
ANIMAL POPULATION HEALTH INSTITUTE

2013 Biennial CIOU Review

Dr. Mo Salman founded the Animal Population Health Institute (APHI) in 2002 and is the Institute Director. Through a 2010-2011 organization process, Institute members wrote updated vision and mission statements, which are provided below. Through these statements, the core Institute values are brought into focus.

INSTITUTE VISION AND MISSION

APHI strives to be an internationally recognized leader in animal population health research and outreach through effective multidisciplinary collaboration and the development and implementation of creative solutions for animal population health issues.

The Animal Population Health Institute initiates, coordinates and conducts multidisciplinary research and outreach programs that serve to improve the health and well-being of animal populations, to prevent and control infectious and other important diseases of animals, and to contribute to national and international animal disease policymaking processes by providing a better understanding of disease epidemiology and pathogenesis.

Specifically, APHI's research and outreach activities are categorized into four major groups:

- Global, emerging infectious animal diseases or those considered in need of immediate action and response. APHI personnel particularly emphasize developing and refining surveillance methods for infectious animal diseases.
- Endemic animal diseases such as vesicular stomatitis, *Mycobacterium bovis* infection (tuberculosis), *E. coli* O157, and brucellosis. APHI personnel continue to emphasize an involvement in developing and using risk/decision analysis models to improve the understanding of impacts related to spread of infectious diseases in animal populations. Within this category APHI personnel also address:
 - antimicrobial drug use and antimicrobial resistance;
 - livestock population issues affecting the health, productivity, and wellbeing of dairy cattle, beef cattle, and sheep populations;
 - Wildlife population issues including wildlife-livestock interface issues;
 - Equine population health issues;
 - Companion animals' population issues affecting the health and wellbeing of dogs and cats.
- Biosecurity regarding infectious disease control in veterinary hospitals, animal premises (e.g. farms, feedlots, livestock auction markets, animal shelters, training facilities) and control of zoonotic diseases among personnel that manage these animals.
- Development and delivery of specialized training and education for scientists and professionals working in animal health, and international training to promote development of veterinary and public health infrastructure.

The Animal Population Health Institute was designated as a UN-FAO Reference Centre for veterinary epidemiology in 2003. In this capacity, Institute members provide advice and expertise on veterinary epidemiology and in particular on global food security, geospatial analysis, risk analysis and identification of drivers of disease emergence and spread including climate change.

INSTITUTE PERSONNEL & PARTNERSHIPS

While APHI is physically located in the Department of Clinical Sciences within the College of Veterinary Medicine and Biomedical Sciences (CVMBBS), it has collaborative ties across departments, across colleges, and outside of the University. APHI is comprised of 18 faculty members (Table 1). Supporting personnel include administrative professionals with efforts in Institute outreach and laboratory activities and key research collaborators. APHI investigators collaborate with USDA - APHIS Centers for Epidemiology and Animal Health, USDA – APHIS Veterinary Services Western Region, USDA – National Wildlife Research Center, USDA – Foreign Agricultural Services, and USDA – APHIS – International Services. Key collaborators, which include members of the Institute’s Advisory Board, are listed in Appendix A.

TABLE 1. APHI FACULTY & STAFF

Faculty	Department	Expertise
Ballweber, Lora	MIP	Parasitology
Belk, Keith	Animal Sciences	Red Meat Safety; Meat Quality; International Trade
Callan, Rob	Clinical Sciences	Food Animal Internal Medicine; Immunology and Virology
Duncan, Colleen	MIP	Veterinary Pathology; Epidemiology; Wildlife Disease
Ellis, Robert	MIP	Biosafety and Biosecurity; Pathogenic Bacteriology; Immunology
Engle, Terry	Animal Sciences	Animal Nutrition
Garry, Frank	Clinical Sciences	Large Animal Internal Medicine; Food Animals
Gillette, Shana	Clinical Sciences	Risk Communication
Hyatt, Doreene	MIP	Bacteriology; Pre-Harvest Food Safety
McArt, Jessica	Clinical Sciences	Large Animal Medicine - Dairy
McConnel, Craig	Clinical Sciences	Large Animal Medicine - Dairy
Morley, Paul	Clinical Sciences	Epidemiology; Biosecurity; Large Animal Internal Medicine; Public Health
Pabilonia, Kristy	MIP	Avian Disease Diagnostics
Pendell, Dustin	Ag & Resource Economics	Agricultural Economics
Rao, Sangeeta	Clinical Sciences	Veterinary Biostatistics
Roman-Muniz, Noa	Animal Sciences	Animal Health and Well-being; Dairy Worker Training; Human Safety & Health on Livestock Operations
Salman, Mo	Clinical Sciences	Veterinary Epidemiology and Infectious Animal Diseases
Traub-Dargatz, Josie	Clinical Sciences	Large Animal Internal Medicine; Equine Infectious Diseases; Biosecurity
Van Metre, David	Clinical Sciences	Large Animal Internal Medicine; Biosecurity, Surveillance; Worker Training
Staff	Title	
Bishop, Jeanette	Molecular Diagnostics Lab Manager-Veterinary Diagnostics Lab	
Bradley, Michele	Administrative Staff	
Linke, Lyndsey	Research Associate -- Laboratory	
Magnuson, Bobbi	Research Associate -- Laboratory	
McCarthy, Barbara	Research Associate – Associate Director & Outreach Program Coordinator	
Nichols, Jeruesha	Veterinary Technologist -- Avian Diagnostics; CSU Veterinary Extension	
Steneroden, Katie	Instructor & Collaborator	
Timms, Pamela	Administrative Staff	
*Zepeda, Cristóbal	Research Scientist -- Coordinator of International Activities; USDA, APHIS, VS, CEAH	

*Dr. Cristóbal Zepeda recently joined the International Animal Health Standards Office at USDA-APHIS Veterinary Services as Senior Epidemiologist.

INSTITUTE ACTIVITIES & ACCOMPLISHMENTS

The historical foci of APHI activities continue to be strong areas of effort, which included veterinary epidemiology training programs and collaborative, multidisciplinary research to improve animal health. APHI research and outreach activities have both a global and local perspective. Activities address livestock population issues and include those allied with the intersection of animal infectious diseases and public health including biosecurity, antimicrobial resistance, the livestock-wildlife interface, and zoonoses. While the clear focus of all APHI activities is the development and implementation of creative solutions for animal population health issues, specific activities conducted by Institute scientists, students, and collaborators involve an extremely diverse range of expertise and talents. APHI collaborative activities combine expertise from disciplines focused on the macro perspective involving populations of animals to those focused on basic sciences related to molecular, genetic, and immunological characteristics of disease agents.

In the past two years, APHI activities have resulted in 56 peer-reviewed publications and more than an additional 34 presentations, conference proceedings, and final reports. APHI is a self-funded entity and does not receive financial support from CVMBS or CSU. During 2012 and 2013, APHI personnel received approximately \$18,680,000 in extramural funding to provide the support for research and outreach activities. Completed research and outreach projects totaled nearly \$16 million and pending projects total nearly \$400,000. During the past two years, ten graduate students have completed their programs (8 MS, 2PhD). The following summary, based on the Institute's activity focus areas, provides highlights of successful outcomes within the past 24 months.

GLOBAL, EMERGING INFECTIOUS ANIMAL DISEASES

- Participation in the global and national science-based policy making process for emerging pathogens in animal populations. (Salman)
- Engagement in risk based approach for animal health and animal welfare in Europe through the contribution to the scientific panel of European Food Safety Authority. (Salman)
- Active participation in the construction and validation of a simulation model to assess the strategies and options to control foreign animal diseases that can threaten the economic well being of the USA. (Salman)
- Support and enhancement of the animal health infrastructure in several countries with the aim to spread of highly contagious animal diseases to other parts of the world. (Salman)
- Participation in the global animal health and public health initiatives for better food security and quality of human life. (Salman)
- Member of the European Union Task Force of Animal Disease Surveillance Systems (Salman)
- Co-Direct the USAID (US Agency for International Development) project on Feed the Future Innovation Lab Collaborative Research (previously known as Livestock-Climate Change-Collaborative Research Support Program (LCC-CRSP)) and lead a collaborative process that results in the development of goals, objectives, and operational plans for the organization. The project supports integrated research and training to help livestock producers adapt to climate change in sub-Saharan Africa and South Asia. (Gillette)
- Worked to enhance animal and public health services in selected countries in East Europe and Asia. (Salman)
- Editor in Chief of Preventive Veterinary Medicine – an international journal to promote science in preventive veterinary medicine (Salman)
- Completed pilot study research evaluating novel avian influenza RNAi antiviral technology for poultry (APHI Lab)
- Provisional patent application, "E.Coli Mediated siRNA Silencing of Avian Influenza in Chicken Epithelium", filed to the United States Patent & Trademark Office (USPTO Application No. 61756918) (APHI Lab)

- Proposed & awarded \$76,000 in funding for two research projects related to the diagnosis and detection of pathogens in animal populations. (APHI Lab)
- Peer reviewer for Preventive Veterinary Medicine & the OIE Scientific and Technical Review (Zepeda)
- Participation in World Organization of Animal Health (OIE) ad hoc groups on: Epidemiology (chairman), Classical Swine Fever, Foot and Mouth Disease, Risk Analysis (Zepeda)
- Member of OFFLU (OIE-FAO avian influenza network) steering committee and chairman of the OFFLU group on epidemiology. (Zepeda)
- Interact with international organizations OIE, FAO, IICA, ILRI, EFSA, EMBRAPA (Zepeda)
- Editor in Chief of Preventive Veterinary Medicine – an international journal to promote science in preventive veterinary medicine (Salman)
- A member of the Joint Committee of FAO-OIE on Post Eradication of Rinderpest (Salman)
- Development of data management and biostatistical analysis protocols for “Investigation of Anthrax in animals in Country of Georgia” (Rao)
- Serve as biostatistics adviser for USAID (US Agency for International Development) project on Feed the Future Innovation Lab Collaborative Research (previously known as Livestock-Climate Change-Collaborative Research Support Program (LCC-CRSP)). The project at Colorado State University supports integrated research that helps small-scale livestock holders adapt to environmental and health impacts of climate change in Sub-Saharan Africa and South Asia. (Rao)
- Participated in several scientific assessment and surveillance designs for tuberculosis, brucellosis, Avian Influenza, and pseudorabies. (Salman)
- Developed a “one health” economic framework using Rift Valley Fever as a case study. (Pendell)

ENDEMIC ANIMAL DISEASES THAT IMPACT ANIMALS

- Continued development and validation of the North American Animal Diseases Simulation Model (NAADSM) for better preparedness for controlling foreign animal diseases in case of introduction. (Salman)
- Describe direct and indirect contact networks among livestock producers in Colorado and Kansas to improve simulation modelling of Foot and Mouth Disease (Salman)
- Developing and evaluating rapid diagnostics for bovine tuberculosis, brucellosis, and other wildlife-livestock interface diseases (APHI Lab)
- Completed pilot for validation of molecular techniques for detection of TB from elephant trunk washes; results led to current MAF funding (APHI Lab)
- APHI RAs were hired to collaborate on additional funded projects; leading to increased awareness of capabilities and inclusion on several pending and future proposals. (APHI Lab)
- Initial prevalence estimates of E. coli O157 super-shedding and shedding events in early lactation dairy cows on Colorado dairies. (McConnel, APHI Lab)
- Initial prevalence estimates of E. coli O157 shedding in pre-weaned dairy calves on Colorado dairies. (McConnel, APHI Lab)
- Commencement of study establishing E. coli O157 antimicrobial susceptibilities on Colorado dairies. (McConnel, APHI Lab)
- Proposed & awarded funding for 6 research projects totaling \$179,000 (APHI Lab)
- APHI RAs were hired to collaborate on additional funded projects; leading to increased awareness of capabilities and inclusion on several pending and future proposals. (APHI Lab)

BIOSECURITY

- Evaluated the economic consequences of foot-and-mouth disease releases from the future National Bio and Agro Defense Facility in Manhattan, Kansas (Pendell)

- Lead and participate in a variety of activities to improve our knowledge base surrounding control of infectious diseases in veterinary hospitals as evidenced by research activities, publications, and mentoring of graduate students. (Morley)
- Proposed & awarded funding for 1 research project totaling \$25,000 (APHI Lab)

SPECIALIZED TRAINING AND EDUCATIONAL PROGRAMS

- Applied for and received funding from CVMBS College Council for purchase of equipment to enable current and future research projects and support/train our undergraduate researchers (\$17,000 awarded) (APHI Lab)
- Hired and/or trained 5 undergraduate and 3 graduate students; many of which completed research projects and presented results at professional conferences and received awards (College of American Veterinary Microbiologists) (APHI Lab)
- Continuing Education for Veterinarians: Coordinated APHI's Summer Foreign Animal Disease Training Courses, 2012 and 2013 (Van Metre, McCarthy, Pabilonia)
- Provided two, two-week training course in veterinary epidemiology to 24 and 28 international veterinary medicine professionals in 2012 and 2013, respectively. The courses were sponsored by USDA, APHIS, International Services and was held in Fort Collins, Colorado from August 27-September 7, 2012 and April 15-26, 2013. (Salman, Zepeda, McCarthy)
 - Participants rated the course as highly valuable for them in terms of increasing their knowledge of veterinary epidemiology and applying epidemiologic principles in their positions (median=5 on 5-point scale).
 - Participants from the following countries attended: Mexico, Brazil, Trinidad, Egypt, Yemen, Iraq, Pakistan, India, Russia, Taiwan, Philippines, Brazil, Spain, Tunisia, Nigeria, Uganda, South Sudan, Morocco, Kenya, Vietnam, Pakistan, Tanzania, Tajikistan, Turkey, Tanzania, Indonesia, China, Kazakhstan, Lesotho, Singapore, Lao, Vietnam, Malaysia, Thailand, and Israel.
- Organized (McCarthy) and presented (Zepeda) two, one-week training courses in risk analysis for 17 international animal health professionals per course. The workshops were sponsored by USDA, APHIS, International Services and implemented in conjunction with USDA Center for Epidemiology and Animal Health (An OIE Collaborating Center), and USDA National Center for Import and Export. The training courses were held in Fort Collins, Colorado from May 14-18, 2012 and May 13-17, 2013.
- Presented basic epidemiology training courses for veterinary officials in: Kazakhstan, Ukraine, Mexico, Panama (Zepeda)
- Hosted and provided a Fellowship experience for five participants of the FAO-UN Thailand-based Field Epidemiology Training Program for Veterinarians (FETPV) from March 31 – April 30, 2012. (Salman, Rao, McCarthy)
- Hosted and provided a Fellowship experience for two participants (from Vietnam and Indonesia) of the FAO-UN Thailand-based Field Epidemiology Training Program for Veterinarians (FETPV) from April 8-26, 2013. The purpose of this program was to enhance their knowledge of veterinary epidemiology and work with APHI mentors to complete their field epidemiology projects. (Salman, Rao, McCarthy)
- Hosted and provided a training program on animal disease surveillance for six Cochran Fellows from Chad, Senegal, South Sudan, and Ethiopia during November 12-21, 2012 (Salman, Rao, McCarthy)
- Conducted a workshop for Regional Animal Health Officers of the National Food Agency (NFA) from the Republic of Georgia, which was held in Fort Collins, Colorado from November 12-24, 2012. The training program was funded by the US Department of Agriculture (USDA), Foreign Agricultural Service (FAS). Eight participants and a translator participated in the workshop, which was implemented by Colorado State

University's Animal Population Health Institute (APHI) in conjunction with the Georgian Rural Development Program (GRDP) of the Georgian Institute of Public Affairs (GIPA). (Salman, Reynolds, McCarthy)

- Provided organizational expertise for The Certifying Disease Status for Safe Trade in Aquaculture workshop, which was held in Fort Collins, Colorado from 29-31 October 2013. The workshop was funded by the US Department of State in support of the US-Chile Environmental Cooperation Agreement. The purpose of the workshop was to facilitate dialog concerning the factors impacting safe trade in aquaculture and develop a discussion document on zoning and compartmentalization in aquatics to inform policy and decision makers. Fifty-two individuals from nine countries participated in the workshop. (McCarthy)
- Advanced epidemiology course for the Screwworm Program and support on the assessment of intervention options for the program. Panama, April 30-May 6, 2013 (Zepeda)
- Invited by Food and Agriculture Organization of the United Nations (FAO-UN) as a resource person/ mentor to train the veterinarians from India in Field Epidemiology Training Program for Veterinarians (FETPV) held in India during July 2012, to train veterinarians from SAARC (South Asian Association for Regional Cooperation) countries in Nepal during November-December 2012 and during September 2013. (Rao)
- Conducted workshop approved from Indo-US Science and Technology Forum (IUSSTF) on 'Biosecurity and public health challenges in Veterinary Hospitals in India – Bridging the gap between human and animal health. Principal Investigators: M.D. Salman, K. Satish Kumar. Co-Principal Investigator: Sangeeta Rao. March 5-8, 2012 in Hyderabad, India. (Rao)
- Developed protocol for statistical analyses for the training of staff for "Investigation of anthrax in animals in the country of Georgia" during 2013. (Rao)
- Mentored research scholar from India on her 4-month fellowship program on food safety funded by Indo-US Science and Technology Forum (IUSSTF) during Oct 2013-Feb 2014. (Rao, Salman)
- Planned and directed the annual CRWAD meetings, December 2012 & 2013. (Ellis)

APPENDIX A

KEY APHI COLLABORATORS

COLLABORATORS		Title; Affiliation
Booker	Calvin	Epidemiologist and Beef Production Specialist; Feedlot Health Management Services
Brigner	Tiffany	Laboratory Director, Rocky Mountain Regional Animal Health Laboratory Animal Industry Division Colorado Department of Agriculture
*Dargatz	David	Veterinary Epidemiologist; USDA, APHIS, VS, CEAH
Granger	Larry	Director; USDA, APHIS, VS, Center for Epidemiology and Animal Health (CEAH)
*Lombard	Jason	Veterinary Epidemiologist; USDA, APHIS, VS, CEAH
*McCluskey	Brian	Chief Epidemiologist; USDA, APHIS, VS
Nol	Pauline	Wildlife Disease Investigator; USDA, APHIS, VS, WR, WiLDIT
Pelzel-McCluskey	Angela	Regional Epidemiologist - Poultry, Equine; USDA, APHIS, VS, Western Region
Portacci	Katie	Veterinary Medicine Officer - Risk Analyst; USDA, APHIS, VS, CEAH
Roehr	Keith	State Veterinarian; Colorado Department of Agriculture
Reynolds	Debby	Retired Chief Veterinary Officer, United Kingdom
Rhyan	Jack	Wildlife Disease Investigator; USDA, APHIS, VS, WR, WiLDIT
Stärk	Katharina	Professor of Veterinary Public Health; Royal Veterinary College, University of London
Wagner	Bruce	Director; USDA, APHIS, VS, CEAH, Monitoring and Modeling
Weber	Stephen	Director; USDA, APHIS, VS, CEAH, Risk Identification and Risk Assessment
Wongsathapornchai	Kachen	Veterinary Epidemiologist; Thailand

*denotes Institute Advisory Group member