

Title: Animal welfare implications resulting from movement restriction for foreign animal disease outbreak management in the pork industry - **NPB #13-153**

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Scientific Abstract: Movement restriction is considered an essential countermeasure to block disease spread during a foreign animal disease (FAD) outbreak. However, historical FAD outbreaks have shown that during outbreaks, movement restriction has great impacts on the well-being of pigs. In this study, we used classical swine fever (CSF) and the data of the swine industry in Indiana to develop different stochastic risk models to evaluate two movement-control policies—namely, complete movement restriction and controlled movement—with an emphasis on the specific adverse impacts on the well-being of pigs. We developed the first model to estimate the amount of time that elapsed before overcrowding or feed interruption emerged on swine premises under movement restriction during a CSF outbreak in Indiana. We developed the second model to assess the risk of secondary outbreaks that could occur due to the controlled movements of pigs from movement restriction zones to slaughter plants. We modeled nursery (19 to 65 days of age) and finisher (40 to 165 days of age) pork-production operations separately. We defined overcrowding as a condition in which the total weight of pigs on premises exceeds 100–115% of the maximum capacity of that premises, which was determined by computing the total weight of all of the pigs at the harvest/transition age. We developed model algorithms to estimate the age-specific weights of the pigs on premises and to compare the daily total weights of the pigs with the threshold weight that defined overcrowding. We implemented this procedure in order to flag the time at which the total weight exceeded the threshold (i.e., when overcrowding occurred). We developed another set of algorithms to model a swine producer’s decision to discontinue feed supply. We incorporated the assumptions that (a) a longer estimated epidemic duration, (b) a longer time interval between the age of pigs at the onset of the outbreak and the harvest/transition age, or (c) a longer progression of an on-going outbreak would increase the probability of a producer discontinuing the feed supply. We assumed that adverse animal-welfare conditions would emerge shortly after an interruption of feed supply. Simulations were run with 100,000 iterations each for a 365-day period. The median (5th and 95th percentiles) time at which either overcrowding or feed interruption emerged was 18 days (4, 40) in nursery operations and 57 days (4, 130) in finisher operations. These estimates may help decision makers plan for effective management of a CSF outbreak and swine producers to minimize economic losses and make informed decisions on the continuity of their businesses.

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Using the swine premises statistics in Indiana, our risk assessment model estimated that approximately 9% to 23% of the swine premises in Indiana would encounter adverse animal-welfare conditions due to movement restrictions. Under complete movement restriction, all pigs on premises that encountered adverse animal-welfare conditions would be euthanized on farm to alleviate the conditions. Under controlled movement, the model estimated that on-farm euthanasia needed to be performed on only approximately 33% of the swine premises that encountered overcrowding or feed interruption. We estimated that movement of pigs to slaughter plants could be initiated to alleviate the adverse animal-welfare conditions on approximately 67% of premises. The risk of secondary outbreaks due to movement of pigs from movement restriction zones to slaughter plants was low, and we determined that testing a sample of seven pigs for CSF from each shipment would be sufficient to detect infection in the shipment.

In summary, our study's risk assessment models determined the early onset of adverse animal-welfare conditions within swine premises that were under movement restriction. Our models supported the controlled movement of market-age pigs to slaughter plants as a low-risk alternative to complete movement restriction wherein on-farm euthanasia is the only mitigation strategy for alleviating adverse animal-welfare conditions. Movement of pigs to slaughter plants could be used to mitigate approximately 67% of the adverse animal-welfare conditions due to movement restrictions.