

## **Bugs, Bones and Vitamin D - A pilot study: Developing novel tools to assess bone health and reduce the risk of bone fractures**

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There is a growing body of evidence supporting the role of calcium, vitamin D and gut bacterial communities in the development and maintenance of healthy bones in mammals. This application is for a pilot project to test the feasibility of some of the research tools required for a large, longitudinal study designed to explore the relationship between gut bacteria, vitamin D status, blood calcium and bone strength. The applicants have an established track record of measuring gut bacterial communities in horses and vitamin D in humans; this application focusses on measurement of vitamin D and calcium in horses and bone strength measurements – both of which are rarely performed and are novel to the project team.

The pilot study will measure blood metabolites and bone strength in 6 healthy, pregnant Thoroughbred mares and their foals from a UK stud farm. Each mare will have vitamin D and vitamin D-related biochemicals measured during the last month of pregnancy. At the same time, ultrasound will be used to make an objective assessment of bone strength of foreleg cannon bones. Each of the six foals in the study will be tested for calcium levels and vitamin D-associated metabolites (using excess blood taken for other clinical reasons) at around one week, one month, three months and five months old. Ultrasound bone strength measurements will be made on both foreleg cannon bones at the same time points.

The data acquired during this pump-priming study will allow us to evaluate: 1) the feasibility and variability of blood testing for vitamin D, calcium and other related metabolites, and 2) the feasibility and variability of measurements of bone strength. Knowing how measurements of vitamin D and bone strength vary between animals will inform the design of a larger study. Completion of the pilot study will demonstrate the ability of the study team to deliver the data necessary for a successful, large-scale study of vitamin D metabolism, calcium metabolism, gut bacterial communities and bone health in horses bred for racing.