From today until at least 2050, the world demand for animal protein will grow enormously in a global economy that is more interconnected than ever before. Today, and for the foreseeable future, more and more animals and animal products will cross national borders with related economic benefits and associated risks.

Never in human history have we seen urbanization occurring as fast as it is today. Never before have so many people relied on so few to produce their safe food supply. Also never before have so many people been so exposed to infectious disease with seventy percent of new diseases in humans coming from wild or domestic animals (remember for example SARS, Ebola, Swine and Avian Flu).

As global societies evolve we ask more of our animal welfare standards and we rely emotionally more and more on the companionship of animals. One of the best performing US companies since the “great recession” has built its success on this human-animal bond.

For the foreseeable future we face a critical human healthcare challenge that requires trained paramedical personnel as well as a continuing supply of graduates willing to pursue further education in the health fields. We also live in a world that has more microbes around, on and even in us, than there are cells of all other organisms on Earth combined.

As the “genomic revolution” unfolded in the first decade of this century, health research in humans, as well as animal research for health and production, became an informational and computational science. Today computing is as fundamental to human and other animal research as microscopes have been historically. The genomic revolution is also driving the bioscience and biomedical industries. Arizona is one of the top five US states for growth in the bioscience and biomedical industries. If Arizona's bioscience and biomedical companies are to remain in Arizona, and for new ones to emerge here, they need highly trained employees.

It will be the talented individuals whose vision created our newest school, the School of Animal and Comparative Biomedical Sciences, who will rise to meet the challenges above, as well as many others we don’t yet recognize. Some of their visionary work is illustrated in the following pages.

We are extremely proud of this new school and its people. It was devised in Arizona's centennial year with a genuine vision for Arizona's future success.
Dedication of the School of Animal and Comparative Biomedical Sciences
March 29, 2013

8:30am  Registration
8:45am - 9:45am  Western Breakfast/Live Music
9:45am - 11:30am  Emerging Trends, Opportunities and Research
11:30am - 12:00pm  School Dedication
12:00pm - 1:00pm  Lunch

Speakers:
Robert F. Moran, Chairman and Chief Executive Officer, PetSmart, Inc.
Mara Aspinall, President, Ventana Medical Systems Inc.
Head, Roche Tissue Diagnostics
Andrew Maccabe, DVM, MPH, JD, Executive Director, Association of American Veterinary Medical Colleges

1:15pm - 2:15pm  AG 100 Business Meeting
2:15pm  Adjourn

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Agricultural Research Center

Faculty at the Agricultural Research Center are dedicated to improving the performance of agriculturally important species by investigating factors such as environmental stress, reproduction and feed intake that affect animal physiology.

Dr. Robert J. Collier is currently Professor and Director of the William Parker Agricultural Research Complex. His research is focused on the effects of heat stress on gene expression and its impact on dairy production. He also conducts studies on the regulation of milk secretion and collaborates with Dr. John Smith in implementing heat abatement strategies that can alleviate the effects of environmental heat on dairy cattle.

Dr. Vince Guerriero’s research is focused on the biochemistry of proteins that regulate the heat stress response and development of these proteins as drugs. His laboratory has discovered and characterized a gene that codes for a protein that regulates the heat stress response and is involved in cancer cell growth. His research will improve the understanding of animal adaptation to stress and will provide new treatments for cancer.

Dr. Sean Limesand is an endocrinologist and his research is focused on improving perinatal health by defining metabolic and endocrine mechanism that are impaired by fetal complications of placental insufficiency. In livestock, fetal growth restriction is induced by either nutritional manipulation or environmental heat stress and is proposed to impose lasting limitations on production efficiency.

The William J. Parker Agricultural Research Center, a 55,000 square foot environmentally controlled facility which includes large and small animal surgical capability, whole animal metabolism and environmental challenge modules for domestic animals as well as microbiology and cell culture labs. Photo Credit: Page 4 and 5, RTIP

Dr. John Smith is a nationally and internationally recognized expert
Dr. Benjamin Renquist is a nutritionist conducting research with four aims directed at improving efficiency of growth in aquaculture and agriculturally important species. These four aims include the control of food intake, the effect of heat stress on dairy cattle, the role of metabolic rate in aquaculture specie growth and lastly, the development of an injectable sterilant. His focus on control of food intake and energy expenditure is also tied directly to work in the obesity field.

Dr. Randy Bogan is a reproductive physiologist and his research is focused on identifying the mechanisms controlling the structure and function of the ovarian corpus luteum, a gland that produces the hormone progesterone which is required for maintenance of pregnancy in all mammalian species. This research has implications for reducing early embryonic losses in domestic animals and humans.

Dr. Ronald Allen is a pioneer in the study of skeletal muscle stem cells (called satellite cells) in domestic animals and humans. Dr. Allen’s research has led to an understanding of how the body signals satellite cells to multiply, form muscle fibers and self-renew to maintain the satellite cell population. Satellite cell function is relevant to muscle growth in domestic animals, to human muscle disease and injury and to problems associated with aging.

The research conducted at the Agricultural Research Center has both biomedical and production-level application. Together this team of researchers addresses the areas that most limit animal performance and affect animal and human health.
Aquaculture

The Aquaculture Pathology Laboratory (APL) is an OIE (Office International des Epizooties or World Animal Health) Reference Laboratory and a USDA APHIS Approved Laboratory for testing of live shrimp and other products intended for export. The services provided by the APL include disease diagnostics, surveillance and reference lab services from the main diagnostic lab, quarantine and disease challenge services at the West Campus Aquaculture facility and technical services and training to governments, companies and aquaculture cooperatives located in the United States, Latin America, Africa, the Middle East, Oceania and in east and southeast Asia.

The APL also carries out a variety of applied research projects for USA-based and foreign companies. This includes quarantine and disease challenge studies to evaluate genetic gains in disease resistance to several OIE-listed shrimp virus diseases provided primarily to commercial shrimp breeding companies located in Hawaii and Florida. Research activities are aimed at developing new tests for shrimp disease diagnosis and for evaluating specific antibacterial and antiviral compounds.
Bioinformatics

New technologies mean that agricultural and biomedical researchers are able to collect and produce an increasing amount of data at an increasing rate. However, for this data to be translated into gains for agricultural production and human health, researchers need to be able to model their data in a way that enables them to understand the complex biological processes they are studying. Bioinformatics is the use of computing and information sciences to link our existing knowledge to experimental data and analyze it in a way that bridges the gap between research and agricultural production or clinical use.

Researchers at the School of Animal and Comparative Biomedical Sciences use bioinformatics and computing to provide information about genes found in agricultural and biomedically important animals, what they do and how they work together to create an organism. We provide free, public databases that are used by researchers worldwide to make sense of their data. We also provide training and outreach for researchers and students who wish to learn how to apply this information to their own research projects.
Microbiology

Microbiology is a very broad discipline that encompasses the fields of Virology, Bacteriology and Parasitology. In the area of bacteriology the School of Animal and Comparative Biomedical Sciences is well represented with the labs of Drs. Vedantam, Viswanathan, Ravashankar and Law. Dr. Vedantam’s lab focuses on the molecular characterization of non-toxin virulence factors of the diarrheic disease pathogen Clostridium difficile and is aimed at designing interventions to combat as well as prevent infection. This bacterium is a leading cause of nosocomial disease worldwide. Dr. Viswanathan’s laboratory focuses broadly on interactions between enteric pathogens and host intestinal epithelial cells, bacterial pathogenesis and innate immunity using Escherichia coli as a model. The laboratories of Drs. Ravashankar and Law are also engaged in bacterial work, largely related to food safety.

The laboratories of Doctors Riggs and Sterling focus on parasitology-related research. The focus of Dr. Riggs’ lab is on the development of recombinant vaccines and novel new drug discovery for prevention and treatment of cryptosporidiosis in calves and humans. Cryptosporidium is a major cause of diarrheal illness worldwide. Dr. Sterling currently is engaged in zoonotic disease research on several parasitic illnesses that occur in Peru but have impact throughout the Americas.

Collectively, these microbiology laboratories utilize many of the biotechnological and bioinformatic tools that will be at the forefront of the School of Animal and Comparative Biomedical Sciences.
Foodborne diseases due to microbial pathogens, biotoxins and chemical contaminants in food represent serious threats to the health of people around the globe. The School of Animal and Comparative Biomedical Sciences has three laboratories working to address these concerns and to find new food safety solutions.

Dr. Bibiana Law’s laboratory is one of the leading laboratories worldwide in the development of a vaccine to reduce Campylobacter in chickens. To date, there is no vaccine available to industry to reduce the numbers of Campylobacter in poultry and intervention strategies remain insufficient.

The focus of Dr. Sadhana Ravishankar’s laboratory is to determine the survival of foodborne pathogenic bacteria and controlling them in foods using natural interventions. Effective means of natural interventions using plant compounds, organic sanitizers and edible films to control foodborne pathogenic bacteria on organic leafy greens, cantaloupes and other foods are being evaluated.

The Food Products and Safety Laboratory, a federally inspected meat processing plant, is heavily involved in conducting microbiological and chemical analyses of various food products for consumers and businesses, as well as providing training to students in food safety procedures. This facility provides an outstanding unit for students to gain hands-on experience working with meat animals, carcasses and with instrumentation designed to evaluate food products for microbiological evaluation and chemical analyses.
Undergraduate Education

The School of Animal and Comparative Biomedical Sciences houses three majors; Animal Sciences, Veterinary Science and Microbiology.

The Animal Sciences degree encompasses a wide range of animal science and industry areas of study including food safety, equine or dairy production, industry and production animal systems, marketing, research and utilization of animals in agriculture, entertainment and companionship. The diverse curriculum allows students to focus on specific areas suited to their individual interests.

A major in Veterinary Science provides it’s students with a solid foundation in modern and advanced biology with an applied focus on the health and welfare of animals. It is utilized by pre-vet and pre-med students as well as by students who plan to pursue graduate school or employment right after graduation.

A major in Microbiology provides a solid foundation in modern biology with an applied focus on microorganisms such as bacteria, viruses, fungi, algae, parasites, protozoans, etc. Given the focus on microbes, students learn about infectious diseases and how microbes interact with their environment and their host organisms. The major is utilized by pre-med, pre-vet, pre-pharm, and pre-health students as well as by students who plan to pursue graduate school or employment following graduation.

To assist students in achieving their academic goals the School boasts a healthy scholarship program of over $250,000 per year.
In addition to the many internship opportunities available students can also participate in extracurricular activities. These include:

The Collegiate Cattle Growers Association (CCGA) works to promote the beef industry and educate students with hands-on livestock experiences. Opportunities include breeding, raising and showing livestock, overseeing meat sales, hosting livestock shows and interacting with key members of the Arizona livestock industry.

The University of Arizona Equestrian Team competes through the Intercollegiate Horse Show Association (IHSA). Riders compete in Hunt Seat Equitation, Hunter over Fences and Western Horsemanship classes at horse shows held in California and Arizona.

The Livestock Judging Team provides students the opportunity to participate in a collegiate judging program. Team members compete in eight judging contests a year located throughout the country.

The Microbiology Club is a national organization student chapter (American Society of Microbiology) that is dedicated to promoting interest in life sciences and microbial awareness in all fields of microbiology.

The Pre-Veterinary Club at the University of Arizona works to expose veterinary science majors, and any other students who are interested, to the veterinary and animal world through speakers, field trips and volunteer opportunities.

The University of Arizona Rodeo Club is a time honored tradition and has the distinction of being the oldest intercollegiate rodeo club, established in 1939. Members participate in the Grand Canyon Region of the National Intercollegiate Rodeo Association (NIRA) circuit.

The Wildlife Disease Association (WDA) is a student chapter of the national Wildlife Disease Association. The WDA works to educate and develop the skills of students in different aspects of wildlife health and ecology, as well as connect students with authorities in the field.
Race Track Industry Program

The Race Track Industry Program (RTIP) at the University of Arizona is the only program in North America to offer both an undergraduate and graduate degree program that specializes in the racing industry. The RTIP has produced almost 600 graduates for the pari-mutuel racing industry with careers spread not only throughout the nation but internationally as well. The RTIP curriculum is enhanced with industry guest speakers who provide students a diverse base of knowledge and custom-designed internship experiences to provide a critical link for students to put scholastic knowledge into context. Seniors complete a capstone research project and have the opportunity to present their research findings to an audience of international racing leaders at the annual Global Symposium on Racing & Gaming. All of these activities allow students to establish relationships with industry professionals prior to graduation.

The RTIP has gained worldwide recognition for its annual Global Symposium on Racing & Gaming held in Tucson each December since 1974. The Symposium attracts attendees from racing interests around the globe; 20 different countries were represented in 2012. The RTIP also organizes and conducts Racing Officials Accreditation Schools as well as continuing education programs for the national racing association. Faculty and student research is published and provided to the racing industry.
Cooperative Extension and Outreach

The School of Animal and Comparative Biomedical Sciences has a very strong Cooperative Extension and Outreach program which provides service to Arizona’s beef industry, dairy industry, food producing entities and the equine industry.

Equine Extension program efforts are directed at providing information and advice to horse owners in a variety of topics in horse production and management, with emphasis on nutritional management and reproductive management. Annual short courses in Equine Reproductive Management are conducted in the spring and fall at the UA Agricultural Center. Each spring, support is provided to County and Tribal Extension Agents in the development and implementation of two major tribal programs held on the Navajo Nation in the area of equine production and management.

The main focus of the dairy extension program is environmental management on commercial dairies. Milk production per cow has a dramatic impact on the profitability of dairies. By working with individual producers to improve their ability to manage heat stress, producers are able to improve milk production per cow. The Dairy Extension program also hosts several conferences including the Arizona Dairy Production Conference, the Southwest Nutrition and Management Conference, Arizona Dairy Day and the Western Dairy Management Conference.

Range cow nutrition and intake is the main focus of the beef research and extension effort. Being able to identify cows that are efficient under Arizona range conditions will improve the economic viability of Arizona beef producers and improve the environmental impact of their beef operations. The beef extension program provides workshops in Beef Quality Assurance (BQA) certification, food safety education, as well as two one-day workshops each year on range livestock nutrition, Ranch Explorers Day at the V Bar V Ranch and hosts the annual Arizona Cattlemen’s College.
Arizona Veterinary Diagnostic Laboratory

The Arizona Veterinary Diagnostic Laboratory (AzVDL) provides accurate and timely diagnostic assistance in animal health to veterinarians, animal owners, university researchers and state and federal agencies. The laboratory serves a diverse client base with submissions of wild animals, exotic zoo animals, pet animals, horses and food producing animals. AzVDL works closely with the Office of the State Veterinarian, USDA, Arizona Game and Fish and other state and federal agencies.

Services provided by the AzVDL include pathology (necropsy, histopathology, cytology, immunohistochemistry and other diagnostic tools used to determine the cause of disease), microbiology (the use of microbiological techniques to identify bacteria, viruses, parasites, and other infectious agents, and their relationships to animal disease), molecular diagnostics (polymerase chain reaction to identify infectious agents), serology (analysis of serum to monitor animals’ prior exposure to diseases) and toxicology (testing available by referral to cooperating labs).

Veterinarians and staff at the AzVDL are actively involved in independent and collaborative research projects, teaching and extension. The AzVDL is a key participant in the Arizona Livestock Incident Response Team (ALIRT) and assists in the investigation of unique or unusual health situations.

ALIRT is a response team composed of veterinarians, Arizona Cooperative Extension personnel, Department of Agriculture livestock officers and other specialists. The program is a valuable service provided to Arizona livestock producers and is designed to enhance the diagnosis of unexplained livestock deaths.
University Animal Care

University Animal Care (UAC) ensures humane and appropriate animal care and use by monitoring the use of animals by principal investigators, technical personnel and students. Daily husbandry and veterinary care is provided for the wide-range of animal species utilized in biomedical and life science research. The UAC faculty and staff are devoted to maintaining a safe environment that minimizes the risk of disease or injury to the animals and the personnel who use them. UAC strives to meet the highest standards of animal care and use and is fully accredited by the Association for the Assessment and Accreditation of Laboratory Animal Care (AAALAC).

UAC faculty and staff participate in teaching and training of undergraduate, graduate and professional students in the areas of Laboratory Animal Science and Comparative Medicine, and are also actively involved in research activities. UAC provides expertise and technical support to researchers in the areas of veterinary anesthesia, analgesia, emergency/critical care, surgery and pathology.

David Besselsen, DVM, PhD, DACLAM, DACVP
Director, University Animal Care and Adjunct Associate Professor

Cynthia Doane, DVM, MS
Assistant Veterinary Specialist

Paula Johnson, DVM, MS
Adjunct Professor and Assistant Veterinary Specialist

S. Peder Cuneo, DVM, MS, ABVP
Extension Veterinarian and Associate Director, Farm Services

Susan Wilson-Sanders, DVM, MS, DACLAM
Associate Director, University Animal Care and Professor
Contact Information

School of Animal and Comparative Biomedical Sciences
1117 E. Lowell Street
PO Box 210090-0090
Tucson AZ 85721
520-621-2355