02172-MOU: Hereditary Deafness in Dogs – Genomic Studies in Australian Cattle Dogs and Dalmatians Using Full Sibling Pairs

Dr. George M. Strain, MS, PhD; Louisiana State University
Program Area: Neurology
Project Dates: 11/1/2015 to 10/31/2018
Grant Amount: $105,091.05 **DCAF Grants $90,567.50** 10/2015-12/2016

ABSTRACT: Hereditary deafness associated with white pigmentation occurs in numerous dog breeds. The breeds most affected are the Dalmatian (Dal, 22% unilaterally deaf, 8% bilaterally deaf) and the Australian cattle dog (ACD, 11.4% and 3%). The mechanism of inheritance is unknown, and previous studies to determine the mode of inheritance and locate the causative gene(s) have thus far been unsuccessful. Using a modified twin study approach, full-sibling littermates will be clinically and genetically evaluated. Like human twins, full siblings should have very similar DNA, which will reduce the variability of their DNA when compared to studies of unrelated dogs. Using the Illumina CanineHD Beadchip, which contains 172,115 DNA markers (SNPs) spread uniformly across the canine chromosomes, markers will be compared between the sibling pairs, and differences between siblings at individual markers will thus be identified. Using this approach candidate deafness genes can be identified and will advance the current understanding of this heritable disorder.

PUBLICATION(S)

Seddon, J. M., Fortes, M., Kelly-Smith, M., Sommerlad, S. F., Hayward, J. J., Burmeister, L., Risio, L. D., Mellersh, C., Freeman, J., & Strain, G. M. (2021). Deafness in Australian Cattle Dogs associated to QTL on chromosome 20 in genome-wide association study analyses. *Animal Genetics.* https://doi.org/10.1111/age.13115

Kelly-Smith, M., & Strain, G. M. (2020). STRING Data Mining of GWAS Data in Canine Hereditary Pigment-Associated Deafness. *Veterinary and Animal Science*, 100118. https://doi.org/10.1016/j.vas.2020.100118

Hayward, J. J., Kelly-Smith, M., Boyko, A. R., Burmeister, L., De Risio, L., Mellersh, C., Freeman, J., & Strain, G. M. (2020). A genome-wide association study of deafness in three canine breeds. *PLOS ONE*, 15(5), e0232900. https://doi.org/10.1371/journal.pone.0232900