



## Anti-influenza A virus antibodies in *Tayassuidae* from commercial rearing farms in Brazil

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**ABSTRACT:** Family *Tayassuidae* in the suborder *Suina* include two species of peccaries in Brazil: the white-lipped peccary (*Tayassu pecari*) and the collared peccary (*Pecari tajacu*). These animals share common pathogens with domestic swine (*Sus scrofa*); however, their role as potential carrier remains unclear. This study focused on detecting the prevalence of influenza A antibodies in *Tayassu pecari* and *Pecari tajacu* from commercial rearing farms from two states in Brazil. A set of 50 blood samples from *Pecari tajacu* and 55 from *Tayassu pecari* were analyzed using a commercial indirect ELISA in order to investigate anti influenza A antibodies. *Pecari tajacu* samples presented 22% (11/50) of seropositivity for the virus. Serological surveillance is an important tool to identify the presence and the spread of the influenza virus in feral pigs.

**Key words:** influenza, antibodies, peccaries.

## Detecção de anticorpos contra vírus influenza A em *Tayassuidae* de criações comerciais no Brasil

**RESUMO:** A família *Tayassuidae* pertencente a subordem *Suina* e compreende duas espécies presentes no Brasil: Queixada (*Tayassu pecari*) e o Caititu (*Pecari tajacu*). Ambas as espécies compartilham patógenos com o suíno doméstico (*Sus scrofa*), entretanto o papel destes animais como carreadores destas infecções permanece indefinido. O presente estudo teve como objetivo detectar a ocorrência de anticorpos contra vírus influenza A em amostras de soro de rebanhos comerciais de queixada e caititu, provenientes de dois estados do Brasil. Um total de 50 amostras de soro de *Pecari tajacu* e 55 amostras de *Tayassu pecari* foram testadas por meio de ELISA, sendo que 22% (11/50) das amostras de *Pecari tajacu* foram soropositivas para o agente. Estudos de vigilância sorológica são importantes para identificar a presença e a disseminação do vírus influenza em suínos selvagens.

**Palavras-chave:** influenza, anticorpos, peccaries.

White-lipped peccary and collared peccary are species of feral pigs found in ecosystems from southern North America throughout South America (SICURO & OLIVEIRA 2002). Peccaries and pigs are able to be infected by several common pathogens, once they diverged one million years ago from a common ancestor (COUTINHO et al., 2012) and previous studies detected peccaries as potential reservoirs of infectious diseases for domestic pigs and wild swine (*Sus scrofa*) (HERRERA et al. 2008; COUTINHO et al. 2012).

Previous studies reported the presence of Porcine Circovirus, Herpesvirus, *Mycoplasma hyopneumoniae* and *Pasteurella multocida* in *Pecari tajacu* and *Tayassu pecari* populations (CASTRO et al., 2014).

Influenza is a major cause of acute respiratory disease outbreaks in domestic pigs, highly contagious, affecting pigs and other species, including humans. When first introduced in the farm, the disease was described as a sudden onset, involving a large number of pigs (up to 100%) of various age groups (VANALSTINE, 2012). Once established in the farm (endemic form), the disease usually appears in the nursery phase in unvaccinated herds, because maternal antibodies persist until the sixth week of life (JANKE, 2000).

The enzootic circulation of virus lineages of H1N1, H1N2, and H3N2 subtypes in swine varies by continent and since 2009, includes reassortments with the pandemic H1N1 (H1N1pdm09) (VINCENT et al., 2014). Besides, recently influenza virus

surveillance in pigs has revealed that influenza virus transmission from humans to swine is far more frequent than swine-to-human zoonosis, and these events are the main source of new viral diversity (NELSON & VINCENT, 2015).

Serological data from other countries in wild boars (*Sus scrofa*) and feral pigs identified antibodies to H3N2 and H1N1 (VICENTE et al., 2002). In Brazil, wild boars samples revealed a human-like H1N2 influenza virus, with genes derived from the H1N1 pdm09 (BIONDO et al., 2014).

The commercial swine herds are constantly investigated for influenza virus infection through passive monitoring, the same does not occur in wild boars and peccaries herds. In this scenario, the present study investigated evidence of antibodies against this virus in peccaries from commercial farms in Brazil.

In the present study blood samples were collected from adult slaughtered peccaries of semi-intensive system farms from two Brazilian States, which produced only one of studied species; i.e., there was no farm with extensive mixing between the two species. A total of 105 animals were sampled, 55 samples of *Tayassu pecari* were obtained on the same day on November of 2014 and 50 samples of *Pecari tajacu* on the same day on February of 2015. Further information about the specific locations of the herds, number of herds, ages and weight of slaughtered peccaries and herd management were not provided by the farmers.

The presence of antibodies against SIV was tested using CIVTEST SUIS INFLUENZA®, Hipra (Amer - Girona, Spain) subtype H1N1, and cross-reaction to H1N2 and H3N2 (100 % specificity, H1N1: 100%, H3N2: 87%, H1N2: 73% sensitivity).

The herd seroprevalence of influenza A virus was 10.47% (CI; 95%; 4.61-16.36). The seroprevalence regarding to the studied species, *Pecari tajacu* samples presented 22% (11/50) of seropositivity (CI: 95%; 10.5-33.48), while *Tayassu pecari* herd did not presented antibodies.

The epidemiology of influenza in pigs is a complex relationship between human, avian and swine viruses with putative genetic viral reassortments, which can create novel subtypes with pandemic potential for people and swine (VANALSTINE, 2012).

In Brazil, influenza virus infection of pigs has been suspected since the late 1930s, but the first isolation from pigs occurred in 1974 (CUNHA et al., 1978). The situation changed quickly after the emergence of H1N1 pdm09 in pigs in 2009 (SCHAEFER et al., 2011).

Since then, serological surveillance in commercial pigs became routine and Brazilian commercial herds have shown the wide circulation of

this agent, presenting more than 70% of seroprevalence in almost 65% of tested herds (CIACCI-ZANELLA et al., 2015) and more than 40% of seropositive sows (RAJAO et al., 2013).

Brazilian studies detected the presence of H1N1, H3N2 (BRENTANO et al., 2002; RAJAO et al., 2013), H1N1 pdm09 in commercial swine herds (SCHAEFER et al., 2011) and recently, H1N2 in commercial herds (SCHAEFER et al., 2015). In U.S., H1N1 and H1N2 viruses in swine herds, derived from human seasonal influenza A viruses and have emerged and spread across pig herds since 2005 (VINCENT et al., 2009).

Regarding to peccaries surveillances, serological results revealed a naïve population before the introduction of H1N1 pdm09 (ALBUQUERQUE et al., 2010; MAYOR et al., 2006), while wild boars and feral pigs were confirmed susceptible (ROIC et al., 2012).

The semi-intensive system allows the circulation of peccaries to an open area, favoring the contact between wild boars and other animal species as avian and feral pigs beside the contact with humans, this situation brings a concern regarding the favorable conditions for virus infection or spreading and possibly an interspecies transmission as observed in previous studies between humans-wild boars (BIONDO et al., 2014) and humans-pigs (FORGIE et al., 2011).

In conclusion, the first detection of influenza antibodies in *Pecari tajacu* confirmed the virus circulation in this population, thus, from now on, the serological surveillance is required to monitor the circulation and further studies are required to understand the role of peccaries on the pathogen dissemination and on risks of reassortment events with pigs.

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## BIOETHICS AND BIOSSECURITY COMMITTEE APPROVAL

The institution's ethics committee approved this research and the certificate registered under the protocol nº 101/2015 on 4<sup>th</sup> of September of 2015.

## DECLARATION OF CONFLICT OF INTERESTS

The authors declare no conflict of interest. The founding sponsors had no role in the design of the study; in the

collection, analyses, or interpretation of data; in the writing of the manuscript, and in the decision to publish the results.

## AUTHORS' CONTRIBUTIONS

TGB, HMSA, LGO, MGR, ABCM and HJM conceived and designed experiments. ABCM, RGM performed the experiments, HMSA and GYS carried out the lab analyses. HMSA performed statistical analyses of experimental data. TGB, HMSA and LGO prepared the draft of the manuscript. All authors critically revised the manuscript and approved of the final version.

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