

# Ph.D. Graduate Research Assistantship

Cornejo's Lab | Mississippi State University

## Doctor of Philosophy in Agriculture

**Concentration:** Animal and Dairy Science

**Research Area:** Antimicrobial Alternatives, Infectious Diseases, and Cell-Based Research in Livestock species

**Start Date:** January 1, 2027

**Expected End Date:** December 31, 2029

**Location:** Mississippi State University, Starkville, Mississippi

## Position Overview

Dr. Cornejo's Lab at Mississippi State University is seeking a motivated, hands-on Ph.D. student interested in research at the intersection of **animal health, infectious diseases, antimicrobial alternatives, innate immunity, and cell biology**.

This three-year Graduate Research Assistantship will focus primarily on **cattle infectious disease and respiratory health**, with an emphasis on developing and evaluating novel antimicrobial strategies using cell-based models. The research program will investigate **antimicrobial peptides (AMPs), ionic liquids (ILs), host–pathogen interactions, and other antimicrobial alternatives**.

The student will develop an independent dissertation research program within the broader laboratory program. Depending on research progress, funding, and student interests, the dissertation may also include **in vivo evaluation of promising antimicrobial strategies in cattle**.

## Ph.D. Research Focus

The student will develop expertise in experimental animal health research, with an emphasis on **antimicrobial alternatives, innate immunity, epithelial biology, and host–pathogen interactions**.

Research activities may include:

- Development and characterization of primary bovine epithelial cell models.
- Establishment and evaluation of differentiated **air–liquid interface (ALI)** cultures.
- Evaluation of antimicrobial alternatives against bacterial and viral pathogens.
- Assessment of cell viability, cytotoxicity, epithelial integrity, and treatment compatibility.

- Molecular approaches for **mRNA-mediated delivery**.
- Molecular and immunological characterization of epithelial responses.
- Development of potential in vivo studies to evaluate promising antimicrobial strategies in cattle.
- Statistical analysis, data interpretation, manuscript preparation, and scientific presentations.

The student will progressively take ownership of the research project, from experimental design and data collection through analysis, publication, and dissertation completion.

## Research & Laboratory Responsibilities

Responsibilities may include:

- Designing and conducting experiments involving animal-derived cell cultures.
- Establishing, maintaining, and differentiating primary epithelial cell cultures.
- Performing bacterial antimicrobial susceptibility assays.
- Conducting viral infection and viral titration experiments.
- Performing PCR/qPCR, RNA extraction, ELISA, and other molecular or immunological assays.
- Performing immunofluorescence and immunohistochemistry.
- Evaluating cellular viability, cytotoxicity, and epithelial integrity.
- Isolating and working with bovine neutrophils when required by the experimental design.
- Maintaining accurate laboratory records and experimental datasets.
- Performing statistical analyses and developing reproducible research workflows.
- Contributing to laboratory biosafety and pathogen-handling procedures.
- Preparing manuscripts and presenting research at scientific conferences.
- Developing and completing an independent Ph.D. dissertation.

## Ideal Candidate

The ideal candidate will have a **Master of Science degree** in animal science, veterinary science, microbiology, immunology, biomedical sciences, biology, or a closely related discipline.

Applicants with experience in one or more of the following areas are particularly encouraged to apply:

- Mammalian or avian cell culture
- Primary cell isolation and culture
- ELISA or other immunological assays
- PCR/qPCR and molecular biology
- Bacterial culture and antimicrobial susceptibility testing
- Viral culture or virus-based assays
- Immunofluorescence or immunohistochemistry

- RNA extraction and gene-expression analysis
- Host–pathogen interaction research
- Animal infectious diseases
- Antimicrobial peptides or other antimicrobial alternatives

Applicants are not expected to have experience with every technique. Training and mentorship will be provided. More important than experience with every methodology is a strong interest in infectious disease research, willingness to learn, careful experimental practice, and the ability to work independently in a collaborative research environment.

**This position is well suited for students interested in careers in animal health research, pharmaceutical or biotechnology R&D, antimicrobial discovery, biologics development, infectious disease research, or academia.**

## Application Materials

Interested applicants should submit:

- Curriculum vitae/resume
- Unofficial graduate and undergraduate transcripts
- Brief statement of research interests
- Description of previous laboratory or research experience
- Names and contact information for three professional references
- Brief statement describing why the applicant is interested in pursuing a Ph.D. in animal health/infectious disease research
- 

Applicants should highlight relevant experience with cell culture, ELISA, PCR/qPCR, microbiology, immunology, infectious disease research, or related laboratory techniques.

Applicants are encouraged to explain how their previous training and career goals align with the research and teaching opportunities available in the laboratory.