I. Cover Sheet

Faculty:

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Student:

Name: Jimma D. Blackwell, Department of Biology

Title of Proposal: Chromogenic media as a diagnostic tool for Salmonella detection in poultry environmental samples.
II. Narrative

**Project Description:** *Salmonella* remains a major worldwide pathogen and one of the most common food-borne poisons. There are currently over 2000 known *Salmonella* serotypes. Poultry meat and eggs are the most important sources of human infection with *Salmonella* in the United States. Since *Salmonella* infection and spread can occur at any point in poultry production, control measures need to be enforced at each point of poultry meat and egg production. Thus, it is important for producers to monitor for *Salmonella* presence on a regular basis. Direct detection of *Salmonella* isolates in stool specimens by molecular methods using the polymerase chain reaction is possible, however, this technique is not readily available for routine use in most clinical laboratories. Currently, many laboratories utilize a variety of selective media which rely on visualization of simple biochemical features, such as the inability to ferment lactose and the production of hydrogen sulfide, to screen for *Salmonella*. The aim of this project is to determine if new chromogenic media, which are microbiological growth media that contain enzyme substrates linked to a chromogen (color reaction), are better for the isolation (detection?) of Salmonella as compared to current industry methods. We will use poultry environmental samples (boot swabs, dust samples, fluff, chick papers, etc) voluntarily provided to the Georgia State Poultry Lab by local production facilities for *Salmonella* detection on both standard plating media: Brilliant Green agar supplemented with novobiocin (BGN) and Xylose Lysine Tergitol 4 (XLT4) agar, and on chromogenic media: Rambach agar, CHROMagar, or other products depending on the possibility of donation to the Georgia Poultry Lab. Each of the plating media will be inoculated the same way by the same person. Five *Salmonella* suspect colonies will be selected from each plate for more detailed screening and confirmation with the traditional biochemical tests and serological typing.

**Significance:** For the last twenty years, the two plating media mentioned above have been used as the standard methodology for detecting *Salmonella* in poultry environmental samples. In the last few years a number of chromogenic media have been developed for the isolation of *Salmonella*. These new media produce well defined colors of the bacterial colonies, produce results more quickly, and allow for shorter analytical times that translate to lower labor costs. Various reports have shown their usefulness and effectiveness in isolating *Salmonella* as compared with other plating media using stool or fecal samples. However, there has not been a direct comparison made between these two types of media with environmental samples; therefore a head-to-head comparison between the two methods will be valuable to justify whether the Georgia Poultry Lab, and possibly the industry, adopts the new method.
**Goals and Products**: Our goals and products for this project include: 1) to allow the student to work directly with the Georgia Poultry Lab as a vital applied research/work experience; 2) travel to a national conference in 2014 that may include the International Poultry Scientific Forum, the Poultry Science Association Meeting in Corpus Christi, or the American Veterinary Medical Association/American Association of Avian Pathologists Annual meeting in Denver to present this research with the student; 3) to disseminate this data in a student co-authored peer-reviewed journal, 4) presentation of results at the CURCA poster session and 5) to evaluate the possibility of utilizing this methodology in future studies with box turtles that are part of a current research project at the Gainesville campus.

**Plan for faculty-student collaboration and mentorship**: Drs. Mook and Morgan will both oversee the student’s progress and participation during the 8-week term. The student will be expected to spend approximately 40 hours per week on the project at the Georgia State Poultry Lab located in Oakwood, GA. During that time, Drs. Mook or Morgan will available in person or by email, chat, or cell phone, to assist with any difficulties or questions. We will plan at least one meeting a week to check on progress with the project, to troubleshoot any problems and to discuss supplementary journal articles pertaining to the project and future publications. The team also plans to meet with other FUSE members every other week to discuss progress in the program. Once the physical work is completed, the mentors will oversee data analysis and final presentation in either or both poster and paper format in preparation for attendance to a meeting.

**Undergraduate involvement**: The collaboration with the state poultry lab, and their biosecurity concerns, requires an especially mature student. We have selected Ms. Jimma Blackwell for the project because she has historically been an excellent student (3.45 GPA) and has performed exceedingly well in lab-oriented courses. By the time the project begins, she will have completed Microbiology (BIOL 2500), Molecular Biology (BIOL 4200K), and Genetics (3220K) which have lab-intensive components where she will gain many of the necessary lab skills for completing the proposed project. The research experienced described in this proposal will allow the student to work in an industrial biological laboratory gaining real-world research experience that expands the skill set attained in college laboratory courses. Not only will she carry out the experiments, but she will design and trouble-shoot the experiments in the project. This experience with a professional lab will provide her with an amazing opportunity to participate in a high-level, high-throughput lab setting.
III. Budget and timeline

**Budget:** Samples will be analyzed using standard protocols by the Georgia Poultry Lab at no additional charge. The funds designated for supplies will be used for purchasing the chromogenic media:
- Rambach ~$200  170 plates
- CHROMager       $300    200 plates
Because the poultry lab has strong connections with suppliers, there is the possibility that some products may be donated by the supplier. In that case, the funds will be reallocated for additional chromogenic media plates in order to make the project more robust.

**Timeline:**
- Prior to project start: Meet Poultry Lab personnel, review biosecurity concerns
- Week 1: Training on normal lab procedures
- Weeks 2-7: Test ~50 samples a week for a total of ~300 samples, research team meeting
- Week 8: Data analysis, research team meeting, preparation for research presentations
- After project completion: Finalize preparations for publication/meeting attendance