

2023 USDA ARS BI Veterinary Scholars Program

Important Dates

February 1, 2023	Veterinary School Program Director submit applications to Dr. Motroni (roxann.motroni@usda.gov) and Tira Halsey (tira.halsey@usda.gov).
February 15, 2023	Applicants and schools will be notified of application status.
April 15, 2023	Approximate date of funding distribution.
May 15 - Aug 1, 2023	Approximate start date of research experience. Programs will last 10-12 weeks.

Application Instructions

REQUIREMENTS:

- Only US citizens are eligible to apply
- Applicants must be in good standing with their veterinary school
- University should select no more than 2 applicants for the ARS BI VSP
- Students are expected to be available at the ARS location for 10-12 weeks to conduct research and attend the NVSS symposium in August

FUNDING:

- Funding for the summer will be administered to the scholar through each scholar's school.
- Each scholar will receive a \$7,500 stipend for the summer and an additional \$1,000 in travel assistance to travel to and from the NVSS. Registration fees for the NVSS will be waived using a registration code provided closer to the symposium.

APPLICATION PACKAGE SHOULD INCLUDE:

1. **Coversheet** with the following information
 - Name
 - Contact information including email
 - Vet School Graduation year
 - Preferred start and end dates
 - Whether you have participated in the ARS BI VSP program previously
 - Graduate work in addition to DVM curriculum (if any)
 - Top 3 choices of ARS research projects (We will do our best to match scholars with their top choice; however, given that some projects and locations are more popular than others this may not always be possible.)

2. **Cover letter** should include:
 - information about previous research experience
 - research interests and how does this experience fit in with career goals
 - What interests you in participating in this summer research experience with ARS. If a scholar has participated in the program, previously, please address how further participation will assist in their career goals.

3. **Resume or CV**

SUBMISSION:

Student applications should be submitted to the individual veterinary school's BI Vet Scholars program director. The school program director will review applications received and forward applications from the top 2 students to ARS representatives Dr. Roxann Motroni (roxann.motroni@usda.gov) and Tira Halsey (tira.halsey@usda.gov). Each school will set their own deadline for student applications to be submitted to their program director. All communications regarding applications and projects should go through the USDA contacts listed above.

Project Proposals

1. [National Bio and Agrodefense Facility \(NBAF\)](#) *(open each hyperlink to see project details)*

LOCATION: Manhattan, KS

PROJECT TITLE: Distribution of Crimean-Congo hemorrhagic fever in Central and West Africa

PRIMARY MENTOR: Lisa Hensley, PhD

NB: This project will be conducted with academic partners for in country work, so the student will need to be flexible, may require additional training and vaccinations prior to traveling. Funding for travel to and from study sites will be provided.

2. [Arthropod-Borne Animal Diseases Research Unit \(ABADRU\)](#)

LOCATION: Manhattan, KS

PROJECT TITLE: Impact of larval density on adult *Culicoides sonorensis* biting midge size and susceptibility to bluetongue virus

PRIMARY MENTOR: Bethany McGregor, PhD

3. [Arthropod-Borne Animal Diseases Research Unit \(ABADRU\)](#)

LOCATION: Manhattan, KS

PROJECT TITLE: Use of small RNAs to block virus transmission by biting midges

PRIMARY MENTOR: Barbara Drolet, PhD

4. [National Animal Disease Center \(NADC\)](#)

LOCATION: Ames, IA

PROJECT TITLE: Strain screening procedures for field isolates of the chronic wasting disease agent

PRIMARY MENTOR: Justin Greenlee DVM, PhD

5. **National Animal Disease Center (NADC)**
LOCATION: Ames, IA
PROJECT TITLE: Investigation of influenza A virus vaccine efficacy in swine and characterization of host-pathogen responses
PRIMARY MENTOR: Bailey Arruda, DVM, PhD
6. **National Animal Disease Center (NADC)**
LOCATION: Ames, IA
PROJECT TITLE: *Haemonchus* vaccines for use in sheep
PRIMARY MENTOR: Jennifer Wilson-Welder, PhD
7. **Animal Parasitic Disease Laboratory (APDL)**
LOCATION: Beltsville, MD
PROJECT TITLE: Investigate changes in the blood serum biochemical pattern due to experimentally induced Ostertagiasis in Holstein cattle
PRIMARY MENTOR: Wenbin Tuo DVM, PhD
8. **Animal Parasitic Disease Laboratory (APDL)**
LOCATION: Beltsville, MD
PROJECT TITLE: Developing a genetically tractable natural mouse model of cyclosporiasis.
PRIMARY MENTOR: Asis Kahn, PhD
9. **Animal Disease Research Unit (ADRU)**
LOCATION: Pullman, WA
PROJECT TITLE: Evaluation of sheep-associated malignant catarrhal fever (MCF) vaccine candidates in bison.
PRIMARY MENTOR: Cristina Cunha, DVM, PhD
10. **Animal Disease Research Unit (ADRU)**
LOCATION: Pullman, WA
PROJECT TITLE: Clinical Signs Associated with Infection of Lambs with *Mycoplasma ovipneumoniae*.
PRIMARY MENTOR: Lindsay Wright, DVM, PhD
11. **Animal Disease Research Unit (ADRU)**
LOCATION: Pullman, WA
PROJECT TITLE: Examining the effect of *Babesia* infection on tick thermal tolerance and dehydration resistance
PRIMARY MENTOR: Kennan Oyen, PhD
12. **Southeast Poultry Research laboratory (SEPRL)**
LOCATION: Athens, GA
PROJECT TITLE: Use of real-time PCR to differentiate live from inactivated Newcastle or Avian Influenza virus
PRIMARY MENTOR: David Suarez DVM, PhD

**Please note that proposed projects listed above may change slightly due to the nature and timing of research. Nevertheless, all mentors are prepared with backup projects so that the students can have a rewarding summer research experience.*

Full Project Information

NATIONAL BIO AND AGRODEFENSE FACILITY (NBAF)

LOCATION: Manhattan, KS

PROJECT TITLE: Distribution of Crimean-Congo Hemorrhagic Fever in Central and West Africa

PRIMARY MENTOR: Lisa Hensley, PhD

NB: This project will be conducted with academic partners for in country work, so the student will need to be flexible, may require additional training and vaccinations prior to traveling. Funding for travel to and from study sites will be provided.

1. What is the proposed title of the summer project you propose for a BI/ARS scholar?

Distribution of Crimean-Congo Hemorrhagic Fever in Central and West Africa

2. Describe your anticipated research project that lends itself to placement of a summer scholar (brief layperson abstract, 2-5 sentences).

Currently we have several NACAs to explore the distribution of high consequence zoonotic pathogens in West and Central Africa. To date there have been limited studies performed in these regions and reporting has been anecdotal at best. This project will provide the first insights into the disease burden for Crimean-congo hemorrhagic fever (CCHF) in these regions. In addition, samples collected will allow assessment of genetic diversity of CCHF.

The scholar will work with partners to collect and analyze sample in the field. Ideally the scholar will participate in one field collection and assist with sample processing and evaluation of the data. The experience will provide the scholar with real world field experience and allow them to explore field work and ecological studies. Sample processing will provide the scholar with laboratory experience. Analysis of data and preparation of an abstract will give the scholar experience in scientific writing.

3. Give specific details of the scholar's anticipated involvement in the study, methodologies they will learn, and expected outcomes. (2-5 sentences or bullet points)

Scholar will participate in sample collection and processing. As part of these efforts the scholar will learn basic biosafety and gain experience in the appropriate use of personal protective equipment (PPE). The scholar will physically participate in sample processing and analysis of the samples. This will allow the scholar to gain experience in performance of basic immunologic assays and potentially molecular assays, troubleshooting of assays, data analysis and preparation of scientific results. It is expected that the scholar at the end of the experience would be able to properly don and doff PPE, be able to recognize and mitigate potential hazards to allow safe processing of samples, independently process samples, independently perform serologic assays and perform basic troubleshooting.

4. Please describe how you will facilitate interactions for the scholar with other scientists, research, veterinary or laboratory professionals within your research unit/location.

The scholar will be integrated as a study team member. It will be expected that they present their data at a laboratory meeting. The scholar will work closely and perform the work with NACA partners. This close interaction will allow the scholar to work with US and international scientists. When not in the field the scholar will be encouraged to participate in other activities at NBAF including scientific meetings, journal clubs etc.

5. Is there specific training for your program necessary that may delay a scholar's start date?

The scholar must be able to travel internationally for field work unless a US site is identified.

ARTHROPOD-BORNE ANIMAL DISEASES RESEARCH UNIT (ABADRU)

LOCATION: Manhattan, KS

PROJECT TITLE: Impact of larval density on adult *Culicoides sonorensis* biting midge size and susceptibility to bluetongue virus

PRIMARY MENTOR: Bethany McGregor, PhD

1. What is the proposed title of the summer project you propose for a BI/ARS scholar?

Impact of larval density on adult *Culicoides sonorensis* biting midge size and susceptibility to bluetongue virus

2. Describe your anticipated research project that lends itself to placement of a summer scholar (brief layperson abstract, 2-5 sentences).

There is evidence that the number of larval mosquitoes present in a habitat (density) can impact the likelihood of the mosquitoes to become infected with pathogens as adults. However, this has not been studied in *Culicoides* biting midges with endemic veterinary pathogens like bluetongue virus (BTV). The scholar would assist with experiments to investigate impacts of different rearing densities on midge size. As time allows, these experiments would be followed with infection studies to test whether midges reared at different densities are more or less susceptible to infection with BTV.

3. Give specific details of the scholar's anticipated involvement in the study, methodologies they will learn, and expected outcomes. (2-5 sentences or bullet points)

The scholar will conduct the density dependent size experiments and do wing and body length measurements of midges. The scholar would then be responsible for conducting bluetongue virus infection assays on midges from different density conditions to determine whether changes in vector competence have occurred (measured as infection and dissemination of virus in the body tissues). The scholar will learn about insect biology and rearing protocols, microscopy and entomological measurements, safe handling and

manipulation of viruses and virus-infected arthropods, and analysis of data. The expected outcomes will be a unique dataset showing density dependent impacts on BTV infection in *Culicoides* midges, which could lead to conference presentations and manuscripts.

4. Please describe how you will facilitate interactions for the scholar with other scientists, research, veterinary or laboratory professionals within your research unit/location.

We are fortunate in Manhattan, KS to be co-located with Kansas State University and their excellent VRSP program. My scholar last year was able to participate in the KSU VRSP program, attend their weekly meetings, and interact with other VRSP students and vet school personnel. Within my unit, we have several scientists focused on different aspects of vector-borne disease transmission, which presents several opportunities to get experience in other areas of vector biology, ecology, and disease transmission depending on the scholar's interest. We are also co-located with NBAF and I would like to facilitate a visit to that facility for the scholar so they can see several unique USDA facilities and how each functions.

5. Is there specific training for your program necessary that may delay a scholar's start date?

The scholar will need to complete training to get onto our IBC protocols. These trainings can be conducted while the scholar is conducting the larval density-dependence assays, so I do not anticipate delays to their start date.

ARTHROPOD-BORNE ANIMAL DISEASES RESEARCH UNIT (ABADRU)

LOCATION: Manhattan, KS

PROJECT TITLE: Use of small RNAs to block virus transmission by biting midges

PRIMARY MENTOR: Barbara Drolet, PhD

1. What is the proposed title of the summer project you propose for a BI/ARS scholar?

Use of small RNAs to block virus transmission by biting midges

2. Describe your anticipated research project that lends itself to placement of a summer scholar (brief layperson abstract, 2-5 sentences).

Biting midges transmit several viruses that cause disease in livestock, including vesicular stomatitis virus, bluetongue virus, and epizootic hemorrhagic disease virus. Although repellents and insecticides are effective in the short term, to combat insecticide-resistant insect long-term strategies, including novel genetic approaches, are needed for reducing vector populations and interrupting the ability of viruses to be transmitted to susceptible animals when midges take a blood meal. To date, no molecular tools have been implemented to prevent virus transmission by biting midges. This project will evaluate the ability of small interfering RNAs (RNAi) to inhibit virus replication and reduce transmission.

3. Give specific details of the scholar's anticipated involvement in the study, methodologies they will learn, and expected outcomes. (2-5 sentences or bullet points)

The student will work with the USDA scientist mentor and a post-doctoral fellow in this research. Training opportunities will include molecular biology, cell culture, virology, and vector biology.

4. Please describe how you will facilitate interactions for the scholar with other scientists, research, veterinary or laboratory professionals within your research unit/location.

The student will interact directly and continuously with the Research Microbiologist mentor, the post doc, and the laboratory technician to learn these skills and contribute to the overall research goal. In addition to interactions with the mentor, interactions are anticipated with Entomologists, an Ecologist, Molecular Biologists, Vector Biologists, and a newly hired bioinformatician.

5. Is there specific training for your program necessary that may delay a scholar's start date?

All volunteers/interns/non-paid non-federal personnel must complete several administrative forms that must be approved at location and some at Area Office. Biosafety training for the Unit, the Center, and specific IBC CITI safety modules must all be completed before personnel are allowed to work in our BSL-2 labs. All can be done electronically and should be completed before the start date to avoid delays in starting lab work.

NATIONAL ANIMAL DISEASE CENTER (NADC)

LOCATION: Ames, IA

PROJECT TITLE: Strain screening procedures for field isolates of the chronic wasting disease agent

PRIMARY MENTOR: Justin Greenlee DVM, PhD

1. What is the proposed title of the summer project you propose for a BI/ARS scholar?

Strain screening procedures for field isolates of the chronic wasting disease agent

2. Describe your anticipated research project that lends itself to placement of a summer scholar (brief layperson abstract, 2-5 sentences).

This project would offer a student an opportunity to learn about CWD and investigate potential CWD strains in an interactive laboratory with two veterinary researchers, an experienced permanent technical staff, and multiple graduate students.

3. Give specific details of the scholar's anticipated involvement in the study, methodologies they will learn, and expected outcomes. (2-5 sentences or bullet points)

While screening field samples for potential strain differences that would identify them for future bioassay studies, the student would learn prion protein genotyping, western blotting, immunoassay, and *in vitro* prion amplification and fibril stability assays. In addition to expanding skills in the laboratory, the student will be expected to participate in live animal procedures, sample collection for ongoing experiments, and collection of samples during postmortem examinations.

4. Please describe how you will facilitate interactions for the scholar with other scientists, research, veterinary or laboratory professionals within your research unit/location.

Each week the student will be expected to attend our lab meeting (currently Tuesday morning) and “mouse hour”, an hour on Friday dedicated to research updates and staying current with the ongoing mouse studies. There are 3-4 scientists, 2 technicians, a postdoc, and 2-3 students present at each of these meetings and there is a time set aside for each person to provide input. This is a great opportunity to exchange ideas and become conversational in the science. As needed, we will also ensure that the scholar makes connections with professionals outside of our laboratory, for example, with the histology laboratory who may be able to provide specific instructions or feedback to improve the quality of the scholar’s research.

5. Is there specific training for your program necessary that may delay a scholar’s start date?

No, there is no training required that should result in a delay. Before entering the laboratory, a safety training is required, but typically it is held at the start of each pay period. Our center requires a name trace, but that should be a fast turnaround time for US citizens and can be completed before the student arrives.

NATIONAL ANIMAL DISEASE CENTER (NADC)

LOCATION: Ames, IA

PROJECT TITLE: Investigation of influenza A virus vaccine efficacy in swine and characterization of host-pathogen responses

PRIMARY MENTOR: Bailey Arruda, DVM, PhD

1. What is the proposed title of the summer project you propose for a BI/ARS scholar?

Investigation of influenza A virus (IAV) vaccine efficacy in swine and characterization of host-pathogen responses

2. Describe your anticipated research project that lends itself to placement of a summer scholar (brief layperson abstract, 2-5 sentences).

Influenza A viruses (IAV) cause one of the most important viral respiratory diseases in swine and humans. This project will address two major research objectives: 1) Developing vaccination strategies to effectively control endemic swine IAVs; and 2) Characterizing the pathogenesis of emerging swine IAVs. Objective 1 will be addressed by conducting computational analyses to identify and design a field-relevant vaccine and a swine experiment to characterize immune responses and correlates of protection following vaccination and

challenge by IAV. Objective 2 will include the investigation of molecular mechanisms related to pathogenesis using various histologic techniques including immunohistochemistry and RNA in situ hybridization followed by image analysis using machine learning algorithms (HALOTM).

3. Give specific details of the scholar's anticipated involvement in the study, methodologies they will learn, and expected outcomes. (2-5 sentences or bullet points)

The scholar involved in this project will gain experience in a BSL-2 laboratory and animal containment settings. The scholar will become familiar with and adept at virus culture, antemortem and postmortem sample collection, and in situ-based techniques.

4. Please describe how you will facilitate interactions for the scholar with other scientists, research, veterinary or laboratory professionals within your research unit/location.

The research project is multifaceted which inherently facilitates interactions for the scholar with technical staff and laboratory professionals to learn and optimize laboratory assays (virus culture and in situ-based techniques), veterinary professionals and animal care staff to conduct swine experiments including antemortem and postmortem sample collection, and other scientists within our project to plan, execute and analyze experiments.

5. Is there specific training for your program necessary that may delay a scholar's start date?

American Association of Laboratory Animal Science (AALAS) courses are required before performing hands-on live animal work. The required courses can be completed prior to arrival on campus or within a day while on campus.

NATIONAL ANIMAL DISEASE CENTER (NADC)

LOCATION: Ames, IA

PROJECT TITLE: Haemonchus vaccines for use in sheep

PRIMARY MENTOR: Jennifer Wilson-Welder, PhD

1. What is the proposed title of the summer project you propose for a BI/ARS scholar?

Haemonchus vaccines for use in sheep

2. Describe your anticipated research project that lends itself to placement of a summer scholar (brief layperson abstract, 2-5 sentences).

Gastro-intestinal nematodes or parasites, commonly referred to as stomach worms, are a major problem in production livestock but especially sheep and goats. Resistance to dewormers or anthelmintics is high. A collaboration between ARS research units is seeking to create a vaccine to use the sheep's immune system to break the parasite's life cycle. Novel vaccines are being tested in sheep which are then experimentally infected with the stomach worms. The sheep's immune response to the vaccine antigens, weight gain, overall health and worm burden is monitored to determine the vaccine's effectiveness. Summer scholars will be involved in all aspects of the project, from sample collection to performing the immune assays to counting parasites.

3. Give specific details of the scholar's anticipated involvement in the study, methodologies they will learn, and expected outcomes. (2-5 sentences or bullet points)

- Sheep handling and sample collection (blood, feces, FACHMA scoring)
- Fecal egg counts, *Haemonchus* identification
- Necropsy procedures
- Immuno-assays: ELISA, PBMC isolation for cytokine analysis, flow cytometry or RNA expression
- Exposure to and participation in everything else that is happening in Infectious Bacterial Disease Research Unit which includes active research projects in digital dermatitis, Leptospirosis, Brucella, Tuberculosis and Johne's Disease.

4. Please describe how you will facilitate interactions for the scholar with other scientists, research, veterinary or laboratory professionals within your research unit/location.

As part of a very active research unit, the scholar will take part in hands on sample collection with other projects in the unit, including animal species such as cattle, swine, sheep, goats, deer, elk, and bison. Our unit has frequent journal clubs, work-in-progress discussion, and social gatherings to promote interaction with others at all levels in the unit. NCAH/NADC is a large multi-agency center, and we strive to introduce visiting scholars to all the departments, supporting units (Animal Care/Veterinary Services, Microscopy and Histology), and agencies housed within the center, their missions, and careers available within USDA.

5. Is there specific training for your program necessary that may delay a scholar's start date?

All training can take place once on site. Completed background checks are required prior to start date.

ANIMAL PARASITIC DISEASE LABORATORY (APDL)

LOCATION: Beltsville, MD

PROJECT TITLE: Investigate changes in the blood serum biochemical pattern due to experimentally induced Ostertagiasis in Holstein cattle

PRIMARY MENTOR: Wenbin Tuo DVM, PhD

1. What is the proposed title of the summer project you propose for a BI/ARS scholar?

Investigate changes in the blood serum biochemical pattern due to experimentally induced Ostertagiasis in Holstein cattle

2. Describe your anticipated research project that lends itself to placement of a summer scholar (brief layperson abstract, 2-5 sentences).

Ostertagia ostertagi infection is known to cause significant changes to the cattle health leading to diarrhea, anorexia, submandibular edema, fever and anemia as major clinical signs. One of

the pathological symptoms of *O. ostertagi* is formation of umbilicated nodules that cause changes in leakage of gastric pepsinogen across damaged epithelium leading to high plasma levels. Directly or indirectly, this results in parasite associated drop in intake and effect weight gain alongside various serious pathological damages to the host locally or non-locally. Investigating serum protein levels could lead us to understand these earlier clinical symptoms and thus contribute to treatment options. We propose to investigate the serum protein levels following the initial infection of *O. ostertagi*. Veterinary summer scholar will focus on investigating these prepatent period of the *O. ostertagi* (normally ~3-4 weeks) that will thereby produce significant effect on serum biochemical parameters.

3. Give specific details of the scholar's anticipated involvement in the study, methodologies they will learn, and expected outcomes. (2-5 sentences or bullet points)

Our study will focus on the prepatent period of the *O. ostertagi* (normally ~3-4 weeks) that will thereby produce significant effect on haematological and serum biochemical parameters. Infective third stage larvae (L3) of *O. ostertagi* will be obtained through culture of eggs isolated from the adult female worms. Infective larvae will be orally administered 3-4 month old Holstein calves. After the patency of the infection, blood samples will be collected from all the experimental animals at weekly interval from 0 to 45 DPI. The samples will be then submitted to IDEXX laboratories® for detecting serum analytes. Scholar will be involved in analyzing, interpreting and presenting the results related to the changes in biochemical patterns across the various timepoints. The study will help the scholar to investigate the early clinical signs from the serum during the infection. Finally, the student will be able to report and write an article. The expected outcome from this study will give details in changes associated with the early signs of Ostertagiasis which could be considered in differential diagnosis. As a veterinary student, the scholar will learn an aspect of clinical changes associated with a parasitic nematode in animals infected with *O. ostertagi*.

4. Please describe how you will facilitate interactions for the scholar with other scientists, research, veterinary or laboratory professionals within your research unit/location.

The scholar will involve in "Cooperative learning" than individual contribution which will be a shared group goal, that is the participation of the scholar will be "celebrated by all". The scholar will be trained on collaborative skills. Firstly, scholar will be introduced to the SY scientists of the research unit. Next, the scholar will be toured to the animal facilities where animal experiments largely take place. Scholar will be scheduled to interact with the laboratory professionals in day-to-day basis and participate in biweekly meetings. The scholar will be trained in aspects of molecular and biochemical experiments. Finally, the candidate will engage in presenting research results to the members of the research unit as well as poster presentation in Veterinary Scholars symposium.

5. Is there specific training for your program necessary that may delay a scholar's start date?

Biosafety trainings, chemical waste management

ANIMAL PARASITIC DISEASE LABORATORY (APDL)

LOCATION: Beltsville, MD

PROJECT TITLE: Developing a genetically tractable natural mouse model of cyclosporiasis.

PRIMARY MENTOR: Asis Kahn, PhD

1. What is the proposed title of the summer project you propose for a BI/ARS scholar?

Developing a genetically tractable natural mouse model of cyclosporiasis.

2. Describe your anticipated research project that lends itself to placement of a summer scholar (brief layperson abstract, 2-5 sentences).

The human coccidian parasite, *Cyclospora cayetanensis* is the causative agent of diarrhea globally. To date, every attempt to propagate *C. cayetanensis* in animals, or cell culture, has failed. Lack of oocysts from clinical samples and the absence of animal models have limited the development of highly sensitive detection techniques and the understanding of host-pathogen interaction of *Cyclospora*. Thus, in order to develop an animal model for cyclosporiasis, we will isolate a species of *Cyclospora* that will naturally colonize the mouse intestine. We will test hundreds of stool samples from field-collected mice using a very sensitive and specific qPCR assay for *Cyclospora*. Positive samples will be colonized into laboratory mice for further enrichment to generate a natural mouse model of cyclosporiasis. We will conduct capture enrichment sequencing followed by whole genome sequencing to compare the genetic architecture of the mouse-adopted strains with *C. cayetanensis*. This animal model system will permit rigorous investigation to develop sensitive detection techniques and potential vaccination strategies and allow the dissection of the complex host-pathogen interactions of *Cyclospora* infection.

3. Give specific details of the scholar's anticipated involvement in the study, methodologies they will learn, and expected outcomes. (2-5 sentences or bullet points)

In the proposed study, the scholar will be involved in collecting 100s of stool samples from field-collected mice. After collecting stool samples, scholar will isolate gDNA from 1/2 of the stool pellet and conduct qPCR with *Cyclospora*-specific primer and probe set. Immunocompetent C57BL/6 mice will be infected with the remaining 1/2 of the positive stool samples for enrichment. The scholar will conduct capture enrichment and whole genome sequencing using enriched samples to compare the genetic architecture.

4. Please describe how you will facilitate interactions for the scholar with other scientists, research, veterinary or laboratory professionals within your research unit/location.

Dr. Khan will supervise the scholar, and he and his lab members will provide assistance to establish and standardization of the protocols, run experiments, collect data, and appraise the team on progress, problems, and questions related to different aspects of the current research project. Additionally, the scholar will receive mentorship from other scientists from our department. Our USDA team has considerable expertise, facilities, protocols, and experience studying poultry pathogens in the genus *Eimeria*. Our facilities, experimental protocols, animal use, care protocols, and world-class expertise position us well to establish this animal model for cyclosporiasis, and the scholar will frequently interact with veterinary professionals and

scientists in our department. We also bring abundant experience advancing the biology, genetics, and genomics of other coccidian related to *Cyclospora*.

5. Is there specific training for your program necessary that may delay a scholar's start date?

The scholar will need to take biosafety training and chemical waste training prior to starting the project. It will take a couple of dates to complete those training.

ANIMAL DISEASE RESEARCH UNIT (ADRU)

LOCATION: Pullman, WA

PROJECT TITLE: Evaluation of sheep-associated malignant catarrhal fever (MCF) vaccine candidates in bison.

PRIMARY MENTOR: Cristina Cunha, DVM, PhD

1. What is the proposed title of the summer project you propose for a BI/ARS scholar?

Evaluation of sheep-associated malignant catarrhal fever (MCF) vaccine candidates in bison.

2. Describe your anticipated research project that lends itself to placement of a summer scholar (brief layperson abstract, 2-5 sentences).

This project involves testing the safety and efficacy of new viral-vectored vaccine candidates in bison. It will give a veterinary scholar the opportunity to have hands on training in several aspects of the project, including monitoring and sampling bison, performing diagnostic assays in the laboratory to evaluate infection and immune response, and interpreting and reporting results from a vaccine trial.

3. Give specific details of the scholar's anticipated involvement in the study, methodologies they will learn, and expected outcomes. (2-5 sentences or bullet points)

- Monitoring and sampling experimental animals: evaluation of clinical aspects related to vaccination and/or development of MCF; blood and nasal secretion collection and processing.
- Diagnostic assays: performing PCR for detection of viral DNA, ELISA for detection of antibodies, and additional assays for evaluation of cellular immune responses in animal samples.

4. Please describe how you will facilitate interactions for the scholar with other scientists, research, veterinary or laboratory professionals within your research unit/location.

This project involves a multidisciplinary team of scientists, veterinarians, an animal farm staff that have important roles in different phases of the study. The scholar will be part of this team and will have training, mentorship and access to resources and knowledge to work collaboratively in the project.

5. Is there specific training for your program necessary that may delay a scholar's start date?

All training will be provided on site.

ANIMAL DISEASE RESEARCH UNIT (ADRU)

LOCATION: Pullman, WA

PROJECT TITLE: Clinical Signs Associated with Infection of Lambs with *Mycoplasma ovipneumoniae*.

PRIMARY MENTOR: Lindsay Wright, DVM, PhD

1. What is the proposed title of the summer project you propose for a BI/ARS scholar?

Clinical Signs Associated with Infection of Lambs with *Mycoplasma ovipneumoniae*

2. Describe your anticipated research project that lends itself to placement of a summer scholar (brief layperson abstract, 2-5 sentences).

There is limited knowledge of how lambs respond to disease caused by the *Mycoplasma ovipneumoniae* bacterium alone. This is due to *M. ovipneumoniae*'s ability to disturb clearance of other commensal bacteria, specifically those within the *Pasteurellaceae*-family. The goal of this research project is to identify clinical signs associated with monomicrobial disease of *M. ovipneumoniae*. Following inoculation with *M. ovipneumoniae*, lambs will be monitored for up to 8 weeks through a combination of physical exam and ultrasound imaging as well as collection of nasal swabs, blood, and bronchoalveolar lavage for laboratory assays. The scholar will focus on the clinical signs and ultrasound imaging associated with infection but will take part in the collection of additional project samples.

3. Give specific details of the scholar's anticipated involvement in the study, methodologies they will learn, and expected outcomes. (2-5 sentences or bullet points)

The scholar will be involved in animal care and sampling. This includes lamb/sheep basic management, physical exams, jugular bleeding, anesthetic methodologies, PCV/TS blood assessment, and ultrasound image acquisition.

4. Please describe how you will facilitate interactions for the scholar with other scientists, research, veterinary or laboratory professionals within your research unit/location.

The student will interface with a number of other personnel on site. First, the scholar will work with other hired summer personnel and our animal management personnel to take care of animals in the study. Second, the scholar will be a part of laboratory meetings which includes scientific assistants, a category 4 scientist, and a collaborating WSU assistant research professor. Third, the ultrasound imaging will require collaboration with a veterinary radiologist present within Washington State University's faculty. Lastly, if the end of study is reached, the scholar will interface with a boarded pathologist to complete necropsies.

5. Is there specific training for your program necessary that may delay a scholar's start date?

The scholar will need to be added to the IACUC protocol to start the project. This requires approximately 8 hours of online training through Washington State University's system.

ANIMAL DISEASE RESEARCH UNIT (ADRU)

LOCATION: Pullman, WA

PROJECT TITLE: Examining the effect of Babesia infection on tick thermal tolerance and dehydration resistance

PRIMARY MENTOR: Kennan Oyen, PhD

1. What is the proposed title of the summer project you propose for a BI/ARS scholar?

Examining the effect of Babesia infection on tick thermal tolerance and dehydration resistance.

2. Describe your anticipated research project that lends itself to placement of a summer scholar (brief layperson abstract, 2-5 sentences).

This is a novel research project with a reasonable timeline that will generate clear outcomes. Physiological thresholds such as thermal tolerance and dehydration resistance influence tick vectoral capacity by limiting tick behavior and persistence across geographic ranges. Little is known about how pathogen infection alters tick physiology. Measuring the effect of pathogen infection on tick physiological thresholds will provide a clear understanding of how infected ticks can persist in novel environmental conditions.

3. Give specific details of the scholar's anticipated involvement in the study, methodologies they will learn, and expected outcomes. (2-5 sentences or bullet points).

The student will have the opportunity to participate in all phases of experiments including: 1) Apply ticks to infected cattle and measure tick infection levels to confirm pathogen presence. 2) Compare cold and heat tolerance limits of infected and uninfected tick larvae using LT50 assays. 3) Compare dehydration resistance of infected and uninfected tick larvae using LD50 assays.

4. Please describe how you will facilitate interactions for the scholar with other scientists, research, veterinary or laboratory professionals within your research unit/location.

ADRU is a highly collaborative unit that provides students with opportunities to interact with colleagues across training levels, including undergraduates, graduate students, postdoctoral scholars, and lead investigators. Students will have opportunities to attend and interact at lab meetings attended by both scientists at ADRU as well as faculty and students in the Veterinary Medicine Department at Washington State University.

5. Is there specific training for your program necessary that may delay a scholar's start date?

No.

SOUTHEAST POULTRY RESEARCH LABORATORY (SEPRL)

LOCATION: Athens, GA

PROJECT TITLE: Use of real-time PCR to differentiate live from inactivated Newcastle or Avian Influenza virus

PRIMARY MENTOR: David Suarez DVM, PhD

1. What is the proposed title of the summer project you propose for a BI/ARS scholar?

Use of real-time PCR to differentiate live from inactivated virus

2. Describe your anticipated research project that lends itself to placement of a summer scholar (brief layperson abstract, 2-5 sentences).

Real-time PCR has become the standard for the rapid and sensitive detection of many viral pathogens. This technique amplifies RNA or DNA regardless of whether it can from a live or dead virus. Being able to differentiate live from dead virus is important because testing is required after an outbreak to assure the premise are free of live virus. A dye that binds free nucleic acid (dead viral nucleic acid) and crosslinks it so it can't be used for PCR amplification provides an approach to only detect live virus. This approach will be tested with different disinfectants to see if they can reliably identify only live virus.

3. Give specific details of the scholar's anticipated involvement in the study, methodologies they will learn, and expected outcomes. (2-5 sentences or bullet points)

Student will become proficient in nucleic acid extraction and conducting PCR on environmental samples.

They will optimize the use of the viability dyes for the purchase of differentiating live from dead virus.

Experience in growing vaccine virus in embryonating chicken eggs.

Goal of writing a protocol for use by other laboratories to routinely test diagnostic samples.

4. Please describe how you will facilitate interactions for the scholar with other scientists, research, veterinary or laboratory professionals within your research unit/location.

Our unit has considerable experience in developing new diagnostics for a number of pathogens. We will train the student in a BSL-2 laboratory to conduct real-time PCR and improve their understanding of the importance of this technique in veterinary practice.

5. Is there specific training for your program necessary that may delay a scholar's start date?

All laboratory employees are required to take online classes on biosafety. They are also required to have 20 hours of supervised training before they can operate independently in the laboratory.