

Postmortem findings in collared peccaries raised in captivity in northeastern Brazil¹

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ABSTRACT.- Batista J.S., Olinda R.G., Rodrigues C.M.F., Silva T.M.F., Vale R.G., Viana G.A., Oliveira A.F. & Oliveira M.F. 2014. **Postmortem findings in collared peccaries raised in captivity in northeastern Brazil.** *Pesquisa Veterinária Brasileira* 34(11):1101-1108. Laboratório de Patologia Veterinária, Departamento de Ciências Animais, Universidade Federal Rural do Semiárido, BR-110 Km 47, Presidente Costa e Silva, Mossoró, RN 59625-900, Brazil. E-mail: jaelsoares@hotmail.com

This study is a retrospective examination of diseases in collared peccaries that were diagnosed by the Veterinary Pathology Laboratory, Universidade Federal Rural do Semiárido. Necropsy and histological examination were performed from 2005 to 2010. Of the 50 necropsied collared peccaries, 24% died due to restraint and capture myopathy; 18% died from trauma; and the remainder was diagnosed with splenic hemangioma (6%), enterolithiasis (6%), gastritis (6%), gastric ulcer (4%), intestinal volvulus (4%), gastric volvulus (2%), mammary carcinoma (2%), polycystic kidney disease (2%), pyometra (2%), and suppurative bronchopneumonia (2%). Twelve animals remained undiagnosed, seven of which (14%) were in advanced autolytic condition and five of which (10%) had no gross or microscopic lesions that were compatible with disease. This paper describes illnesses that have not been reported in the collared peccary, focusing on their clinical and pathological aspects.

INDEX TERMS: Collared peccary, *Tayassu tajacu*, wild animals, necropsy, pathology.

RESUMO. - [Achados post-mortem em catetos criados em cativeiro no Nordeste do Brasil.] Este trabalho teve por objetivo realizar um estudo retrospectivo sobre as doenças de catetos diagnosticadas pelo Laboratório de Patologia Veterinária da Universidade Federal Rural do Semi-Árido, através do exame de necropsia e histológico no período de 2005 a 2010. Dos 50 catetos submetidos à necropsia, as percentagens das enfermidades diagnosticadas foram: miopatia por captura e contenção (24%), morte por traumas (18%), hemangioma do baço (6%), enterolitíase (6%), gastrite (6%), úlcera gástrica (4%), vólculo intestinal (4%), vólculo gástrico (2%), carcinoma mamário (2%), doença renal policística (2%), piometra (2%) e broncopneumonia supurativa (2%). Onze (22%) animais permaneceu-

ram sem diagnóstico, dos quais sete (10%) apresentavam avançado estado autolítico e cinco (14%) não foram observadas lesões macroscópicas e microscópicas compatíveis com nenhuma enfermidade. Este estudo apresenta relatos de doenças ainda não descritas em catetos, com enfoque nos aspectos clínicos e patológicos.

TERMOS DE INDEXAÇÃO: Catetos, *Tayassu tajacu*, animais silvestres, necropsia, patologia.

INTRODUCTION

Knowledge of the epidemiological, clinical, and pathological factors of diseases is paramount for their diagnosis in domestic animals. Once a correct diagnosis is made, measures can be taken immediately to control the disease, and preventive measures can be implemented to significantly reduce the resulting economic losses (Riet-Correa et al. 2003).

Among pathological examination methods, the necropsy is essential for confirming, refuting, clarifying, modifying, or establishing a diagnosis (Peixoto & Barros 1998). Often, the correct diagnosis can only be obtained with a necropsy.

A postmortem examination is particularly useful in diagnosing diseases in wild animals, because in many cases, the

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clinical signs are not as characteristic as in domestic animals. Also, the occurrence of deaths in wild animals is infrequently preceded by clinical signs (Batista et al. 2010). Referred exams of wild animals allow one to identify the morphological, ecological, and pathological aspects of a disease, all of which are fundamental in the practice of conservation medicine, enabling these data to be correlated with quality of life and the environment (Almeida et al. 2005). Clinical and pathological studies have produced substantial data from necropsies, which could guide the development of proper wildlife management programs (Batista et al. 2010).

The collared peccary (*Tayassu tajacu*), also known as the javelin, or saíno, is a type of wild pig that belongs to the class Mammalia, order Artiodactyla, suborder Suiforme, and family Tayassuidae. This species dwells throughout the American continent, living in a wide variety of habitat areas, including arid climates and humid forests (Haemig 2004).

The collared peccary population in Brazil faces the threat of poaching, deforestation, and habitat fragmentation. Thus, there is growing interest in raising wildlife in captivity to preserve this species and providing an alternative source of protein for this population. The collared peccary has adapted well to captivity; thus, its breeding has been widely disseminated in the semiarid climate of the Brazilian Northeast (Pinheiro et al. 2001, Batista et al. 2008, Batista et al. 2009).

Nevertheless, the occurrence of diseases is one of the main barriers to the successful breeding of this species in captivity. Moreover, a description of the anatomopathological aspects of diseases in collared peccaries could help to establish treatment protocols and improve their prognosis. To this end, this study discusses the diagnosis of diseases in collared peccaries that underwent a pathological examination at the Laboratory of Veterinary Pathology, Universidade Federal Rural do Semiárido (UFERSA) from 2005 to 2010.

MATERIALS AND METHODS

The animals in this study were obtained from Centro de Multiplicação de Animais Silvestres (CEMAS), Universidade Federal Rural do Semiárido (UFERSA), in Mossoró/RN, registered for scientific breeding in IBAMA (Brazilian Institute of Management and Renewable Natural Resources) under entry 14.789.12.

The animals were kept in pens (1.5x20m) and housed at 3 females: 1 male. The food comprised ground corn, soybean, and wheat bran; citrus fruits; and green vegetables and was provided *ad libitum* with water.

The animals were inspected daily and underwent a clinical examination, and 2mL of blood was collected by radial venipuncture. The blood was stored in sterile tubes for hematological examinations in the period 2005 to 2010 (Almeida et al. 2011).

Between 2005 and 2010, 50 *Tayassu tajacu* that were found dead were sent immediately to the Laboratory of Animal Pathology for necropsy and histopathological examination. Routine necropsy was performed, as was an external examination of the animal. Then, the thoracic, abdominal, and cranial cavities were opened; the organs were removed; and a complete macroscopic study was conducted, with photographic documentation of significant findings. Fragments of several organs were collected and fixed in 10% formalin, processed routinely for histology, embedded in paraffin, cut at 5- μ m thickness, and stained with hematoxylin-eosin (H&E) (Prophet et al. 1992).

The organs that showed evidence of inflammation that was bacterial in origin, demonstrated by the presence of purulent exudates, were sampled using swabs to isolate and identify the etiological agent. The samples were plated on agar defibrinated sheep blood (5%) and incubated at 37°C for 48 h under aerobic conditions (Olinda et al. 2010). The samples were classified, based on macroscopic, morphotinctorial (by Gram staining), and biochemical characteristics (MacFaddin 2000).

Because the study evaluated the pathological diagnosis in collared peccaries, the data are expressed as percentage of frequency of diagnosis.

RESULTS

Capture myopathy was the cause of death of 7 animals (24.0%). During the capture and restraint of the animals, based on sex and age, some animals had clinical signs that were compatible with myopathy, characterized by ataxia, lameness, muscle weakness, lateral recumbence, tachypnea, and hyperthermia (temperature up to 42°C). In these animals, the hematological examination revealed hematocrit values that ranged between 46.8% and 53%; elevated total erythrocytes counts erythrocytes and leukocytosis due to neutrophilia and monocytosis (Almeida et al. 2011).

In the necropsy, all animals had intense rigor mortis; diffuse, pale skeletal muscle and petechial hemorrhages in the spleen; ecchymosis in the heart; and congestion of the meningeal vessels. Two animals experienced bleeding in the intramuscular fascia of the hind limbs. The main histological changes occurred in the skeletal and cardiac muscle, characterized by the separation of muscle fibers by edema and focal hemorrhage. Several muscle fibers were wound up, contracted, with eosinophilic and lacked transverse striations.

Trauma deaths due to injury occurred in 9 animals (18%). In 6 animals, trauma occurred during fights in disputes over dominance or during the merging of bands in creating new reproductive groups. The main lesions in these animals were blindness, injury with subsequent hematoma and fracture, skin laceration, and bleeding, which resulted in hypovolemic shock in 2 cases. Three animals that died due to injuries were newborns.

Splenic hemangiomas were observed in 3 dead animals (6.0%) with no clinical suspicion of disease. In these animals, the neoplasm had a red and circumscribed aspect that involved the entire rear end of the visceral surface (Fig.1). Histologically, the hemangioma contained many blood vessels that varied in size, with thin walls and vascular spaces that were filled with blood (Fig.2).

Examination of the abdominal cavity, 3 animals (6.0%) had enteroliths with diameters ranging from 4.0 to 6.5 cm inside the stomach. The calculi had irregular surfaces and consisted of hairs and fibers, weighing from 15 to 70 grams (Fig.3). The enteroliths were incidental findings and unrelated to the clinicopathological evidence of obstructive lesions.

In addition, we noted 3 cases of gastritis in the glandular stomach (6.0%). On visual inspection, the gastric mucosa showed red and swollen aspects. One animal developed moderate gastritis, whereas the other 2 had severe gastritis that involved the entire length of the region of the mucosa.



Fig.1. Macroscopic characteristics of a splenic hemangioma in collared peccary (*Tayassu tajacu*) raised under captive conditions. Note the multiple elevated dark red nodules on the splenic surface.

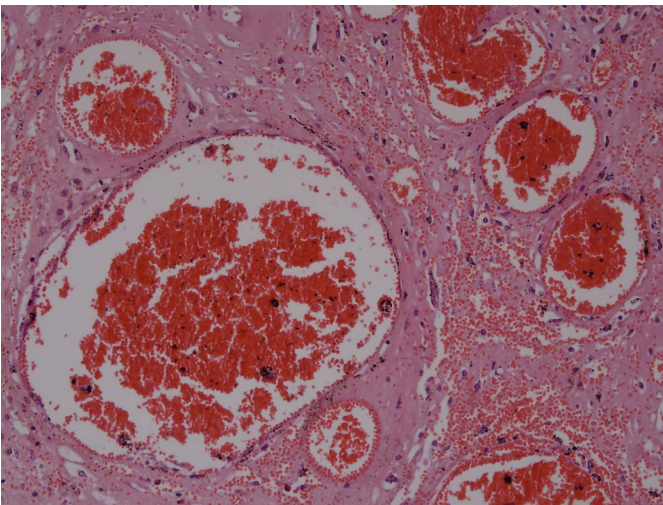


Fig.2. Microscopic characteristics of a splenic hemangioma in collared peccary (*Tayassu tajacu*) raised under captive conditions. Note proliferation of capillaries containing red blood cells inside. H&E stain, obj.20x.

Further, by microscopy, the animal with moderate gastritis presented an inflammatory infiltrate of neutrophils in the lamina propria. The animals with severe gastritis showed diffuse infiltration of lymphocytes and plasma cells.

Peptic ulcer was diagnosed in two animals (4.0%) In the glandular region of the stomach, we observed 5 round ulcers with raised edges with hyperemia that were covered with a dark fibrinopurulent pseudomembrane, measuring 2.0x2.5 to 4.5x 6.5cm in extension (Fig.4). By histology, there was a superficial fibrin-leukocyte layer, necrosis and erosion of the epithelium, parakeratosis, and inflammatory infiltration of the submucosa and muscular layer of the mucosa. In another animal, the ulcer resided in the nonglandular stomach region, measuring 0.4x0.7cm. By microscopy, we noted an inflammatory infiltrate with mononuclear leukocytes and fibrosis, characterized by fibroblast proliferation and the accumulation of collagen fibers.

Intestinal volvulus occurred in two cases (4.0%) - one in each gender. The first case was diagnosed in a peccary that was found dead in its enclosure without previous clinical

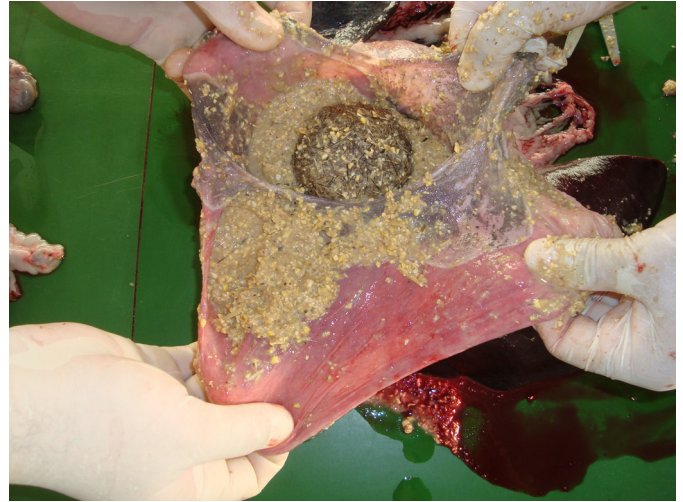


Fig.3. Macroscopic aspect of enterolithiasis in collared peccary (*Tayassu tajacu*) raised under captive conditions. Note the spherical enterolith comprised by a mixture of hair and fibers through out gastric contents. The enterolith is six cm in diameter and weighting 15 grams.

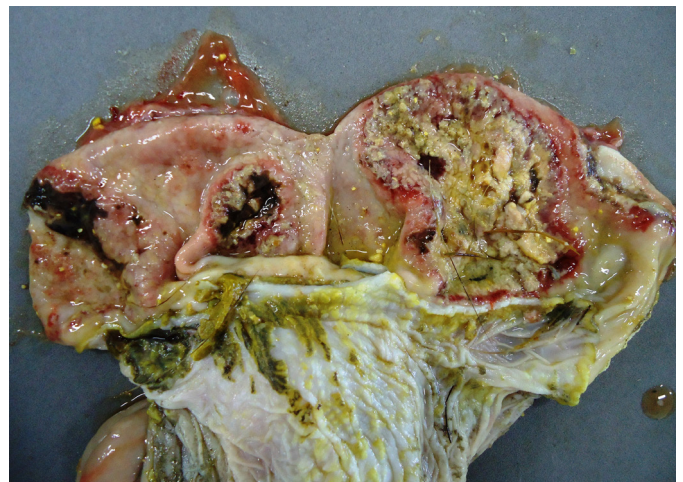


Fig.4. Macroscopic aspect of stomach ulcers in collared peccary (*Tayassu tajacu*) raised under captive conditions. Note the presence of large deeply excavated ulcers in the glandular mucosa of the stomach region.

signs of disease. By necropsy, full rotation of the jejunum and ileum around the mesenteric base was observed. The affected section of the bowel was dark red and harbored congested blood vessels. The second case of volvulus occurred in an animal that had shown anorexia, anxiety, bloating and tenesmus. At the necropsy, there was rotation of the cecum-colon segment, which was distended with gas, intense congestion, edema, cyanosis, and hemorrhagic areas in the serosa (Fig.5).

Gastric volvulus was observed during the necropsy of an animal (2.0%) with a history of anorexia, depression, lethargy, pale mucous membranes, abdominal distension, and progressive weight loss. The stomach was severely distended with gas and twisted 90° counterclockwise. The cranioventral portion of the cecum was shifted to the right against the visceral surface of the diaphragm. The spleen



Fig.5. Macroscopic aspect of intestinal volvulus collared peccary (*Tayassu tajacu*) raised in captivity. Note the bluish discoloration and swelling of the bowel due to accumulation of gas and food.

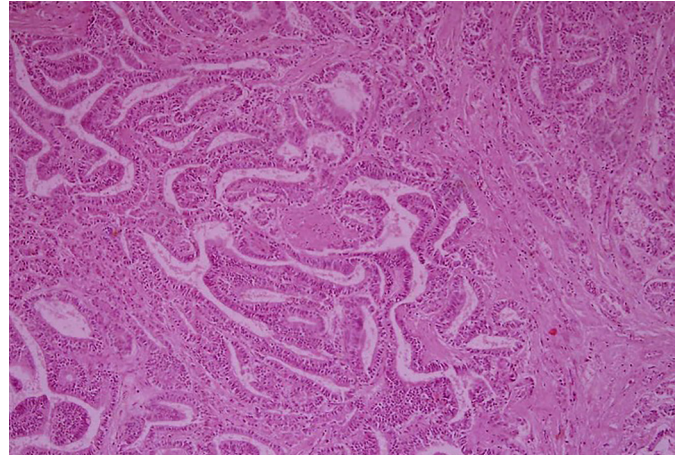


Fig.7. Microscopic changes of a mammary carcinoma in collared peccary (*Tayassu tajacu*) kept under captive conditions. Proliferation of mammary ducts circumscribed by large amounts of fibrous connective tissue.(H&E stain, obj.20x.)



Fig.6. Macroscopic characteristics of a mammary carcinoma in collared peccary (*Tayassu tajacu*) kept under captive conditions. Note the huge yellowish-white mass with nodular aspect on the cut surface.

was enlarged and shifted to the right ventral side of the abdomen, with a focal area of the dorsal end of the parietal surface adhering to the peritoneum.

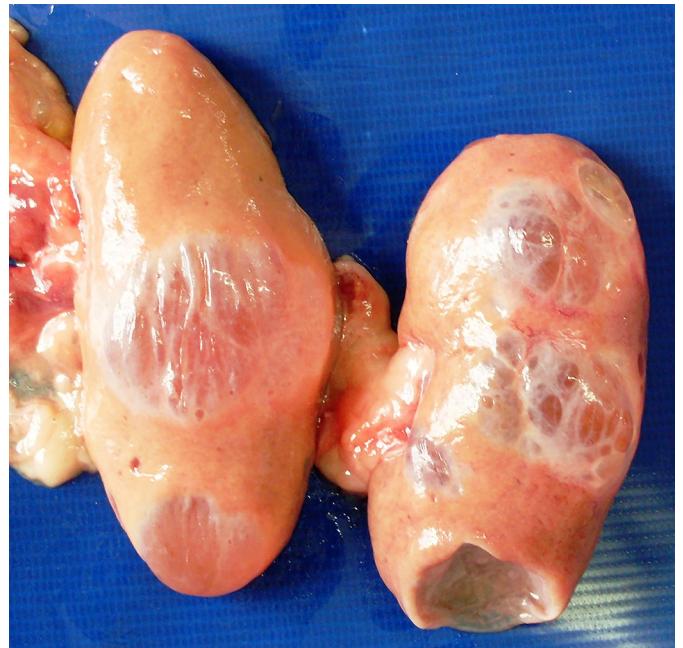


Fig.8. Macroscopic aspects of a polycystic kidney in collared peccary (*Tayassu tajacu*) kept under captive conditions. Observe the dilated thin-walled cortical cysts filled with liquid.

Mammary carcinoma was observed in one 10-year-old female peccary (2.0%), presenting as a firm nodule in the left inguinal region and measuring 4.0x5.0cm. The necropsy revealed a nodular, yellowish-white mass in the mammary gland on visual inspection (Fig.6). Metastatic nodules in the lung parenchyma were also observed. By microscopy, the mammary adenocarcinoma was characterized by proliferating mammary ducts, accompanied by stromal desmoplasia. Neoplastic cells were pleomorphic with large nuclei and, basophilic, with evident nucleoli and several mitotic figures (Fig.7).

Polycystic kidney disease was recorded in one case (2.0%) during necropsy of a peccary that died after showing progressive weight loss, listless, anorexia, lethargy,



Fig.9. Macroscopic aspect of pyometra found in a collared peccary (*Tayassu tajacu*) kept under captive conditions. Observe the hyperemic and thickened uterine mucosa with purulent exudate contain fibrin lattices.



Fig.10. Macroscopic aspects of pneumonia in a collared peccary (*Tayassu tajacu*) kept under captive conditions. There are multiple abscess containing caseous and yellowish material in the diaphragmatic lobe of the lung.

and pale mucous membranes. The right and left kidneys were whitish, harboring many cysts in the cortical and medullary regions, ranging from 2.7x0.4x0.5 to 2.5x0.2x0.3cm in diameter and containing bright serous fluid (Fig.8). The animal also had characteristic lesions of uremia, such as ulceration of the oral mucosa, multifocal ulcerations in the stomach (uremic gastropathy), and lung edema. Microscopically, the kidneys contained many spherical cysts, covered by epithelium. In addition, multifocal lymphoplasmacytic interstitial nephritis and interstitial fibrosis were observed.

Pyometra was noted in one 4-year-old animal (2.0%) with a history of reproductive disorders, permanently in anestrous, and characterized clinically by apathy, anorexia, dehydration, and fever (up to 40°C). In this animal, the hematological examination revealed a hematocrit value of 50.9% and leukocytosis due to neutrophilia with band neutrophils. In the gross examination, distended uterine horns and whitish-yellow fibrinopurulent exudate were observed (Fig.9). In the histological examination of samples from the uterus, we found diffuse infiltration of polymorphonuclear cells in the endometrium and myometrium and cellular debris and fibrin in the uterine lumen. Microbiological analysis of the uterine contents revealed the presence of *Escherichia coli*.

Pneumonia was found in one animal (2.0%) with a history of fever, anorexia, depression, lethargy, pale mucous membranes, progressive weight loss, and dyspnea. In the necropsy, small abscesses (0.1x0.2cm) were randomly distributed throughout the lung parenchyma, and a 5.5x4.0cm abscess was found in the diaphragmatic lobe (Fig.10). Microscopic examination revealed destruction of the lung parenchyma with a suppurated exudate that was rich in neutrophils, cellular debris, and bacterial colonies of *Staphylococcus aureus* in the bronchi, bronchioles, and alveolar spaces.

It was impossible to define the postmortem diagnosis in 12 peccaries (22.0%) that were necropsied five (10%) had no abnormal gross or microscopic lesions, and in the other seven (14%), the advanced degree of autolysis makes infeasible an anatomopathological analysis (Table 1).

Table 1. Occurrence of diseases in collared peccary (*Tayassu tajacu*) raised in captivity, identified by necropsy in the Laboratory of Veterinary Pathology, UFRSA, from 2005 to 2010

Diagnosis	Number of cases	Gender		Broad (%)
		Male	Female	
Capture and restraint myopathy	12	07	05	24
Trauma	09	07	02	18
Splenic hemangioma	03	02	01	06
Enterolithiasis	03	02	01	06
Gastritis	02	-	02	04
Gastric ulcer	02	01	01	04
Intestinal volvulus	02	01	01	04
Gastric volvulus	01	01	-	02
Mammary carcinoma	01	-	01	02
Polycystic kidney disease	01	-	01	02
Pyometra	01	-	01	02
Suppurative bronchopneumonia	01	-	01	02
Autolysis	07	04	03	14
Undiagnosed	05	04	01	10
Total	50	29	21	100

DISCUSSION

Diseases pose a threat to animal populations in their natural habitat or in captivity. The postmortem examination is a diagnostic method that can determine the natural history of a disease, its prevalence, and the predisposing factors and provide subsidies for developing measures to prevent and control the diseases.

This study has demonstrated that capture and restraint myopathy are the main pathologies in necropsied collared peccaries. Although these animals adapt well when raised in captivity, they often maintain their aggression. Thus, when they experience an abnormal situation, such as capture and restraint, physiological responses are exacerbated during the alarm reaction, which could have contributed to the development of myopathy in our study (Batista et al. 2008).

The average hematocrit values were above the limit for this species, which is 44.5% (Almeida et al. 2011). The stress that is caused by physical restraint is often accompanied by a rise in hematocrit levels. The increasing number of circulating red blood cells is due to the splenic contraction. The spleen, besides several other functions, stores the red blood cells and by splenic contraction provides to the

muscles a great amount of red blood cells from the oxygenated blood, which is necessary to the alarm reaction during stress (Montane et al. 2002).

Batista et al. (2008) reported that the capture and restraint of peccaries in semiarid climates in northeastern Brazil, when performed at high temperatures, increases pulse and respiratory rates, rectal temperature, and the frequency of death due to myopathy. The study suggests that peccaries should be handled in the early morning hours, when environment temperatures are colder.

We noted frequent death in our animals due to injuries that resulted from aggression, similar to the results of Margarido and Mangini (2001), who correlated injuries due to fighting to 20% of the diseases in collared peccaries that were bred in captivity. According to Furtado and Kashiwakura (2007), peccaries in captivity are prone to trauma, commonly suffering from lacerations, contusions, and fractures; injuries due to territorial disputes, and deaths due to fighting, predation, and maternal rejection.

Peccaries form cohesive social and stable groups (Byers & Bekoff 1981). However, even when kept in captivity, the relationship between dominance and social hierarchy that is observed in free-living animals persists (Nogueira-Filho et al. 1999). In this study, mixing animals from different groups changed their social interactions, and some animals developed aggressive and hostile behavior, causing frequent fights, injuries, and deaths in the newly introduced individuals.

The disruption in social structure was also evidenced by the occurrence of infanticide in three animals. The origin of this behavior and whether it was carried out by the mother, by males, or by unrelated animals that were introduced into the group could not be determined. In an experimental study in the same facilities as in this report, Pinheiro et al. (2001) found that the infanticide rate increased when a higher population density was established and when there was an increase in the male:female proportion.

There is limited data on the frequency of deaths from neoplasms in wild animals. However, neoplasms in these animals are increasingly being reported (Frazier et al. 1994, Harrenstein et al. 1996, Gonçalves & Oliveira 2000, Lucena et al. 2010, Rehtanz et al. 2010). This study is the first report of a mammary adenocarcinoma and splenic hemangioma in a peccary. Mammary tumors are common in dogs and cats, but such data in wildlife are scarce (Cubas et al. 2006). The clinical and pathological presentation of mammary carcinoma with metastases in the lung in one of our animals was similar to what has been described in small domestic animals. Metastases are major complications of malignant neoplasms in the mammary tissue and lungs, which are the most frequently affected organs (Oliveira Filho et al. 2010).

Hemangiomas are benign tumors of vascular origin that are common in dogs and have also been diagnosed in cats, horses, cows, sheep, pigs, and mice (Meuten 2002). In our cases, hemangioma was accidentally found finding by necropsy, with no clinical suspicion of disease. It can affect several organs, primarily involving highly vascularized organs, such as liver and spleen (Jones et al. 2000).

Gastric diseases are characterized by varying degrees of epithelial lesions, which could extend to the adjacent layers of the stomach, resulting in failures that can extend to the serosa (Morés et al. 2000). The lesions in the gastric wall layers in the necropsy ranged from mild inflammation to ulceration of the mucosa. Gastritis and peptic ulcers are multifactorial diseases that are linked to environmental and management, nutrition, and stress-related factors (Almeida et al. 2006) and are more frequent in pigs that are raised intensively in confinement (Sobestiansky & Barcellos 1999).

Gastric volvulus, intestinal volvulus, and enterolithiasis were important causes of obstructive lesions in this study. The etiology of gastric volvulus is not understood, since varies between animals (Silva et al. 2006). Possible causes are diet, high-energy foods, food intake, feeding frequency, feeding behavior (eating quickly), exercise, and stress after eating (Glickman et al. 1994).

Intestinal volvulus occurs in all species but is more frequent in horses, cattle, pigs, dogs, and humans. In general, this disease is attributed to increased peristalsis, incarceration of the intestine through cracks in the mesentery or hernias, massive infections with nematodes, and intestinal obstruction by foreign bodies. None of the predisposing factors of intestinal volvulus was observed in the necropsied peccary; thus, the cause of the disease could not be established. Obstruction of the digestive tract often results in secondary bloating and endotoxemia (Zachary & McGavin 2013), prompting a series of events that culminate in circulatory disorders, various degrees of hypoxia and tissue damage, and ultimately cell death (Corrêa et al. 2006). This condition might have contributed to the fatal course of obstructive lesions in one of our peccaries.

Enteroliths are calculi in the gut that are formed by minerals, such as magnesium, ammonia, and phosphate crystals (struvite), and accumulate around objects that are accidentally ingested, such as small stones, metals, and other indigestible bodies (Philps & Fascetto 2003). Enteroliths can remain without causing any problems, but if they become larger, they can cause partial or total obstruction of the intestinal lumen (Schumacher & Mair 2002).

On necropsy, a case of pyometra was diagnosed. The animal showed no vaginal discharge and thus, classified as a closed pyometra case. Leukocytosis ($22,000 \text{ mm}^3$) with left-shift regenerative neutrophilia ($2,400 \text{ cells/mL}$) and toxic neutrophils were observed. The presence of *Escherichia coli* in intrauterine purulent exudate is consistent with the literature, which cites this bacterial as the most commonly organism isolated in animals with pyometra (Coogan et al. 2008). Intrauterine infections often result in bacteremia and endotoxemia, which lead to systemic disorders and often to the animal's death (Pretzer 2008). Therefore, when there is a case of closed pyometra, it should be considered as medical emergency that requires immediate intervention to prevent sepsis and death (Smith 2006).

There are a few reports on diseases of the genital tract in the collared peccary. Batista et al. (2007) conclude that such diseases temporarily or permanently impair fertility and, as in domestic animals, significantly impact their pro-

duction by decreasing reproductive efficiency, thus generating economic losses.

In the necropsied peccaries, the main cause of death regarding to the respiratory system was suppurative pneumonia due to *S. aureus*. The clinical and macroscopic status was similar to that reported by Ecco et al. (2009) in boars (*Sus scrofa*) that were affected by bacterial pneumonia. *S. aureus* is the predominant agent in abscesses of the lungs (Aalbaek et al. 2003). Liljegren et al. (2003) reported that these bacteria are responsible for 80% of lung abscesses in pigs.

We report the first case of polycystic kidney disease in a peccary. Renal cystic disease is common in cats, dogs and humans (Beck & Lavelle 2001, Feliciano et al. 2008) and has a congenital, hereditary or acquired origin, might cause chronic kidney disease due to compression and intratubular obstruction caused by inflammation and interstitial fibrosis (Feliciano et al. 2008). We were unable to determine the cause of the polycystic kidney disease in this animal, but it is likely to have been an acquired case since the morphological characteristics of multifocal lymphoplasmacytic interstitial nephritis suggested pre-existing renal injury.

These cysts can compress the parenchyma and compromises renal function clinically manifesting as lesions of uremia (Forrester 2003), as shown in our case, which the parenchyma of the right and left kidney was replaced by multiple cystic formations, and in animals that have pathological examination results consistent with uremic syndrome, such as ulceration of the oral and gastric mucosa and pulmonary edema.

The main diseases of collared peccaries bred in captivity in the study area were related to livestock health and management factors. Furthermore, this retrospective study is regarding to epidemiological, pathological and clinical disease information about diagnosed diseases in this species bred in captivity. This study emphasizes the importance of adopting measures for disease control and improvement of the environmental aspects of captivity and especially about the nutritional aspects of these animals.

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