Qualitative risk model to estimate bovine rabies occurrence in Brazil

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Bovine rabies is still considered endemic in Brazil and despite the control efforts, the disease still spreads in an insidious way and the main vector is the vampire bat, Desmodus rotundus. This project aimed to create a predictive model to estimate the probability of bovine rabies outbreaks in each municipality of 21 out of 27 Brazilian States. The risk was estimated using concepts of receptivity and vulnerability. Questionnaires were sent to the Local Veterinary Units of each State and covered a number of questions related to the surveillance of possible risks, such as: bovine outbreaks, active roosts, bats positivity and spatial changes. The bovine density and geomorphologic features were obtained from national registries and geographic information systems. The risk results where compared with the 417 bovine outbreaks in 2010 distributed throughout the municipalities. Out of 5,016 municipalities accessed, 217 (4.3%) were rated as having a high risk for the virus spread, 1,277 (25.5%) as medium risk, 2,045 (40.8%) as low risk, and 544 (10.8%) as negligible risk. In 933 (18.6%) cases the risk was unable to be determined because the lack of information. From 417 municipalities presenting herbivores outbreaks in 2010, 183 (43.9%) were rated as high risk, 196 (47.0%) as medium, 23 (5.5%) as low and in 15 (3.6%) the risk was not determined. The results showed that places with outbreaks were skewed towards areas with higher risk for the virus spread. In the future, these models could allow the targeting of efforts, adoption of control measures directed to certain locations, optimization of the control team's transit and a better understanding of rabies spread. Additionally, efforts need to be made to stimulate the continuous surveillance of risk and reduce areas with lack of information.