Title

Genetic Breed Association And Contraceptive Response GWAS Of The Feral Horses (Equus Caballus) Of Theodore Roosevelt National Park (https://commons.und.edu/cgi/viewcontent.cgi?article=5298&context=theses)

Author

Melissa Amy Thompson (https://commons.und.edu/do/search/?q=author%3A%22Melissa%20Amy%20Thompson%22&start=0&context=10651111)

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Turk Rhen

Second Advisor

Rebecca Simmons

Abstract

Theodore Roosevelt National Park (TRNP) is home to a herd of feral horses (Equus caballus) which were present on the landscape prior to the establishment of the park and are now maintained as a living history demonstration herd. I used genomic analyses to investigate the TRNP horses' relatedness to other breeds and the genetic basis for variation in response to a contraceptive vaccine. DNA from 118 horses was genotyped for 70k SNPs spread evenly across the genome. To clarify the relationship of this herd with other horses, I used population genomic analyses to compare the TRNP genotypes to a dataset of horses from 35 established breeds. These analyses indicate that the TRNP herd has experienced inbreeding and differentiation from other breeds, likely due to bottleneck events and isolation. The TRNP herd is an admixed population with no clear ancestral relationship to any one breed, but with greatest influence from draft breeds such as the Shire or Percheron. The genetic data do not support the oral history of Spanish origin. To identify genetic factors that influence the effectiveness of GonaCon contraception I conducted a genome-wide association study. While GonaCon-Equine has proven effective in reducing fertility among TRNP mares, there is individual variation in the duration of infertility. I found an association with SNPs on ECA18 for which the most likely candidate genes are STAT1 and STAT4, both involved in immune system function. Variation in STAT function could affect the immune response to the vaccine, leading to the variation observed in contraceptive efficacy. These findings will aid the TRNP management team in making informed decisions to improve management practices for the herd.

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