, weight loss, blood in stool, anemia.

*Treatment Strategy:* None listed. All cases were reported upon necropsy. Stomach ulcers were listed as the primary cause of death for two individuals. In the other four cases, stomach ulcers were a contributing cause of death.

#### 15. Toxic Ingestion

*Number of individuals reported:* 0.2 (2% of population). Ages: 10 months and two years.

*Causes:* a) Ingestion of dye, cement, and glue. b) Ingestion of rat poison.

*Symptoms:* Rat poison – extreme lethargy, labored breathing, abdominal pain when palpated, bleeding from nose/rectum.

*Treatment Strategy:* Activated charcoal – used to treat ingestion of dye, cement, and glue. The case of ingestion of rat poison was fatal. The animal died in two days, before treatment could be attempted.

#### 16. Vomiting

*Number of individuals reported:* 2.1 (3% of population). Ages: One year, two years, and four years.

*Causes:* No causes were determined.

*Symptoms:* In two of the cases, the animals continued to eat normally. In the third case anorexia existed while symptoms persisted.

*Treatment Strategy:* Animals put under observation – no treatment administered.

#### 17. Tongue Problems

*Number of individuals reported:* 4.7 (10% of population). Of the ages provided, the average age of these individuals was nine years. The youngest was three years old.

*Causes:* In each reported case, the cause was diet-related. The stringy material found in ground-up horsemeat acted like a noose around the animal's tongue and prevented blood circulation.

*Symptoms:* a) Anorexia – animal shows interest in food but does not actually eat it. b) Excessive salivation – mouth held open with tip of the tongue hanging out. c) Tongue discoloration – tongue turns lighter in appearance due to a lack of circulation.

*Treatment Strategies:* a) Surgery to remove obstruction on tongue. b) Remove excessively stringy types of meat (such as horsemeat) from the diet.

#### 18. Anorexia

*Number of individuals reported:* 16.14.1 (29% of population). This was the most common problem reported by the 19 institutions. The average age of these individuals was six years. Of those provided, nine individuals were between one and three years old and 14 were between five and 14 years old.

*Causes:* a) The causes of anorexia are numerous and varied. Anorexia was associated with every major medical problem listed. In numerous cases, no cause was determined for loss of appetite. b) Temperature – three institutions reported changes in environmental temperatures as a contributing factor for anorexia. When environmental temperatures dropped into the low 50s °F or increased into the 100s °F, anorexia was noted. c) Stress – heightened stress levels seemed to promote anorexia.

*Symptoms:* Loss of appetite – depending on the accompanying medical problem, this symptom lasted for as little as two days and as long as four months. In the cases where no cause was determined, symptoms only persisted for one day to 10 days. Anorexic symptoms persisting longer than two weeks were usually associated with other medical problems such as GI tract obstructions, GI tract infections, stomach ulcers, tongue problems, pneumonia, heart problems, liver disease, kidney disease, and hypothermia.

*Treatment Strategies:* a) In cases where symptoms lasted for a week to 10 days, no treatment was necessary. Animal was observed and seemed to improve on its own. b) Increase environmental temperature – several institutions located in cold climates noted that supplemental heat encouraged their anteaters to eat regularly. Temperatures in the mid-70s °F to 80s °F seemed to be effective. c) Warm-water baths were reported to help stimulate ant eater appetites even for the more medically-challenged individuals.

**19. Upper Respiratory Congestion: 5.10 (14% of population). Nasal Discharge: 2.11 (12% of population). Pneumonia: 7.11.1 (18% of population)**

*Number of individuals reported:* As the above numbers indicate, these respiratory-related problems seem to afflict females much more than males, by a ratio of 2:1. The ages of these individuals were scattered. The youngest ant-eater reported suffering from pneumonia was five days old, while the oldest was 28 years. Of the 11 individuals of known age suffering upper respiratory congestion, six were under two years old. Of the 11 individuals of known age reported experiencing nasal discharge, five were under two years old. Lastly, of the 13 individuals of known age reported with pneumonia, seven were under two years old, and of these, four were less than six days old.

*Causes:* a) Nasal discharge/Upper respiratory congestion – exposure to consistently cold (below mid-50s °F), wet environments. In one case a female was reported chroni-

cally congested for 10 years and no causes were determined. b) Pneumonia – bacterial infection/septicemia or untreated upper respiratory congestion. Of the 19 cases reported, pneumonia was listed as either the primary or associated cause of death for 12.

*Symptoms:* a) Nasal discharge/Upper respiratory congestion – visible discharge from nose, abnormal/strained breathing sounds, occasional reports of lethargy. b) Pneumonia – anorexia, lethargy, a few reports of coughing observed. The majority of these cases were reported as difficult to detect, the symptoms not being obvious.

*Treatment Strategies:* a) Nasal discharge/Upper respiratory congestion – in three reports of nasal discharge, symptoms disappeared within one week with no treatment. Other treatments: antibiotics (Baytril), increase holding temperatures up to 70s °F, keep holding area dry, use humidifier. b) Pneumonia – the seven individuals that survived their bout of pneumonia were all kept in a warm (>70 °F) and dry environment, and all were treated with antibiotics. One case reported that the only antibiotic they found successful was Naxcel.

**20. Eye Discharge**

*Number of individuals reported:* 7.9 (15% of population). Of the ages provided, nine individuals were between one and four years old and four individuals were between 10 and 12 years of age.

*Causes:* a) Stress. b) Allergic reaction. c) Cold air.

*Symptoms:* Generally, a milky white substance exudes from the eye region.

*Treatment Strategies:* a) Observation – symptoms commonly reported to fade over one week. b) Allergic reaction – change bedding / apply Fusidic Acid eye ointment.

**21. Heart Problems**

*Number of individuals reported:* 4.5 (8% of population). The average age of these individuals was 10 years. The youngest indi-

---

vidual reported was three years old while the oldest was 21 years of age.

*Causes:* Not listed – all heart-related problems were diagnosed upon necropsy.

*Symptoms:* Two to 10 days before death – anorexia, lethargy, edema in neck region, and blood in stool.

*Treatment Strategy:* Not listed – all cases were fatal as diagnosis was made in necropsy.

## 22. Stroke

*Number of individuals reported:* 0.1 (1% of population). Age: 28 years.

*Causes:* Undetermined.

*Symptoms:* Lethargic, unable to stand, unresponsive to stimuli, blood in stool, and bloody vaginal discharge. There was temporary partial paralysis of the front left side of the body. Onset of symptoms was immediate.

*Treatment Strategy:* Initial treatment – place on oxygen, administer subcutaneous fluids, administer series of antibiotics (TMS, Baytril, Penicillin), vitamin K injection. Secondary treatment – physical therapy for one year to regain adequate use of front left leg.

## 23. Seizures

*Number of individuals reported:* 2.1 (3% of population). Ages reported: Eight years and 27 years.

*Causes:* a) Contact with electrified fence. b) Undetermined – other two cases.

*Symptoms:* Disorientation, shaking, loss of bodily functions. Onset is immediate.

*Treatment Strategy:* Not listed.

## 24. Hydrocephaly

*Number of individuals reported:* 0.1 (1% of population). Age: 17 years.

*Causes:* Infection by *Cryptococcus neoformans*.

*Symptoms:* Not listed.

*Treatment Strategy:* Not listed – proved fatal.

## 25. Liver Disease

*Number of individuals reported:* 3.6 (8% of population). Of the ages provided, the average was 17 years old. The youngest reported

anteater was eight years while the oldest was 26 years.

*Causes:* Not listed. Of the nine reported cases, there were five in which kidney disease was also a factor.

*Symptoms:* Anorexia, lethargy that becomes progressively worse to the point that they are unable to stand.

*Treatment Strategy:* Not listed – proved fatal in each case.

## 26. Kidney Disease

*Number of individuals reported:* 3.8 (10% of population). The average age of these individuals was 14 years. The youngest reported was seven years old while the oldest was 21.

*Causes:* Not listed – of the 11 cases, there were five in which liver disease was also a factor.

*Symptoms:* Anorexia, extreme lethargy, whole-body edema.

*Treatment Strategy:* Not listed – kidney disease was either the primary cause of death or a contributing cause in all 11 instances.

## 27. Urinary Tract Infection

*Number of individuals reported:* 0.1 (1% of population). Age: Two years.

*Causes:* Not listed.

*Symptoms:* Hematuria, diarrhea, and anorexia/weight loss.

*Treatment Strategy:* Antibiotics.

## 28. Lethargy

*Number of individuals reported:* 16.13 (27% of population). The ages of these individuals were evenly spread out. A cluster of eight individuals was between one and three years old. The remaining 21 individuals showed no significant age clusters. The oldest reported case was 30 years old.

*Causes:* Like anorexia, the causes of lethargy are numerous and varied. Lethargy was a symptom of practically every major medical problem. In several cases, no cause was diagnosed for lethargic behavior. In each instance of lethargy, anorexia was also

---

reported. Low environmental temperatures (below mid-50s °F) were also listed as a cause of lethargy.

*Symptoms:* Drowsiness or indifference to external stimuli. These symptoms varied from mild to extreme depending on the severity of other associated medical problems. In the cases where no cause was determined, symptoms remained mild and lasted no more than 10 days. Lethargic behavior persisting longer than two weeks or increasing in severity over a short time period usually indicated the presence of a more serious medical problem.

*Treatment Strategies:* a) In cases where symptoms remained mild for a week to 10 days, no treatment was necessary. Once animal started eating again, lethargic behavior regressed. b) Temperature – supplemental heating proved effective in a few cases if temperatures could be increased to more than 70 °F.

#### 29. Trauma Due to Aggression

*Number of individuals reported:* 6.11.10 (25% of population). Of these 27 individuals, 22 were under six days of age. All 22 infants died as a result, making this the number one cause of death for neonates.

*Causes:* a) Neonatal cases – mother and/or father inflicted fatal wounds to offspring. In six of these 22 cases (over one-quarter of those reported) the mother appeared to be acting normally and cared for the neonate. However, by the fifth or sixth day, the dam had killed her baby. Upon necropsy of each infant, a serious medical problem was detected, such as pneumonia or under-developed lungs. This may or may not have some bearing on the reasons behind the dam's aggressive behavior toward the neonate. Unfortunately many infants did not have necropsies performed when cause of death was trauma. b) Adult cases – aggression leading to physical injury or death was reported in situations involving breeding or introductions.

*Symptoms:* Lacerations/puncture wounds over body.

*Treatment Strategies:* a) Neonatal cases – separate sire from dam before birth and keep sep-

arate. Males have a long history of aggression towards infants in captive situations. Monitor interaction between neonate and dam as much as possible. From reported survey data, most neonatal trauma-induced deaths occurred within six days of birth. b) Adult aggression – not listed.

#### 30. Hypothermia

*Number of individuals reported:* 4.1 (5% of population). Two of these individuals were under three days old and the other three were between one and 10 years of age.

*Causes:* Exposure to cold temperatures (< 50 °F).

*Symptoms:* Anorexia – individual in a state of torpor and unresponsive to external stimuli. Onset of symptoms is rapid.

*Treatment Strategy:* Proved fatal for two neonates. Other three adult individuals recovered when placed in warm environment (> 70 °F).

#### 31. Ear Infection

*Number of individuals reported:* 1.0 (1% of population). Age: One year.

*Cause:* Not listed.

*Symptoms:* Bloody discharge from ears, unstable when walking.

*Treatment Strategy:* Medicated ear drops.

#### 32. Dehydration

*Number of individuals reported:* 2.0 (2% of population). Age: Seven and eight years.

*Causes:* Not listed.

*Symptoms:* Lethargy, anorexia.

*Treatment Strategy:* Administer subcutaneous fluids. Individuals improved in a couple of days.

#### 33. Dry Skin

*Number of individuals reported:* 7.8 (14% of population). Nine individuals were between one year and three years old when condition was reported. The other six individuals were between 12 and 30 years old.

*Causes:* Dietary deficiency? Climate? No cause proven yet.

---

*Symptoms:* Persistent dry flaky skin, especially around the forehead, neck, shoulders and ridge of back.

*Treatment Strategies:* a) Topical treatments – E45 cream, Aloe Heal cream, Bath Oil. b) Dietary supplements – Vitamin E, DermCaps, Omega 3 fatty acid capsules, Platinum Performance supplement. c) Humidifier placed in enclosure.

#### 34. Swollen Salivary Glands

*Number of individuals reported:* 0.1 (1% of population). Age: 29 years.

*Causes:* Undetermined.

*Symptoms:* Visible enlargement of salivary glands on underside of neck. Very soft and fluid-filled to the touch. Eventual rupture causing discharge of saliva-like substance. Fresh new skin found underneath.

*Treatment Strategy:* Keep area clean with dilute Nolvasan.

#### 35. Ehrlichiosis

*Number of individuals reported:* 0.1 (1% of population). Age: Eight years.

*Causes:* Tick-borne disease affecting white blood cells.

*Symptoms:* Abnormal bleeding tendencies.

*Treatment Strategy:* Antibiotic therapy – doxycycline monohydrate.

#### 36. Anteater Pox

*Number of individuals reported:* 1.1 (2% of population). Ages: Three and four years.

*Causes:* Not listed.

*Symptoms:* Lesions resembling chronic dermatitis were found in multiple sites on feet and neck.

*Treatment Strategy:* No treatment listed. Poxvirus is a localized disease that regresses spontaneously.

#### 37. Schistosome Larvae

*Number of individuals reported:* 1.0 (1% of population). Age: Four years.

*Causes:* Parasitic skin infection.

*Symptoms:* Larvae were found in a lesion resembling dermatitis on the animal's head.

*Treatment Strategy:* Praziquantel.

#### 38. Systemic Mycobacteriosis

*Number of individuals reported:* 0.1 (1% of population). Age: Four years.

*Causes:* Infected wound created by aggressive male.

*Symptoms:* Inguinal wound that would not heal. Infection spread to peritoneal cavity.

*Treatment Strategies:* Multiple surgeries, aggressive debridement, and antibiotic therapy (Isoniazid). All efforts were unsuccessful, and the animal was euthanized.

#### 39. Tail Wounds

*Number of individuals reported:* 0.4 (4% of population). Ages reported: 23 and 29 years.

*Causes:* Animal lying down near wall creates abrasions on lateral sides of tail base.

*Symptoms:* Raw areas on lateral sides of tail where it meets body.

*Treatment Strategy:* Clean area regularly with dilute Nolvasan and apply Panalog Cream or Triple Antibiotic ointment.

#### 40. Foot Cuts

*Number of individuals reported:* 2.4 (6% of population). Average age was four years.

*Causes:* a) Excessively dry skin that cracks open. b) Trauma due to aggression.

*Symptoms:* Pads of feet are raw and/or bloody.

*Treatment Strategy:* Oral – Vitamin K; topical – Triple Antibiotic ointment.

#### Reported Anteater Weight Fluctuations

Table 1 provides information on weight loss reported by eight institutions currently housing giant anteaters. This dataset includes the sex of the individual, age, original body weight, quantity of weight lost, the time it took to lose weight, and causes behind weight loss. These weight fluctuations are all primarily a result of an individual experiencing certain medical problems.

TABLE 1. Weight loss and its causes in four male and six female giant anteaters, *Myrmecophaga tridactyla*.

Sex	Age in years	Starting weight	Weight lost	Time span	Cause
Male	14	140 lbs	14 lbs	20 days	Anorexia due to tongue constriction from piece of horsemeat.
Male	8	111 lbs	10 lbs	7 months	Peritonitis.
Male	8	108 lbs	15 lbs	4 months	Occurs only in the summer season as appetite declines.
Male	5	138 lbs	15 lbs	2 months	Not listed.
Female	14.5	81 lbs	15 lbs	4 months	Kidney disease.
Female	12	101 lbs	23 lbs	< 2 months	Diagnosed with kidney/liver disease. Experienced prolonged periods of anorexia during time span.
Female	9	149 lbs	25 lbs	6 months	Kidney disease.
Female	3	143 lbs	23 lbs	8 months	Individual deemed overweight and put on a diet.
Female	2	141 lbs	10 lbs	6 months	Hematuria and chronic diarrhea.
Female	1.7	70 lbs	15 lbs	2 months	Sand impaction caused anorexia.

### Conclusions

The medical challenges surrounding giant anteaters (*Myrmecophaga tridactyla*) are numerous and varied. The results of the Health Care Survey provide insight into the frequencies of occurrence, age trends, causes, symptoms, and treatment strategies for 40 distinct medical problems that the 19 respondents have experienced with the giant anteaters in their collections. The following paragraphs summarize the top five most commonly reported medical issues involving a combined living and deceased giant anteater population of 107 individuals.

#### *Anorexia and lethargy*

The two most commonly reported medical problems were anorexia and lethargy, affecting 29% and 27% of the surveyed population respectively. In each report of an individual exhibiting lethargic behavior, anorexia was also noted. In most cases anorexia and lethargy turned out to be symptoms of much larger medical issues, including GI obstructions, respiratory ailments, heart problems, and liver/kidney disease. In several instances anorexia and lethargy were attributed to low environmental temperatures (below mid-50s °F). However, there were a few cases in which no causes could be determined for anorexic or lethargic behavior, and in a week or two the individual fell back into its normal habits.

#### *Chronic loose stool*

Chronic loose stool tied with lethargy as the second most commonly reported problem, affecting 27% of the surveyed population. The majority of affected giant anteaters were between one and four years of age at the onset of the symptoms. There is no question that diet is responsible for many of these cases. In several instances the treatment strategy employed was to alter the ingredients of the diet in order to aid in digestion. The traditional diet of ground-up horsemeat, dog kibble, and yogurt has proven time and again to instigate chronic loose stool. The second section of our survey, reported below, focuses on these diet-related issues, and results are still being compiled for future distribution.

#### *Trauma due to aggression*

The third most common medical problem reported, and perhaps the most fatal, was trauma due to aggression, affecting 25% of the surveyed population. Of the 27 individuals reported, 22 were under six days of age. All 22 neonates died as a result of wounds inflicted by the dam and/or sire, bringing the infant mortality rate up to 46%. However, the neonatal death rate dramatically decreased after the first six days of life. The reasons behind this remain undetermined based on the survey data provided.

---

### *Respiratory ailments*

The fourth most commonly reported medical problem consisted of respiratory ailments including pneumonia, upper respiratory congestion, and nasal discharge. Generally these ailments seemed to predominantly affect female individuals under the age of two years. The majority of reported causes centered on the cold/wet environments some of these giant anteaters were exposed to. In the cases where temperatures were reported, the definition of cold was considered to be below the mid-50s °F. In the situations where pneumonia developed, the fatality rate was nearly 60%. Practically all the respondents that had dealt with these respiratory ailments agreed that providing a warm (> 70 °F) and dry environment was important in preventing the onset of respiratory-related problems.

### *Vitamin K deficiency*

The fifth most frequently reported medical problem experienced by the giant anteater was vitamin K deficiency, affecting 18% of the 107 individuals surveyed. The spontaneous bleeding from the rectum, genitalia, and/or nose caused by this deficiency was generally due to a nutritionally incomplete diet. Altering the dietary components to include Leaf-Eater biscuits high in vitamin K was one solution frequently employed. The alternative used by several facilities was to add vitamin K supplements to the nutritionally incomplete diet.

After sorting through all the medical records provided by the 19 respondents, a pattern began to emerge. Those institutions that weighed their anteaters on a regular basis (i.e., at least once per month) appeared to have greater success recognizing any potential medical problems earlier on. Because anorexia is such a prevalent symptom in so many medical problems anteaters experience, weight loss usually occurs as a result. Being able to recognize this is key, especially for those institutions that do not monitor dietary intake of individual anteaters. Just from a visual inspection, it is difficult to accurately judge whether or not an anteater has lost weight, because its body hair and robust ribcage can mask weight

loss easily. Anorexia, weight loss, and lethargy are three symptoms that we as anteater caretakers can easily observe and monitor. When we see them occur in unison, this should serve as a red flag indicating that closer scrutiny is required in order to determine if a medical problem is arising or if it is nothing at all.

### **Acknowledgements**

We sincerely thank the 19 institutions that participated in the Health Care Section of the giant anteater survey. Those institutions include: Reid Park Zoo (Tucson, Arizona); Chaffee Zoological Gardens (Fresno, California); San Francisco Zoological Gardens (San Francisco, California); Santa Barbara Zoological Gardens (Santa Barbara, California); Jacksonville Zoological Gardens (Jacksonville, Florida); Disney's Animal Kingdom (Lake Buena Vista, Florida); Brevard Zoo (Melbourne, Florida); Brookfield Zoological Park (Brookfield, Illinois); Rolling Hills Refuge Wildlife Conservation Center (Salina, Kansas); Audubon Park Zoological Gardens (New Orleans, Louisiana); Detroit Zoological Institute (Detroit, Michigan); Cleveland Metroparks Zoo (Cleveland, Ohio); Columbus Zoological Gardens (Columbus, Ohio); Oklahoma City Zoological Gardens (Oklahoma City, Oklahoma); Philadelphia Zoological Gardens (Philadelphia, Pennsylvania); Nashville Zoo (Nashville, Tennessee); Houston Zoological Gardens (Houston, Texas); Caldwell Zoo (Tyler, Texas); and London Zoo (London, England).

The information provided by these facilities has shed some light on the basic trends in medical problems experienced by giant anteaters in captivity. In conjunction with these illnesses, we have also gained valuable insight into the treatment strategies employed by the respondents in their attempts to provide the best care possible to the giant anteaters in their collection. We are especially grateful to Mike Flint, the General Curator and Giant Anteater Studbook Keeper at Reid Park Zoo. Mike's interest and support regarding this survey has helped immensely in encouraging others to participate and share information about the giant anteaters in their

---

collections. Lastly, we want to acknowledge “Anna”, a twelve-year-old giant anteater, who brought us to the realization of just how mysterious and amazing a creature this edentate species can be.

---

## Giant Anteater (*Myrmecophaga tridactyla*) Diet Survey

Scott Morford<sup>1</sup> and Mary Ann Meyers<sup>2</sup>

*Santa Barbara Zoological Gardens, 500 Ninos Drive, Santa Barbara, California 93103, USA.*

### Introduction

The Giant Anteater Survey is comprised of four separate sections designed to target specific questions and issues involved in the overall care and management of the giant anteater (*Myrmecophaga tridactyla*). The four sections to this survey and their status in terms of completion are as follows: 1) Health Care – results compiled and distributed July 2001; 2) Diet – results compiled; 3) Housing – results in process of being compiled for distribution; and 4) Neonatal Care – survey questionnaire to be distributed at a later date. Due to the shortage of published information on these topics, the Giant Anteater Survey creates an opportunity to share valuable information and experience among institutions that maintain giant anteaters as part of their collection.

The primary purpose of the Diet section was to look at the trends in giant anteater diets currently being fed in captivity. In addition, behavioral enrichment items as well as types of vitamin and mineral supplements used in the daily diet are discussed. The information presented is based on the survey responses provided by 21 of 24 institutions currently housing giant anteaters.

---

<sup>1</sup> Now at the San Diego Zoo, 2920 Zoo Drive, San Diego, California 92101.

<sup>2</sup> Now in the program for Pre-Veterinary Medicine at the University of California, Santa Barbara.

It is important to note that the Diet Survey Results are designed to simply present what different institutions choose to feed giant anteaters in their collections. No outside research on nutritional values or overall diet-related health concerns were performed on the authors' part unless noted. It is our hope that the results of the Diet Survey will provide a better understanding of the nutritional needs of the giant anteater and how different institutions might attempt to meet these requirements.

### Graphs Interpreted

Four graphs were created to illustrate the survey results for the following four topics: 1) Individual food items in diet; 2) Staple diets; 3) Vitamin and mineral supplements; 4) Behavioral enrichment items. The information is current up to May 15, 2001, when compilation of the survey data was begun.

#### *Individual food items in the diet*

Figure 1 represents the individual food ingredients comprising the anteater diets at 21 institutions housing giant anteaters. These ingredients do not represent behavioral enrichment items or “treats” given to the anteaters. Instead, these individual food items are fed in various combinations with one another to create a daily diet. As the graph indicates, the three most common ingredients used in the anteater diet include Leaf-Eater, dry dog food, and dry cat food. In comparison, the rest of the food items listed are not used as broadly by the 21 respondents. An interesting finding was the predominance of Leaf-Eater in giant anteater diets. Of the 21 responding institutions, 67% incorporated Leaf-Eater in their diets. Some of the respondents indicated that the reason for this was because Leaf-Eater is naturally high in vitamin K, something captive anteaters tend to become deficient in. Also, Leaf-Eater is high in cellulose, which is reported to provide gut fill, thus promoting fecal consistency (Edwards, n.d.). Many of the respondents indicated that the addition of Leaf-Eater to the daily diet helped alleviate some of the problems with chronic loose stool that have become common with captive giant anteaters.