

FAHM Food Animal Research Studies Currently in Progress:

1. *Mycoplasma bovis* is an important cause of pneumonia, arthritis and mastitis in cattle. When cattle are infected with *M. bovis*, the disease can be very difficult to treat; this may be because the bacteria can suppress host immune responses, although little is known about this possibility. Researchers in the FAHM group have shown that *M. bovis* isolates obtained from cattle in Georgia backgrounding and stocker cattle operations are able to decrease the ability of the white blood cells of cattle to produce the toxic oxygen molecules which help the cattle fight bacteria. This suppression of bacterial killing ability by *M. bovis* is likely one of the reasons that *M. bovis* infection can be so hard for cattle to clear. This collaborative project between FAHM and Dr. Susan Sanchez, UGA – CVM, Athens Diagnostic Laboratory, is supported by FAHM funds and the Terry Family Respiratory Disease Fund. (Drs. Woolums, Hurley, and Sanchez)
2. Vaccines are often used to help protect calves from respiratory disease. However, it can be difficult to vaccinate calves effectively, because the antibody they receive from their mother's first milk can sometimes prevent vaccines from inducing a protective immune response. Researchers in the FAHM group are comparing two different routes of vaccination—intranasal and subcutaneous—to see which route is more effective in vaccinating calves with maternal antibodies. Calves in two age groups (2 days of age and 70 days of age) were vaccinated either intranasally or subcutaneously with a vaccine containing modified-live IBR, BVD, BRSV, and PI3 viruses, and the immune responses to these viruses in all groups were compared when the calves were given a booster vaccine at weaning. Analysis of the data is still ongoing, but when completed this research will help producers understand how best to vaccinate young calves who may have circulating maternal antibody, but who are also susceptible to respiratory disease. This project is a collaborative effort between FAHM faculty and Dr. Jerry Saliki, UGA-CVM, Athens Diagnostic Laboratory, and is supported by FAHM funds and Intervet Schering-Plough. (Drs. Woolums, Hurley, Pence, Ellis, Berghaus, Saliki and Smith)
3. Intestinal and abomasal parasites (such as *Ostertagia* and *Cooperia*) are a common problem for cattle in many parts of the U.S. Because of the wet and warm climate, Southeastern U.S. cattle are particularly susceptible to parasitism. These parasites are known to decrease the ability of cattle to absorb nutrients from their diet, decreasing growth and productivity. However, recent information suggests that parasites may also impair the ability of cattle to develop effective immunity against viruses and vaccines to prevent viral infection. FAHM researchers are about to undertake a study that will measure the effect of intestinal parasitism on vaccination for IBR and BVD viruses. This research will help develop better guidelines for parasite control that should improve the ability of cattle to respond appropriately when vaccinations are given. It is a collaborative effort between FAHM faculty and Dr. Ray Kaplan, UGA-CVM parasitologist and Dr. Jerry Saliki, UGA-CVM, Athens Diagnostic Laboratory. This is a pilot project that runs from March – October, 2010. We are seeking support for a more complete assessment of the concept. The current project is being funded with FAHM funds and supported in kind by Intervet Schering-Plough and Boehringer-Ingelheim. (Drs. Woolums, Pence, Hurley, Ellis, Berghaus, Kaplan, Saliki and Smith)

4. Mastitis continues to be a large source of economic loss for the Southeast dairy industry. We currently have two funded mastitis vaccine projects in collaboration with Dr. Steve Nickerson of UGA-ADS.
 - a. One project is being run in Athens and involves the use of an immune stimulator to enhance a commercial *S. aureus* vaccine in dairy cows. This project will seek a way to enhance immunity prior to delivery and reduce new and recurring cases of infectious mastitis. This project is applied in nature, but in the early stages of development. It will require subsequent studies to reach the market. This project is funded by Prince Agra (Drs. Hurley and Nickerson)
 - b. The second project is an assessment of novel *S. uberis* vaccine designs using pregnant heifers. The objective of these studies is to provide early priming of heifers to help improve life-time enhanced protection against environmental mastitis. The *S. uberis* challenge model in heifers during the beginning of the third trimester is being validated now at the Athens dairy. The vaccine and challenge trials (two 20 heifer trials are planned) will be conducted using heifers at the Tifton Dairy. We will assess systemic and mammary immunity relative to vaccination, and protection based on an intramammary challenge. This project is funded by Merial, LTD (Drs. Hurley, and Nickerson)
 - c. Further studies in the area of mastitis vaccine development, timing and integration are planned. Drs. Nickerson and Hurley would like to examine the feasibility of using a combined *S. aureus*, *S. uberis* and *E. coli* J5 vaccination program in yearling heifers to enhance priming of immunity against mastitis pathogens. We are also planning a study to examine the timing of exposure and colonization of the mastitis pathogens in heifers to determine optimal vaccine delivery windows. (Drs. Hurley and Nickerson)
5. Dairy cows continue to struggle with fresh cow disease issues and reproductive challenges. As a group, we are working in several different areas related to uterine health and reproductive performance in dairy cattle:
 - a. We are working on a 3-year program to study the role of reproductive inflammation in dairy cow infertility. This project is being done by FAHM faculty in collaboration with Dr. Jakob Scherzer, UGA – CVM, Dept of LAMS. We started phase 1 of the project this January. This infertility project involves sample collection at a Southeast dairy about 2 hours from Athens. We are examining systemic and uterine flush cells for evidence of inflammatory activation, and the uterine flush for the presence of pathogens, total IgG, IgA, PGE₂, and myeloperoxidase activity. The laboratory measurements will be evaluated in light of the reproductive outcome. Further goals will be defined based on the strongest indicators in the initial dataset. This project is being funded by USDA Animal Health Formula Funds. (Drs. Overton, Scherzer, Smith and Hurley)

- b. Uterine infections in the dairy cow are a very common and costly problem that typically leads to reproductive problems, decreased milk production, and a greater susceptibility to other challenges. FAHM members are working in collaboration with the manager of a large Western dairy (Sam Mosley, PhD from Wendell, ID) to determine whether routine postparturient uterine douching of Holstein dairy cows will reduce the risk of acute uterine disease and potentially improve reproductive performance. This project is being supported by FAHM funds. (Drs. Smith and Overton)
 - c. Reproductive management of dairy cattle often includes some form of ovulation synchronization program. FAHM faculty are working with a Dairy Science Masters student to examine the potential impact of an injection of prostaglandin during the postparturient period and prior to the start of a synchronization program on subsequent fertility. This injection of prostaglandin might positively impact conception risk by enhancing uterine immune function and by improving the response of cows to the Double Ovsynch program. This project is being supported by FAHM funds. (Drs. Smith and Overton)
6. Dr. Roy Berghaus is collaborating with POPH members in the Poultry Diagnostic and Research center in two longitudinal studies of Salmonella in broiler and broiler breeder flocks, as well as a study to evaluate the effectiveness of Salmonella vaccination in poultry. In addition, Dr. Berghaus has also recently collaborated with other researchers in the Department of Population Health on a variety of different studies related to vaccination for common respiratory diseases in beef cattle, leptospirosis in dairy cattle, and avian influenza in wild bird populations. (Dr. Berghaus)
 7. Dr. Hurley is collaborating with Dr. Steve Harvey, UGA – CVM, Dept of POPH and Assistant Director, University Research Animal Resources. Together, they are assessing innate immune products (acute phase protein, myeloperoxidase, and PGE2) produced during the course of piglet challenge with two different PCV2 stains. This study is designed to give additional quantitative measures for the severity of challenge infection that will provide a better method to score vaccine efficacy and improve our understanding of vaccine protection to PCV2. (Drs. Hurley and Harvey)
 8. Drs. Hurley and Woolums are also working to develop a better set of recall antigen monitoring tests for use in assessing the protection provided by bacterial and viral vaccines in cattle, horses and dogs. These studies will examine a combination of antigen recall proliferation, cytokine protein production, cytokine gene expression and activation antigen expression (on different lymphocyte subpopulations) to enhance our ability to analyze vaccine induced protective immunity. (Drs. Hurley and Woolums)
 9. Neonatal immune development and transfer of maternal immunity to the neonate. Drs. Hurley and Woolums are examining the role of transferred maternal antibody/cytokines, cells and their combination on bovine respiratory viral infection in four-day old bull calves. This study is funded by Pfizer Animal Health. (Drs. Hurley and Woolums)