

**Faculty Mentor:**

*Stephen J. Coleman, MS, PhD*

**Project Title:**

*Investigation of Gene Expression in the Equine Hind Gut*

**Justification:**

*Horses do not possess the enzymes necessary to digest the dietary fiber they consume and instead rely on microbial fermentation in their hindgut to generate nutrients and energy. Maintaining the balance between the horse and these resident microbes (homeostasis) is essential for proper digestive physiology.*

*Recent work in my lab has demonstrated that each compartment of the hindgut possesses a unique microbial community that is tied to particular aspects of digestion. We have also investigated the expression of non-coding RNA transcripts in the tissues of the equine gastrointestinal compartments as a potential mechanism for horses to interact with and regulate these microbial communities.*

*The purpose of the work to be completed by the Undergraduate Research Fellow is to contribute to our developing understanding of the host-specific (horse) factors – such as coding and non-coding gene expression –involved in physiology and homeostasis in the gastrointestinal tract.*

**Tasks to Complete:**

- *Isolation/quality control analysis of RNA from equine gastrointestinal tissues*
- *Small RNA-seq library preparation*
- *Sequence generation @ CSU Next-Generation Sequencing Core facility*
- *Sequence analysis*
- *Summary of results*

**Major Skills and Competencies developed:**

- *Design & execution of scientific investigations*
- *Working in and contributing to a collaborative laboratory group*
- *Handling of biological tissue samples*
- *Isolation and handling of RNA for analysis*
- *Next-generation sequencing (library preparation – sequencing – analysis)*

**On-Board Training:**

- *General laboratory practices*
  - *Operation of laboratory equipment*
  - *Pipetting*
  - *Standard operating procedures*
- *Laboratory safety training*
- *RNA-isolation protocol*
- *Sample QC protocols*

**Who will the fellow work with:**

- *Fellow will work with the Fellowship Mentor directly*
- *Fellow will work alongside graduate and undergraduate researchers established in the lab*

**Group Meeting:**

- *The lab has weekly meetings*

**Specific Mentorship:**

- *I anticipate meeting one-on-one with the research fellow on a weekly basis throughout the semester to support progress on the project.*
- *The nature of the Equine Genetics Lab is that I am in and out of the lab every day supporting many spontaneous and informal interactions between myself and the members of my lab (this will include the research fellow).*