



RESEARCH PROGRESS REPORT SUMMARY

Grant 03045-A: Artificial Intelligence and Machine Learning for Diagnosis of Dog Sperm Morphology

Principal Investigator: Leonardo Brito, DVM, PhD
Research Institution: University of Pennsylvania
Grant Amount: \$12,422.16
Start Date: 7/1/2022 **End Date:** 12/31/2023
Progress Report: Mid-Year 1
Report Due: 12/31/2022 **Report Received:** 1/25/2023

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Original Project Description:

Sperm morphology evaluation is an important component of dog fertility analysis. However, visual evaluation of sperm morphology is difficult to teach, and results are largely dependent on the proficiency and experience of the evaluator, leading to large variability in results within and across evaluators. The objective of this pilot study is to explore recent advances in artificial intelligence for image pattern recognition, similar to that used by the likes of Google and Facebook, to create an automated method for sperm morphology evaluation. A large database with 10,000 dog sperm images will be created. The images will be evaluated by expert veterinarians, then used to train a Convolutional Neural Network (CNN) using deep learning methods. Investigators expect to generate an algorithm capable of classifying sperm morphology with greater than 90% accuracy and precision. Employing such an algorithm could allow veterinarians to establish more reliable reference values and guidelines for prospective stud dogs and for semen to be used for artificial insemination, improve veterinarian's abilities to formulate diagnoses and prognoses for infertility problems related to specific sperm defects, and to establish the reproductive safety of drugs and compounds.

Publications:

None at this time.

Presentations:

None at this time.



Report to Grant Sponsor from Investigator:

Collection of all semen samples required for the study has been completed. Samples from 62 dogs presented to the veterinary hospital at The Ohio State University have been preserved in formalin and shipped to the University of Pennsylvania. Acquisition of dog sperm images has started. In addition, we have started the work with our collaborators at the University of Wisconsin-Madison to develop an algorithm to automatically identify and crop sperm using a bank of bovine sperm images. The expectation is that the trained algorithm will be able to identify dog sperm with similar accuracy.