A prevailing and hotly debated uncertainty in immunology is whether invertebrates, including arthropods such as ticks, possess an immune system with adaptive abilities or if, as it has long been assumed, they are merely capable of generating an innate immune response. Innate immunity is characterized by a lack of memory of prior infections, no specificity in response to a particular pathogen, and no change in intensity of response between first and subsequent infections with the same pathogen. Adaptive immunity, however, is oppositely characterized and a growing list of studies have contributed evidence to suggest that invertebrate immune adaptability does indeed exist. To date, zero studies have been published investigating the possibility of any aspect of adaptive immune potential in ticks. In this study, we investigated whether the lone star tick (Amblyomma americanum) immune response can increase in intensity or decrease the time taken to respond to repeated infection with the same bacterial species. Ticks were initially infected followed by a reinfection after six weeks. Their hemolymph was subsequently extracted, smeared on microscope slides, and Gram-stained to view both hemocytes and bacterial cells. Additionally, bacterial load persistence was assessed by smearing hemolymph from gram-negative bacteria-infected ticks onto agar plates. We found that repeated gram-negative infections induced a faster hemocyte response peak that was not seen in gram-positive infection but not for gram-positive infections. We also found that the differences in bacterial colony counts between initial and repeated tick infection, while not supported statistically, did trend towards significance, however the results were opposite of our hypothesis. Our results may indicate the potential for an adaptive capacity of tick hemocytes in repeated infections, however they may also indicate that overall, gram-negative bacteria subvert either the initial or the enhanced hemocyte response and therefore persist in ticks. If confirmed, this finding would help explain why these ticks are such effective vectors of gram-negative but not gram-positive human pathogenic bacteria.