

Male-male aggression in free-ranging collared peccaries, *Pecari tajacu* (Artiodactyla, Tayassuidae), from Brazilian Pantanal

ÍISIS MERI MEDRI¹ AND GUILHERME MOURÃO^{2*}

We video-recorded the first aggressive interaction between two wild adult male collared peccaries (*Pecari tajacu*), resulting in the death of the defeated individual. The aggressor repeatedly bit the scrotal area and the hind leg of the attacked individual, which remained lying on the ground, vocalizing and clicking his teeth. Occasionally, the attacked individual raised his head, unsuccessfully attempting to bite the attacker to defend himself. The attacked individual died few minutes later the end of the aggression. The aggression was possibly caused by competition for female in estrus.

Keywords: Aggressive behavior; agonistic encounter; collared peccary; *Pecari tajacu*.

Agressão macho-macho em catetos de colarinho livres, *Pecari tajacu* (Artiodactyla, Tayassuidae), do Pantanal brasileiro

Registramos em vídeo o primeiro comportamento agressivo entre dois catetos (*Pecari tajacu*) machos adultos de vida livre, que resultou na morte do indivíduo derrotado. O agressor mordeu repetidamente a região escrotal e a perna traseira do indivíduo atacado, que permaneceu deitado no chão, vocalizando e estalando os dentes. Ocasionalmente, o indivíduo atacado levantou a cabeça, tentando sem sucesso morder o atacante para se defender. O indivíduo atacado morreu poucos minutos depois do final da agressão. A agressão foi possivelmente causada pela competição por fêmea no cio.

Palavras-chave: Comportamento agressivo; encontro agonístico; cateto; *Pecari tajacu*.

¹ Programa de Pós-Graduação em Ecologia, Universidade de Brasília, DF, Brasil

^{2*} Corresponding author: Laboratório de Vida Selvagem, Embrapa Pantanal, Caixa Postal 109, Corumbá, MS, Brasil, 79320-900. E-mail: guilherme.mourao@embrapa.br

The collared peccary, *Pecari tajacu* (Linnaeus, 1758) (Artiodactyla, Tayassuidae), has the widest range of all peccary species and occurs from the Southern United States of America to Northern Argentina, in a diversity of habitats ranging from deserts to rainforests. The social unit of collared peccaries is a cohesive herd that can vary from two individuals to over 50. However, most herds range from 5 to 15 individuals (Sowls, 1997) and, in the Brazilian Pantanal, the herds usually range from 5 to 10 individuals (Desbiez et al., 2009). Herds are generally composed of 1–2 adult males, 1–3 adult females, and several young of different ages (Dubost, 2001). Males and females are about the same size and possess a scent gland located on the dorsal ridge line that is rubbed against tree trunks and other objects for territorial marking. Also, scent gland is used for recognition between group members as well as coordination of herd movements (Nowak, 1991). Breeding occurs all year long (Neal, 1959) and the persistence of sexual activity throughout the year seems to favor mixed groups as the basis of the peccary social system (Dubost, 2001).

Behavioral information on social behavior of the collared peccary indicates that affiliative behaviors among group member (including play, mutual rubbing and olfactory investigations) occur more frequently than agonistic interactions (Byers & Bekoff, 1981). Furthermore, most agonistic behaviors does not involved physical contact (Byers & Bekoff, 1981), and threatening actions are far more common than the fighting actions (Schweinsburg & Sowls, 1972). However, Lochmiller and Grant (1982) recorded an agonistic encounter between captive adult male collared peccaries resulting in the death of one individual. In this case, an adult male caught from the wild was released into an outdoor enclosure containing a herd with three adult

males and nine adult females. Shortly after the newly arrived male was released into the facility, the resident males repeatedly attacked him. Bites concentrated around the scrotal area were observed in the fifth day, and the animal was found dead by severe infection in the tenth day. Schweinsburg (1971) also described an attack in the field, in which a solitary male engaged in a fight with other male and was badly cut. Once again, bites concentrated around the hind-quarters. Schweinsburg and Sowls (1972) found that the most severe injuries of the fighting collared peccaries were caused by reciprocal biting of flanks and hindquarters.

This note describes an agonistic encounter between two free-ranging wild adult collared peccary males in the central region of the Brazilian Pantanal. To our knowledge, this is the first case of male-male aggressive interaction under natural conditions that resulted in the death of the defeated individual. We recorded the sequence of aggressive behaviors on 18 August 2007 at 5:02 p.m. in the Embrapa Pantanal Nhumirim ranch (18°58'32"S; 56°38'14"W), state of Mato Grosso, Central Brazil. The study area is about 112 m above sea level and is composed of a mosaic of permanent and temporary ponds, forest patches, savanna, scrub savanna and seasonally flooded grasslands. The site was reached with an all terrain vehicle and the behavior of collared peccaries was video-recorded for a total 2 min and 9 sec with a digital photographic camera.

The agonistic encounter occurred at the edge of a temporary pond, where we observed a herd of collared peccaries. Most of the individuals from the herd ran away to the forest upon our arrival, except two adult males and an adult female that only moved away about 5 m from the place. One of the males was severely biting the other around his scrotal area and on his right hind leg (Fig. 1a). The aggressor was undistur-

bed by our presence and continued to injure the other individual, even when one of us approached within few meters of them to record the action. The injured individual remained lying on the ground, raising his head sporadically, vocalizing and clicking his teeth, unsuccessfully attempting to bite the aggressor to defend himself. We witnessed this action for approximately 70 seconds. After that, the aggressor ran off in the direction of an adult female that remai-

ned about 5 meters from the place, and then both the aggressor and female ran away to the forest (Fig. 1b).

The defeated individual stayed lying on the ground, apparently exhausted, with his head submerged in the mud, almost motionless. A few minutes later he died. In the field, we observed he presented totally erupted and well-worn third molars on both the maxilla and mandible, indicating that he was an adult (Keuroghlian & Desbiez,

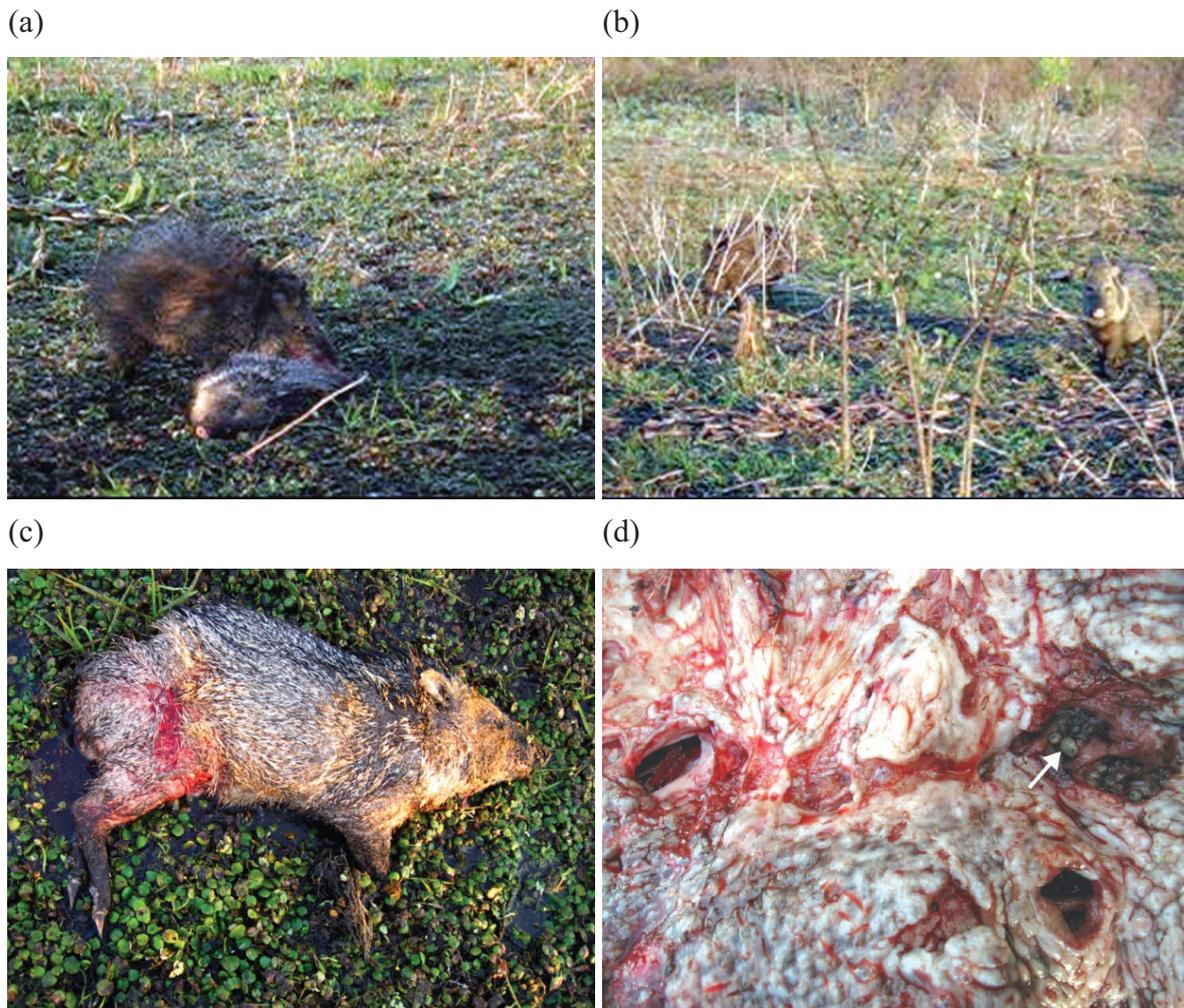


Figure 1. Aggressive behavior between two free-ranging adult collared peccary males (*Pecari tajacu*) resulting in the death of the defeated individual. (a) Adult male collared peccary biting other adult male towards scrotal area and hind leg. (b) The aggressor (left) ran in the direction of an adult female (right) that was about 5 m of the fighting place. (c) Bites in the right hind leg. (d) Bite injuries in the scrotal area, some of them presenting well-developed screwworms (arrow).

2010; Kirkpatrick & SOWLS, 1962). Upon closer inspection, we found several recent bites on the right hind leg (Fig. 1c), and recent and former bite injuries on the scrotal area. Some of the injuries presented myiasis caused by well-developed screwworms (Fig. 1d), probably of the species *Cochliomyia hominivorax* (Coquerel, 1858) (Diptera: Calliphoridae), which is found in many parts of the Brazil and is the fly that most frequently causes myiasis in live tissues of mammals in the tropical America (Guimarães, Papavero & Prado, 1983). Screwworm larvae emerge from the eggs in 12 to 24 hours, and reach maturity about 5–7 days after egg hatch (OIE, 2008). The presence of well-developed screwworms suggests that the attacked individual had previous wounds, possibly caused by biting of peccaries. Untreated myiasis may cause discomfort, decreased appetite, lethargy, and individuals may die in 7 to 14 days by toxicity and/or secondary infections (CFS-PH, 2006).

There is a controversy in the literature regarding the dominance and social hierarchy among collared peccary herds, probably because no one has yet studied a sufficient number of marked animals and observed them long enough in wild herds (SOWLS, 1997). Bissonette (1982) observed wild herds and found that collared peccaries have a linear dominance hierarchy of both sexes with a dominant male in every group. Moreover, Dubost (2001) observed the behavior of semi-captive collared peccary and recorded that there are two distinct monosexual hierarchic orders, with clear dominance hierarchy within males and females inversely proportional to age, and that the dominance hierarchy was less evident in females than the males. The dominant male is the focal member of the social unit in the collared peccary, because it displays higher frequency of behaviors for the group cohesion. Subordinate males, in

turn, have a limited social role and live as satellites to the troop, whereas subordinate females are elevated to the top of the hierarchy after giving birth. Some individual males are seen living alone and are often referred to as solitary in contrast to the majority which live in herds (Neal, 1959). Females can also be found living solitary (Oldenburg et al., 1985; Schweinsburg, 1971), as well as both young and old collared peccaries (Oldenburg et al., 1985).

As reported by Schweinsburg (1971), herd numbers fluctuate when members separate from the group. This fission may occur when (i) individual peccaries wander away from the main herd, (ii) there is aggression among herd members, driving an individual out, or (iii) the herd is scattered during an alarm. Separated individuals remain within the herd's home range and usually rejoin the herd in a few hours or days (Oldenburg et al., 1985; Schweinsburg, 1971). There are cases in which individuals leave the herd and home range and stay within the home range of an adopted herd, but these permanent alterations do not occur as frequently as fluctuations in herd size (Schweinsburg, 1971). Individuals that attempt to join a herd usually encounter strong hostility by members of the group, even those which were temporarily separated and returned to the original herd (Byers & Bekoff, 1981). This exclusion is more intense between individuals of the same sex (Lochmiller & Grant, 1982) than different sexes (Dubost, 2001).

Since permanent exchange of individuals between herds does not occur as frequently as fluctuations in the herd size (Schweinsburg, 1971), it is thought that the attack observed here in wild collared peccaries may have occurred between a solitary male trying to join a herd, but being repulsed by a resident male. In addition, it is likely that the aggressive behavior between collared peccaries described here was not a

casual attack, but occurred more than once in the last two weeks prior to the death of the defeated animal, due to the presence of well-developed screwworms in his wounds. In a previous study of social behavior of free-ranging collared peccaries, 4.8% of total behavior was agonistic and only 13.7% of this involved physical contact, but wounds or bleeding were not observed (Byers & Bekoff, 1981). Overall, serious fighting resulting in death is thought to be rare within wild herds, and although Lochmiller and Grant (1982) reported an agonistic encounter in captivity resulting in death, it has never been reported in field studies elsewhere.

Finally, we suggest that the aggression between these two males free-living collared peccaries may have been caused by competition for estrous female, because the dominant male does virtually all the breeding and subordinate males are not allowed to approach females in estrus (Ingmarsson, 1999). Dominant males of captive herd are large in body weight, have higher concentration of testosterone than subordinates, and are the most successful breeders (Hellgren et al., 1989). Only one male marks the territory with his dorsal gland and has conflict with others herd members, principally when a female is among the males (Nogueira-Filho, Nogueira & Sato, 1999). Furthermore, fights with physical injury between collared peccary males are observed only when a female is in estrous and usually occur when two peccaries are matched closely in size (Bissonette, 1982). Thus, we advocate the dispute for females as the more plausible cause of the agonistic encounter between these free-ranging adult males that resulted in the death of the defeated animal.

ACKNOWLEDGEMENTS

We are grateful to Embrapa Pantanal for logistic support, Conselho Nacional de

Desenvolvimento Científico e Tecnológico for the scholarship provided to the first author, and research grant for the second author as well as financial support (Process PELD/CNPq 520056/98-1), and Idea Wild for the donation of the digital photographic camera and laptop to the first author. We also thank Arnaud Léonard Jean Desbiez and Antonio Thadeu Medeiros de Barros for their useful comments and review of the manuscript, José Lopes and Waldno da Silva Aquino for explanations about fly larvae found in the wounds, and Carlos Rodrigo Lehn for the loan of bibliographical reference.

REFERENCES

- Bissonette, J. A. (1982). Ecology and Social Behavior of the Collared Peccary in Big Bend National Park. *National Park Service Scientific Monograph Series*, 16, 1-85.
- Byers, J. A., & Bekoff, M. (1981). Social, Spacing, and Cooperative Behavior of the Collared Peccary, *Tayassu tajacu*. *Journal of Mammalogy*, 62 (4), 767-785.
- CFSPH. (2006). Center for Food Security & Public Health. Screwworm Myiasis. Retrieved on 15 November 2016 of the CFSPH Technical Fact Sheets: http://www.cfsph.iastate.edu/Factsheets/pdfs/screwworm_myiasis.pdf
- Desbiez, A. L. J, Santos, S. A., Keuroghlian, A., & Bodmer, R. E. (2009). Niche partitioning among white-lipped peccaries (*Tayassu pecari*), collared peccaries (*Pecari tajacu*), and feral pigs (*Sus scrofa*). *Journal of Mammalogy*, 90 (1), 119-128.
- Dubost, G. (2001). Comparison of the social behaviour of captive sympatric peccary species (genus *Tayassu*); correlations with their ecological characteristics. *Mammalian Biology*, 66, 65-83.

- Guimarães, J. H., Papavero, N. & Prado, A. P. (1983). As miíases na região neotropical (identificação, biologia, bibliografia). *Revista Brasileira de Zoologia*, 1 (4), 239-416.
- Hellgren, E. C, Lochmiller, R. L., Amoss, Jr. M. S., Seager, S. W. J., Magyar, S. J., Coscarelli, K. P., & Grant, W. E. (1989). Seasonal variation in serum testosterone, testicular measurements and semen characteristics in the collared peccary (*Tayassu tajacu*). *Journals of Reproduction & Fertility*, 85, 677-686.
- Ingmarsson, L. (1999). "Pecari tajacu". Retrieved on 15 November 2016 of the Animal Diversity Web: http://animaldiversity.org/accounts/Pecari_tajacu/
- Keuroghlian, A., & Desbiez, A. L. J. (2010). Biometric and age estimation of live peccaries in the Southern Pantanal, Brazil. *Asian Wild Pig News*, 9, 24-35.
- Kirkpatrick, R. D., & Sowls, L. K. (1962). Age Determination of the Collared Peccary by the Tooth-Replacement Pattern. *The Journal of Wildlife Management*, 26 (2), 214-217.
- Lochmiller, R. L., & Grant, W. E. (1982). Intraspecific Aggression Results in Death of a Collared Peccary. *Zoo Biology*, 1, 161-162.
- Neal, B. J. (1959). A Contribution of the Life History of the Collared Peccary in Arizona. *American Midland Naturalist*, 61 (1), 177-190.
- Nogueira-Filho, S. L., Nogueira, S. S. C., & Sato, T. (1999). A Estrutura Social de Pecaris (Mammalia, Tayassuidae) em Cativoiro. *Revista de Etologia*, 1 (2), 89-98.
- Nowak, R. M. (1991). *Walker's Mammals of the World*. Baltimore: The John Hopkins University Press.
- OIE. (2008). World Organisation for Animal Health. New World Screwworm (*Cochliomyia hominivorax*) and Old World Screwworm (*Chrysomya bezziana*). In *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals (mammals, birds and bees)* (pp. 265-275). Paris, France: Office International des Epizooties.
- Oldenburg, P. W, Etestad, P. J., Grant, W. E., & Davis, E. (1985). Structure of collared peccary herds in South Texas: spatial and temporal dispersion of herd members. *Journal of Mammalogy*, 66 (4), 764-770.
- Schweinsburg, R. E. (1971). Home Range, Movements, and Herd Integrity of the Collared Peccary. *The Journal of Wildlife Management*, 35 (3), 455-460.
- Schweinsburg, R. E., & Sowls, L. K. (1972). Aggressive behavior and related phenomena in the collared peccary. *Zeitschrift für Tierpsychologie*, 30, 132-145.
- Sowls, L. K. (1997). *Javelinas and Other Peccaries: Their Biology, Management, and Use*. Texas: Texas A&M University Press.