RESEARCH PROGRESS REPORT SUMMARY

Grant 02723: Scientific and Clinical Assessment of Fecal Microbiota Transplant in Obese Dogs: SLIM Study

Principal Investigator: Jenessa Winston, DVM, PhD

Research Institution: The Ohio State University

Grant Amount: $113,129.00

Start Date: 6/1/2020 **End Date:** 12/31/2023

Progress Report: End-Year 3

Report Due: 6/30/2023 **Report Received:** 6/30/2023

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Original Project Description:

Obesity is a growing epidemic in companion animals. Obesity results from a prolonged positive energy balance leading to excessive fat accumulation, which promotes dysregulation of metabolic, hormonal, and inflammatory responses. Ultimately these changes lead to physical impairment, comorbidities, and reduced quality of life. Evidence is mounting that the intestinal microbiota (collection of microorganisms that live in the intestines) contributes to obesity, and rational manipulation of this ecosystem may confer a health benefit. This study will provide a comprehensive scientific and clinical assessment of the efficacy of fecal microbiota transplantation (FMT) as an adjunctive therapy for canine obesity management. The investigators hypothesize that FMT (the transfer of feces from a healthy, lean donor dog into an obese dog) will amplify weight loss in obese dogs compared to the use of standard dietary obesity management. A randomized, placebo controlled clinical trial in client-owned obese dogs consisting of three groups: diet alone, diet + FMT, diet + placebo will provide data on weight loss and characterize the intestinal microbiota and metabolic function. Success of this study will benefit obese dogs by providing a microbial intervention to augment current strategies for canine obesity management aimed at promoting weight loss, normalizing metabolic status, and improving quality of life.

Publications:

Moore, Rustin M., Vanessa Hale, Jenessa Winston, and Toni Hare. “Harnessing the Microbiome to Improve the Health and Well-Being of Animals and People.” American Journal of Veterinary Research 1, no. aop (August 5, 2023): 1–1. https://doi.org/10.2460/ajvr.23.07.0156.

Preparation of Fecal Microbiota Transplant Capsules for Companion Animals. Randolph, N., Klein, H., Salerno, M., Horne, R., and J. Winston. Target Journal: PloS One Protocols. We have added in 16S amplicon microbiome analysis to this manuscript to ensure that fecal processing is not significantly impacting the microbiome. The manuscript is currently in preparation with anticipated submission in Fall 2023.

• Based on the complexity of the SLIM study we are anticipating multiple publications from this clinical trial, including but not limited to the following:
o A clinical paper describing the clinical efficacy of FMT as an adjunctive therapy to enhance standard canine obesity management
    ▪ Current Status: Manuscript in preparation
o A microbiome paper of the integrated gut metagenomics and metabolomics data describing the longitudinal alterations within the canine "obesogenic" intestinal ecosystem throughout a structured obesity management program with FMT compared to standard dietary management alone or with placebo
    ▪ Current Status: Awaiting data multi-omics data analysis
o A clinical paper describing the use of FitBark monitors during a structured obesity management program
    ▪ Current Status: Data analysis underway

Presentations:

Hailey Lenis (3rd year veterinary student) is completing this project as part of the OSU Veterinary Student Summer Scholars Program and will be presenting a project abstract at the National Veterinary Scholars Symposium in August 2023.

The PI (Dr. Winston) was invited to give several veterinary podcasts, related to fecal microbiota transplantation and during these the SLIM study was discussed.
- Morris Animal Foundation's Fresh Scoop podcast show titled "The Amazing Science of Fecal Microbiota Transplantation". Aired on January 13, 2022.
- Fully Vetted podcast show titled "The Power of Poop: Fecal Transplants for Treating Disease". Aired on January 3, 2022.

ACVIM Forum 2022 invited oral research abstract presentation titled: "Standardized preparation of canine fecal transplant material does not alter microbial community structure". Randolph, N., Klein, H., Salerno, M., and J. Winston.
- This oral presentation provides evidence that our standardized preparation of canine FMT capsules utilized in the SLIM study did not significantly alter the microbial community structure. This data will be presented by a fourth-year veterinary student that assisted with this project (M. Salerno). Due to the ACVIM Forum requirements, we held on submitting this data for publication until after the presentation (see above publication section).

The PI (J. Winston) was invited to give an oral presentation titled “Harnessing the Power of Microbes to Fight Obesity” for the Comparative Medicine Program at the University of Mizzou in November 2022.

Report to Grant Sponsor from Investigator:
We screened (comprehensive physical examinations, bloodwork, and fecal analysis) 51 dogs for the SLIM study. Of these, 31 met the inclusion criteria and were enrolled. Of these enrolled dogs, 25 dogs completed the 24-week clinical trial. Unfortunately, 6 dogs were removed from the study early with the most common reason related to administration of antimicrobials needed for underlying health conditions including dog bite wounds, urinary tract infections, and surgical procedures. Based on recalculating our power analysis for sample size estimation, out current samples size (n=25) is sufficient to find a significant difference in weight loss between the treatment groups. Our last SLIM patient finished the clinical trial at the end of October 2022. Since this time, we have entered the analysis phase and sample processing for microbiome sequencing and metabolomics.

The most rewarding part of this clinical trial was that all dogs achieved their weight loss goals, despite their treatment group (see Figure 2). Our patients’ owners were thrilled with how their pets progressed in their weight loss goals and were greatly appreciative for the improvement in their pets’ quality of life since completing the SLIM study. For example, over the 24-week SLIM study, Pax’s achieved a total weight loss of 23% of his body weight. His body condition score (BCS) improved from 8/9 to 5/9 during the SLIM study. His owners’ report a marked improvement in his energy and actively levels since completing the SLIM study.