The nesting site of social insect colonies determines local resource availability as well as exposure to competitors, predators, and pathogens. During colony relocation, nest site selection involves exploration and assessment of potential sites followed by colony movement on the basis of a collective decision making process. Nest hygiene and pathogen load are predicted to be factors ants evaluate, given the high risk of epidemics in group-living animals. Some invasive ant species may experience particularly high selection pressure posed by pathogens due to the limited genetic variation and unicolonial social system characterizing their introduced populations. The well-known Pharaoh’s ant (Monomorium pharaonis) is a tramp species that shows life-history traits and population structure that makes it a good candidate to test the ability of invasive ants to detect and avoid infected nests during colony emigration. Surprisingly, when presented with the choice of a nest containing nestmates overgrown with sporulating mycelium of the entomopathogenic fungus Metarhizium brunneum (infected nest) and a nest containing nestmates killed by freezing (uninfected nest), experimental colonies preferentially moved into the infected nest (84%, P < 0.001). Colonies did not show a significant preference when presented with the choice of an empty nest with no corpses and an infected nest (38%, P = 0.229), neither between an empty and an uninfected nest (63%, P = 0.143). While we cannot rule out the possibility that this is a case of pathogen manipulation, we propose that the overall preference for infected nests we observed is an adaptive strategy operated by the host to ‘immunize’ the colony against future exposure to the same pathogen.