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Producing farms of beef and dairy cattle in northern and northwestern of Rio de Janeiro State, Brazil: analyses of vampire bat-transmitted cattle rabies and profile economic-sanitary*

Fazendas produtoras de bovino de corte e leite no norte e nordeste do Estado do Rio de Janeiro: análises da raiva transmitida aos bovinos por morcegos hematófagos e perfil econômico-sanitário

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Rabies is an infectious disease of viral origin and lethal course that affects domestic animals of economic interest (domestic herbivores). The main transmitter for domestic herbivores is the common vampire bat *Desmodus rotundus*. The objective of this work is to trace the profile economic-sanitary of the producing farms of beef and dairy cattle with rabies transmitted by *D. rotundus*. Survey of farms with rabies cases in Northern and Northwestern of Rio de Janeiro State was made from the data of the Centers for Agricultural Defense (NDA) in the study area, and questionnaires were delivered to farmers. Data were analyzed by drawing a profile of these farms according to their production type, size and breeding system, identifying the occurrence of rabies and the degree of knowledge of the farmers about the virosis at the following locations: Batatal, Boa Vista, Cardoso Moreira, Caxeta, Dores de Macabu, Espírito Santinho, Hatobá, Italiana, Itálva, Pedra Santa, Santa Maria, São Francisco de Itabapoana e Vila Nova. Mixed farming (37%), dairy farms (36%) and beef producing (27%) were typed. For size, 47% were small-scale farming (up to 100 animals), 18% of medium farms (100 to 300 animals) and 35% of large (over 300 animals). The farms had an extensive creation system, even with pasture rotational; 55% of extensive system, 27% of extensive system with pasture rotational, and 18% of pasture rotational. The presence of the vampire bat bite was reported in animals (75%); most farmers showed that knowing the dangers that the vampire bat-transmitted cattle rabies can bring, but often there was negligence on their farms. The "vampiricid topic" and the contact with NDA were the main control measures; 20% of the farmers were applying the "vampiricid topic" on animals attacked, 30% applying the "vampiricid topic" and sought NDA, and 50% sought NDA. All farms had more suspected cases of cattle rabies than confirmed laboratory; 20% of the farmers reported suspected cases in their properties and of these, 50% did not have sent samples for laboratory examination. Regarding the rabies vaccination, most farmers vaccinate their cattle (80%), however in a mistaken way; 75% made in the wrong period, 80% made not strengthening the first dose, and 20% have never used rabies vaccine. The results show that, as in most of Brazil, in Northern and Northwestern of Rio de Janeiro there are underreported cattle rabies cases. Through a greater number of data and a focused effort to cattle farmers, more information on prevention and control of rabies can be transmitted.

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Phylogeographic analysis of rabies virus from domestic herbivores and vampire bats in the Rio de Janeiro State, Brazil, between the years 2001 and 2006*

Análise filogeográfica de vírus rábico isolado de herbívoros domésticos e de morcegos hematófagos no Estado do Rio de Janeiro, Brasil, entre os anos de 2001 e 2006

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Rabies is an enzootic disease in Brazil, including Rio de Janeiro state, especially rabies transmitted by vampire bats. All years are accounted large losses of livestock due to this disease in the State. The aim of this study was perform a phylogeographic analysis of rabies virus in the Rio de Janeiro state. It was analyzed a dataset of 58 genetic sequences from the coding region of the N gene. We isolated 35 samples in the Rio de Janeiro between 2001 and 2006 from vampire bats and domestic herbivores in 18 cities of the State. It was retrieved from GenBank 15 and 8 sequences from São Paulo and Minas Gerais states, respectively. With the Beast v1.6 software package, the group of sequences was analyzed by Bayesian Markov chain Monte Carlo method with the nucleotide substitution model K3Puf + G, strict molecular clock and an exponential growth tree prior. The reconstruction of the spatial-temporal dispersion of the samples, with viewing on Google Earth software, was performed by continuous phylogeographic analysis using relaxed random walks (RRW). The tree topology showed at least four main clusters of rabies virus in the Rio de Janeiro state. In a region of the state can exist, concomitantly, more than one virus lineage. In the South region circulate two lineages, three in the Centre, two in the Metropolitan and only one in the Northern region of the Rio de Janeiro state. It can be noticed among the main clusters the formation of sub-clusters, which consist of samples of nearby cities. Only a single sample from Itaboraí (metropolitan region) is included in a cluster with samples from the south of state. The space-time analysis showed the rapid movement of this sample, leaving the South toward the metropolitan region. Probably, this bovine was transported during the incubation period of the disease. In the Rio de Janeiro city was isolated a sample that has no close relationship with any other sequence analyzed. Probably the horse also was introduced in the Rio de Janeiro state during the incubation period of the disease. The movement of the virus among the States showed a spread of the virus from the Rio de Janeiro state towards the Minas Gerais and São Paulo states. In this case, the samples were genetically closer to those of municipalities near the border between the States. The results show an intense movement of rabies across the Rio de Janeiro state. These data can assist in disease control measures in the State.

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