

School of Animal & Comparative Biomedical Sciences

Feature

ISSUE HIGHLIGHTS

Research



The hard work of ACBS Faculty has been recognized in recent grant funding, including a \$2,398,682 grant from the National Institute of Diabetes and Digestive and Kidney Diseases with Principal Investigator Dr. Sean Limesand.
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Teaching



The Human and Animal Interrelationships class (ACBS 160) brought a variety of domesticated animals to the UArizona Mall for student interactions and selfies.
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Extension



Participants in the Arizona State 4-H Horse Judging Contest competed at the Campus Agricultural Center on 5/15/2022.
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Calving Management Course Provides Cattle Handling Experience in Tucson and at the V Bar V

Students at the UArizona have a unique opportunity to further their knowledge of calving and cattle handling through the Calving Management course (ACBS 397A). The course is offered during the Spring semester. Students gain a basic background of range cattle reproduction management, as well as hands-on experiences, working with cattle at the UArizona Campus Agricultural Center (CAC) in Tucson and the V Bar V, the UArizona's working cattle ranch, located in Camp Verde, AZ.



The cows at the CAC begin to calve during the last week of January, this allows for students to dive right in. Students help give neonatal vaccines, ear tag calves for record keeping, and observe normal healthy behavior pre and post calving of cows and calves. Students learn about the phases of calf delivery, assistance for dystocia management, and post-partum cow/calf care.

At the start of the semester students meet for their scheduled class time at the CAC. Each class begins with a structured lecture in a classroom and then relocates outside to the pastures for a hands-on lab experience. Along with calving management students learn about safely working with and around cattle. This includes the low stress handling of cattle. Students learn about flight zones, and how to calmly move the animals and be near the cows without stressing them.

As students become more proficient in their cattle handling, they are able to help with administering annual vaccines, estrus synchronization, artificial insemination, and boosting of vaccines for the calves at 3 months of age. Having cattle located in Tucson for students to work with has increased the amount of hands-on experiences students are able to participate in during the course.

(Calving Course continued on 2)



Students observe cattle for signs of calving at the V Bar V ranch.

Recent ACBS Grant Funding Highlights



Placental Insufficiency and Beta-Cell Function

Dr. Sean Limesand, a professor in ACBS, has been awarded **\$2,398,682** from the **National Institute of Diabetes and Digestive and Kidney Diseases** to study the “Prevention of Placental Insufficiency Improves Beta-Cells Function”.

The placenta is the highly specialized organ that forms during pregnancy to provide oxygen and nutrients to the growing fetus. Insufficient placental

function can cause the insulin-releasing cells in the fetal pancreas to fail due to low oxygen and nutrition conditions.

Limesand, along with co-investigator, Dr. Ravi Goyal, will use this project to test approaches that lead to correcting low oxygen and nutrient conditions in the fetus and, thus, prevent pancreas dysfunction in the fetus.

The Role of Blood Flow in Heat Stress

Principal Investigator, **Dr. Benjamin Renquist**, has been awarded **\$650,000** from the **National Institute of Food and Agriculture (NIFA)**. Dr. Renquist will investigate “The Role of Blood Flow in Heat Stress Hypophagia and Hypogalactia” with fellow UArizona co-investigators, Drs. Sean Limesand (ACBS) and Paulo Pires (Physiology).

Heat stress decreases the profitability and efficiency of the U.S. animal production industry. Heat exposure shifts blood flow toward the skin and away from internal organs decreasing feed efficiency and milk production. Cooling strategies can reduce heat exposure however are highly dependent on water and energy. Global climate change demands that we find water and energy independent strategies to limit production losses caused by heat.

This project is focused on restoring normal blood flow to the digestive tract and mammary gland to increase feed intake and milk production in heat exposed animals.



Live Biotherapeutic Anti-Infective for *Clostridioides difficile*

Clostridioides difficile can cause life-threatening diarrhea, and *C. difficile* Infections (CDIs) are dominant in both healthcare and community settings. Currently, antibiotics are the only fully FDA-approved treatment for CDI, but they are associated with persistent gut dysbiosis, and therefore, recurrent *C. difficile* infections in a significant proportion of patients. There are no licensed vaccines to prevent CDIs.

Principal Investigator, **Dr. Gayatri Vedantam**, has been awarded **\$408,653** from the **National Institutes of Health (NIH)** for work on “A Bio-controlled, Microbiota-Sparing, Live Biotherapeutic Anti-Infective for *Clostridioides difficile*”.

In this project, Dr. Vedantam proposes to refine an orally-administered, live biotherapeutic that was previously developed by her lab. The new anti-infective agent will prevent CDI in a multi-pronged manner highlighted by both niche occupancy (colonization resistance) as well as adaptive immunity (oral vaccine) against the pathogen and its toxins. Further, and via a precisely-engineered “kill-switch”, the technology will not engender either extensive dysbiosis or drug resistance attendant with antibiotic use.



(Continued from 1)

Calving Course

At the end of February, students are invited to the UArizona V Bar V ranch to further their skills. At the ranch students watch heifers during the night for calving and learn to palpate for pregnancy detection and pelvic measurements which support best practices for cow/calf operations. Students benefit from working with long time managers of the V-V, Bopper and Keith Cannon, as well as with Dr. Joslyn Beard, the Livestock Extension Specialist for Arizona.

Course instructor, Amber Hubbell, MS, has been the manager of the beef herd in Tucson for 5 years. She is very passionate about cattle and educating students. About the course, Hubbell says, “My goal for this course is to provide as many hands-on opportunities for students as I can, both during class time and outside of class. Managing the cow herd, has allowed me to utilize them for teaching before going to the ranch where students are exposed to a few hundred head of cattle. I love working with cattle and love sharing that with the students.”



Clockwise from top left:

- Students practice palpating cows under the direction of V Bar V Ranch Livestock Specialist, Keith Cannon.
- Students move calves between pens using low stress handling techniques.
- Dr. Joslyn Beard, livestock extension specialist, demonstrates how to bottle feed a calf.



From the Director



Ahh, summertime. The pace is slower and vacation time beckons. My family and I love visiting the Alps to hang with the dairy cows in the high meadows, and so off we went in June to meander with the cows across those glorious, sun drenched meadows of Germany, Switzerland, France, and Italy. For a good part of the summer these rather large-horned alpine cows are on their own, with the herd being led by one apparently dominant cow that will casually push you aside if you're in its path (image below). Spending time with the cows, tuning in to the distinctive sounds of each of their bells, I wondered if they were bothered by the constant, albeit to us pleasant, clang of the bells affixed to their necks. They are. Studies show that the noise is detrimental to their hearing and feeding behavior. On the whole though, it seemed to me that their life was likely a pleasant one and reminded me of the responsibility we have to provide animals in our care with the highest possible level of welfare—a life that, as much as possible, is not only free of stress and suffering but also one of flourishing.



One of the features of our school that distinguishes it from other departments and programs within CALS, if not the entire university, is our responsibility for the care of numerous animals both large and small. ACBS owns cattle, sheep, horses, mice, and, yes, shrimp. All are used for a variety of purposes that span teaching, research, and extension. We have dedicated veterinary, farm, and laboratory staff that are responsible for the daily lives of our animals. But can more be done to enhance the quality of their lives?

The answer depends on our assessment of an animal's capacity for suffering or joy. As humans we clearly value a life that overall has a greater balance of joy and fulfillment over suffering. This is because we are sentient, or feeling, creatures, but are we uniquely so among all animals? Although we can never be sure whether another animal (or, for that matter, another human) is conscious or has feelings, more and more scientific evidence now favors the view that all mammals, many other vertebrates, and perhaps some invertebrates (e.g., octopus) are sentient and hence can feel pain, or suffer in other ways, and strive for pleasure. (For those interested in the question of animal sentience, there is a relatively new, open access, interdisciplinary, peer-reviewed journal devoted entirely to the topic: *Animal Sentience* <https://www.wellbeingintlstudiesrepository.org/animsent/>)

It is easier to appreciate from their behavior that other animals can suffer (e.g., withdrawal from pain) than it is to recognize that they also experience positive feelings, such as joy, or, say, aesthetic pleasure. Such positive feelings are harder to detect from behavior. Social play may be an exception. Like humans, animals at

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- Page 12 - All photos - Dr. Sadhana Ravishankar
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From the Director

play look and sound like they are having fun (rats, dogs, and apes “laugh” during play). But what about ‘loftier’ pleasures, such as the enjoyment of music? Turns out not only humans are positively affected by music. While the clang of the cowbells is not enjoyable to their bovine wearers, experiments show that cows do have a taste for music, an apparent aesthetic pleasure that increases their milk production! Pigs, too, yes, those ‘uncultured swine’, have a taste for particular genres of music. A farmer colleague in Rwanda shared with us that when his pigs heard country music, and only country music, they produced more piglets. Our farmer friend had not conducted experiments to test the effects of music, but the effects of different kinds of music on pig mood and growth are backed by research. Research in this area is in its infancy, but it is direly needed because of its direct implications for how we should treat animals in our care. One thing is clear already, from a purely utilitarian standpoint, improving the welfare of the animals in our care leads to more of the end-product we desire, whether it is more milk, piglets, or reliable research results.



To be sure, the provision of animal welfare has improved steadily since the term was coined a century ago. Today, animal welfare regulations and laws regulate the care we provide for animals, whether farmed or used for research. For example, animal research at our university must comply with the now well-known 3 Rs: Replacement, Reduction, and Refinement, and the welfare of livestock is governed by adherence to the “five freedoms” (e.g., freedom from hunger, thirst, pain, fear). The most significant recent change in our understanding of animal welfare is the recognition that animals have mental needs in addition to physical ones, and that improved welfare fundamentally means an improved mental state. For example, it is more and more appreciated that having a sense of agency, by allowing an animal to express its preference for foods, social partners, toys, use of space, etc., improves its mental state and hence its welfare. Many countries (especially, Germany, France, Spain, New Zealand) are ahead of the US in their recognition that nonhuman animals are sentient with complex needs and desires, and thus deserving of respectful, humane treatment. In my journey to the Alps and southern Spain just a few weeks ago, I became acutely aware of this difference in how our animal relations are regarded and valued, and it stood as a forceful reminder of work we can do here at home to improve the lives of our animals on farms, in research labs, and even in our homes.

We can begin by building greater awareness of animal behavior and its connection to welfare among our students and all those who work tirelessly in our labs, farm facilities, and extension sites. For example, as part of the Animal Science and Veterinary Science curricular revision, we will create a new course on animal behavior and welfare. All of us who have animals in our care, must recognize them for the sentient beings they are and become actively engaged in the improvement of our husbandry and processing facilities to meet the highest standards of welfare. ACBS should and can take a leadership role in the scientific understanding of animals and their humane treatment. Our school’s Mission and Vision wisely include the commitment “to improving animal and human health and welfare” because we have come to recognize that human and animal welfare are tightly interconnected.

At this midsummer’s point, as the dawning realization is upon us that a new semester is around the corner, let us all be ever mindful of the needs of the animals in our care. Their lives and ours will be better for it.

H. Dieter Steklis

Director Interim and Professor, ACBS
Affiliate Faculty, Psychology and Family Studies & Human Development
Co-Director, Human-Animal Interaction Research Initiative (HAIRI)
University of Arizona
Emeritus Professor of Primatology
Rutgers University

Promotions & Tenure

ACBS is excited to announce the promotion of the following faculty members. Congratulations to all!

- **Dr. Katherine Broneck**
promoted to Associate Professor of Practice
- **Dr. Margarethe Cooper**
promoted to Associate Professor of Practice
- **Dr. Crista Coppola**
promoted to Associate Professor of Practice
- **Dr. Arun Dhar**
promoted to Full Professor (with tenure)
- **Dr. Rebecca Kochanowsky**
promoted to Associate Professor of Practice

Animal Encounters Connect Students to Animals

Though the rates of dog and cat ownership in the US and even in other countries is steadily climbing, fewer people have a chance to ever meet and interact with other domesticated animals. Since the Industrial Revolution and the resulting massive population shift into urban centers and now suburban living, people only see animal products but not the individual live creature. They see milk cartons but not a cow, or eggs but never a chicken.

For this reason, as a part of ACBS 160, the introductory class on “Human and Animal Interrelationships”, course instructors Drs. Dieter and Netzin Steklis, make an effort to bring animals to campus through their “Animal Encounters” extra credit activity. The opportunity facilitates interactions between students and live animals, and while brief, encourages curiosity and connection to them. Several students commented that they loved this class activity because they had never interacted with either a horse, chicken, rabbit, or goat before and are thankful for the opportunity to just be with them.

About the activity, Dr. Netzin Steklis says, “What we find is that when students have the opportunity to interact with animals, they quite naturally find their own way to connect what they have learned about domesticated animals to their own interests and background”.

A few examples of those connections were: A student who was a history buff loved to hear about the importance of chickens for the Roman army; A student who likely had a family tradition of deer hunting, was amazed to find out that just like deer, a female rabbit is called a doe and a male is a buck; Another student who sat for a long time with a rabbit took a special interest in the fact that rabbits are used as therapy animals to alleviate anxiety; One student that suffered from cat allergies learned that if you are allergic to cats you are most certainly allergic to rabbits too!

Dr. N. Steklis goes on to say, “I also hope that with this one-on-one contact with animals students continue to build understanding, respect, and ultimately practice more humane treatment of animals we keep as pets or livestock”.

To measure the impact of the course and the animal encounters activity on students beliefs, students were given a survey which asked them to rate how much they agree or disagree with statements about their attitudes towards animals or animal welfare. 556 of the students in the spring course responded, with the majority indicating they expanded their view of domesticated animals:

This course changed my attitude (i.e., my feelings, beliefs or behaviors) toward one or more domesticated animals. Strongly agree or Agree = 73% of responding students.

Students make connections with various domesticated animals including goats, miniature horses, rabbits, and chickens during the ACBS 160 “Animal Encounters” interactive exhibit on the UArizona Mall.

This course led me to think differently about the welfare of domesticated animals. Strongly agree or Agree = 77% of responding students.

This data shows that learning about animals, their long history with people, and their influence on human culture and biology, coupled with a close encounter ‘of the animal kind’, enhances students’ appreciation of their connection to, and humane treatment of, animals.

Dr. N. Steklis was particularly heartened by these compelling statistics and says, “That is motivation for me to continue the extra effort for this extra credit activity”.



Internships On Tap For RTIP Students This Summer

Hands-On internships are an important component of the Race Track Industry Program (RTIP) experience. In fact, internships are so important, they are required for students to graduate. These training opportunities allow students to take their classroom education and apply it to the real world.

All-important connections with industry stakeholders are also a key part of the internship experience. “Internships align with the University of Arizona’s Pillar 1 – the Wildcat Journey” noted Robert Hartman, RTIP endowed chair. “ACBS has also placed high value on experiential learning as part of its strategic plan and we are pleased our students can take part in these invaluable experiences.”

Here is a snapshot of some RTIP 2022 summer internships:

Eric DeCoster – New York Racing Association (NYRA)

Department: Racing

Eric will be learning the ins-and-outs of the racing department under the tutelage of racing secretary and RTIP alumnus Keith Doleshel. Keith and Eric connected at the 2021 Global



Eric DeCoster at Belmont Park.

Symposium on Racing where the internship opportunity was first discussed.

Ben Atkinson – Del Mar Thoroughbred Club (Del Mar, CA)

Department: Racing

Ben will be stationed in the racing office located in the barn area on entry days while learning the fundamentals of taking entries and the condition book. Ben will also work with the various racing officials – from the paddock judge and horse identifier to the stewards.

Alexa Bernal – Arizona Downs (Prescott Valley, AZ)

Department: Photography

Alexa will be working for Coady Photography, the worlds leading track photography company and the official track photographer of 32 race tracks in North America, including Arizona Downs, Churchill Downs, and the Kentucky Derby. Alexa made the internship connection while working at Rillito Park this Spring as a camera operator.

Hailey Shiffer – Arizona Downs (Prescott Valley, AZ)

Department: Television Production

Hailey will be working with RTIP alumnus, Aaron Vercruyse, as part of the on-air handicapping team. Hailey parlayed her handicapping duties at Rillito Park into this summer opportunity. The Arizona Downs broadcast will be aired at tracks nationwide.

Mohanad Almokhadm – Gulfstream Park (Hallandale Beach, FL)

Department: Racing

Mohanad will be working alongside Gulfstream Park racing secretary and RTIP alumnus, Michael Costanzo, while learning the ins-and-outs of the racing department. Mohanad connected with Michael and Director of Racing, Mike Harlow, during the February student field trip to Florida.

Students will be providing updates on social media as the summer progresses. Follow the summer internship and all RTIP news at <https://www.facebook.com/rtip.ua>.

ACBS End of Year Awards

ACBS held their annual End of Year get together on May 5, 2022. Several faculty, staff, and graduate students were recognized by their peers for their outstanding performance over the past year.

Outstanding Staff in Research

- Dipali Goyal (R. Goyal Lab)
- Dr. Estela Jasmin Jauregui (Craig Lab)
- Libin Zhu (Ravishankar Lab)

Outstanding Staff Member

- Jason Lindsey
- Aurora Plascencia

Outstanding Faculty in Extension

- Dr. Jerry Lopez (STEM)

Outstanding Faculty in Research

- Dr. Kerry Cooper

Outstanding Faculty in Teaching

- Dr. Sadhana Ravishankar
- Dr. John Scott Wilbur

Outstanding Graduate Student in Teaching

- Gabriela Hilda Pedroza

Outstanding Graduate Student in Research

- Kirat Khushwinder Bains (Ravishankar Lab)
- Jenna Marie Fenwick

ACBS Above and Beyond Award

- ACBS Student Advising Team
- Dr. Jennifer Lising Roxas (Vedantam Lab)



(Left to Right) Kirat Bains, Sadhana Ravishankar and Libin Zhu displaying their Certificate of Excellence Awards.

Microbiology Alumnae Finds Career in Food Safety

UArizona alumnae, Kami Weddle, is the director of food safety and quality at Rousseau Farming Company in Phoenix. For the past 15 years she has implemented and maintained the safety and quality programs for the 9,000 acre produce farm. She has also managed the air quality program, risk management and workplace safety, and health programs. About her position, Kami says, "I enjoy the collaboration that takes place between food safety professionals across different organizations to enhance the safety of our products. There is promising research being conducted right now and it's our responsibility as food safety professionals to implement new guidance's based on that research that are practical and feasible for our growers to use."

Kami graduated from the UArizona with a Bachelor of Science in Microbiology and a minor in Chemistry in 2004. She then went on to receive her MBA from the University of East Anglia. She is an Arizona native, having grown up on a family farm in Yuma. She was heavily involved in 4-H, FFA, and Student Council. She credits all three organizations with shaping her into who she is today by developing her skills in leadership and communication. A career in food safety was not originally on Kami's radar however the UArizona helped provide her with the necessary tools to lead her on to this career path.

Kami was very strategic in her decision to major in microbiology. She knew she was interested in the sciences, but it was important to her to be able to stay connected with agriculture. Having the microbiology program housed in the College of Agriculture and Life Sciences (CALs), rather than the larger College of Science, gave her the connection with agriculture she wanted. Another draw for Kami was the CALs ambassador program. When entering CALs, she appreciated the unique contribution the ambassador's brought to the college and wanted to be a part of this dynamic group of young leaders.

One important aspect of college that Kami would like to emphasize to current and incoming students is, "The larger value for students in college is not the actual courses you are taking (although it is important) the larger value for me was connecting with alumni,

industry members, experts, extension agents, etc. at events and learning from their experiences. Networking with those members is extremely important for your future career and the direction your career takes. Those connections I made back in 2000-04 are connections I still rely on today."

Kami stays engaged in the agriculture and food safety industries by serving on the Arizona Department of Agriculture's Citrus, Fruit & Vegetable Committee, the Arizona Leafy Greens Marketing Committee, and the American Farm Bureau Food Safety Advisory Committee. She also takes full advantage of the active research arm in produce food safety at the UArizona by attending trainings and getting the opportunity to see research applied into practice which assists her in staying current on food safety practices as guidance evolves and changes.

When asked what stands out for her about her time at the UArizona Kami says, "A feeling of connectedness – anytime I'm back on campus I have a sense of pride in my college years, and I know I made the right choice in attending the UArizona. I always feel welcomed back, and all the memories of those four years rush back in when I come onto campus. I met some of my best friends I have in college, and we always make time to meet back up on campus when we can."



Kami Weddle (right) hiking the Grand Canyon Rim 2 Rim with three UArizona alumnae friends. Kami enjoys traveling to new destinations, as well as boating, and off-roading in the beautiful state of Arizona.

UArizona Equestrian Team Member Shines at Nationals

The UArizona Equestrian Team had a stellar competition year culminating with Elle Oldre, team president, traveling to Harrisburg, PA, to compete in the Intercollegiate Horse Show Association (IHSA) National Finals May 5 - 8, 2022 in the Cacchione Cup and Individual Open Equitation on the Flat classes.

Riders qualify for the National Championship Horse Show (Nationals) through a point system. During the year, contestants accumulate points at their IHSA local shows to qualify for the Regional Finals in their respective divisions. The top two riders in each class of the Regional Finals move forward to the Zone Finals. The top two competitors in each class at Zones qualify for Nationals.

IHSA welcomes beginners through advanced

riders in the hunter and Western disciplines to compete individually or on a team. IHSA eliminates the expenses of horse ownership by having horses furnished by host colleges and chosen by drawing lots. The use of personal tack is not allowed and schooling is not permitted. The format fairly tests the horsemanship of the athletes. Divisions range from Beginner to the Open Division for the more experienced riders.

The UArizona Equestrian Team is a club sport and does not receive university funding. The team raises funds for member participation through member dues, fund raisers, sponsorships, and donations.

For more information on the UArizona Equestrian Team go to <https://www.facebook.com/uofaequestrian/>



UArizona Senior, Elle Oldre, placed fifth in the Individual Open Equitation on the Flat class at the IHSA National Championship in Harrisburg, Pennsylvania. Pictured with UArizona Huntseat Equestrian Team Coach, Gardner Powell and IHSA Founder Bob Cacchione.

Congratulations Recent ACBS Graduates!

Summer 2021

Animal & Comparative Biomedical Sciences

John Stephen Bloomberg, MS

Animal Sciences

Science and Pre-Professional

Michael Christian Fong, BS

Shaina Lenay Halverson, BS

Equine

Alexandra Marie Jeffers-Sample, BS

Race Track Industry

Jayne Ray Thomas, BS

Microbiology

Katharine Elizabeth Getchell, BS

Abraham Gerardo Sanchez, BS

Ycied Talavera Guillen, BS

Claire Anne Vercruyse, BS

Veterinary Science

Alison Thach Do, BS

Brianna Zoe Espinosa, BS

Hayley Anne Lee, BS

Taiz Salais Rascon, BS

Madison Gene Triviz, BS

Katelyn Nichole Woodring, BS

Fall 2021

Animal Sciences

Animal Industry

Genavieve Morgan Arrieta, BS

Criselle Marie Mahiya, BS

Science and Pre-Professional

Sydney Greene, BS

Sloan Austin Williams, BS

James Toru Yano, BS

Equine

Paige Nichole Babcock, BS

Emily Rose Plocinski, BS

Race Track Industry

David Range, BS

Microbiology

Cesily Cynthia Cirerol, BS

Emmalee Alicyn Felix, BS

Pedro Alberto Galdamez, BS

Noor I Juboori, BS

Charles Anthony Keasey, BS

Anthony Michael Smith, BS

David Jeremiah Tafoya, BS

Karime Guadalupe Torres, BS

Jonathan Vega, BS

Kenneth William Yingst, BS

Veterinary Science

Amelia Sughey Cervantes Durazo, BS

Tabitha Pauline Clement, BS

Angeles Jackeline Contreras, BS

Hannah Donel Dudderar, BS

Trinity Evers, BS

Pablo Ivan Gamas-Landavazo, BS

Samantha Leigh Johnson, BS

Stephanie Marie Miu, BS

Julianna Elyse Montella, BS

Alana Sophie Neary, BS

Katie Rene Pecha, BS

Andreah Nicolle Porchas, BS

Daniella Adrianna Remillard, BS

Erin Rose Rothenberg, BS

Monit Amit Shukla, BS

Matthew Reyes Tolero, BS

Anasofia Zavala, BS

Applied Animal Behavior

Isabella Anaya, BS

Carlie Ann Scholten, BS

Spring 2022

Animal Sciences

Animal Industry

Kiona Baelyn Padilla-Melton, BS

Science and Pre-Professional

Jolene Elise Buschbacher, BS

Meya Camilla Casono, BS

Lacie Marie Olson, BS

Adriana Valenzuela, BS

Xinran Yang, BS

Equine

Haley Cosette Olson, BS

Amanda Rose Smith, BS

Samantha Rose St Onge, BS

Madelene Hulda LiJia Tiedens, BS

Race Track Industry

MaryRuth Hodsdon, BS

Giselle A Lugo, BS

Microbiology

Duan Copeland Jr., PhD

Isabella Ali, BS

Antonio Chavez-Hernandez, BS

Antonio Giuseppe Conte, BS

Jesenai A Corella, BS

Rachel Crumpacker, BS

Sydney Marie Field, BS

Caitlyn Elizabeth Flores, BS

Olivia Ahmad Ghemrawi, BS

Madison Paige Goforth, BS

Cassidy Heiner, BS

Brennen Olsen Hunt, BS

Jenna Lee Jackson, BS

Alexander Stephen Kaczynski, BS

Regan Marie Martinez, BS

Olivia Elizabeth Mills, BS

Jack Lansing Picton, BS

Gabrielle Racquel Russell, BS

Sara Grace Te, BS

Elana L Turner, BS

Kacy A Tucker, BS

Jannel Valencia, BS

Anna Maureen Williams, BS

Ryan Ricardo Wynter, BS

Veterinary Science

Ashley Brianna Barnes, BS

Diana Laura Bartosh, BS

Maya N Boyle, BS

Shayla Danielle Bristow, BS

Justice Angeli Campbell-Rodriguez, BS

Ahimara Cardenas, BS

Camryn Patricia Craig, BS

Luis Maurilio Cuarao Campoverde, BS

Ashanti Z Dalton, BS

Serina Dorine De La Trinidad, BS

Tania Thuytrinh Do, BS

Francisco Ruben Duarte, BS

Tamiqua Hailey Freeman, BS

Alba Gallego, BS

Brittney Danielle Gil, BS

Courtney A Gilbert, BS

Katie L Gronbach, BS

Kaitlin Marie Jenkins, BS

Molly Ann Juetten, BS

Kiana Mae Kreiner, BS

Jake Edson Little, BS

Ines Lopez-Escobedo, BS

Jacqueline C Loving, BS

Daniela Gomez Martinez, BS

Madison Park McBride, BS

Brianna Young Nicolson, BS

Taylor McKay Nisser, BS

Alejandra M Ochoa, BS

Hannah M Ordonez, BS

Jalak Ashokkumar Patel, BS

Mia Alyssa Pereyda, BS

Jillian M Peterson, BS

Emily Elaine Pinero, BS

Alexandria Renea Polito, BS

Kelly Louise Pursley, BS

Lauren Paige Salsburg, BS

Tiphany Janae Steele, BS

Rebecca Marie Taylor, BS

Shyla Bonde Terns, BS

McKenzie J Torres, BS

Reese Elizabeth Turner, BS

Carsyn Michel Van Blarcum, BS

Lillian Mae Van De Weghe, BS

Brendan John Walker, BS

Applied Animal Behavior

Alexis Robin Leann Dibene, BS

Amber Nicole Fussell, BS

Taylor A Jaramillo, BS

Janelle Rene Lara, BS

Rosario Evangelina Peralta, BS

Kendall Lee Phillips, BS

Lily Tatum Tees, BS

Erna Irene von Estorff, BS

2022 Spring ACBS Outstanding Seniors Celebrated at Much Anticipated In-person Event

On May 5th, the ACBS Advising Center hosted their end of the Spring semester celebration where current students, some parents, ACBS faculty, and staff honored our Spring 2022 Outstanding Seniors. As one of the first in-person events offered by the Advising Center since the pandemic, this event had a high turnout with close to 40 attending.

In addition to honoring our Outstanding Seniors, this event also offered current students the opportunity to take a break from their studies to enjoy free Egee's and participate in one of the different stress relieving stations. The basement lobby was filled with activities and each station was thriving with student engagement. Many arrived alone but were quickly able to bond with others through painting flowerpots, completing puzzles or coloring pages, playing word pun games, or playing with the giant Connect Four. Others took the opportunity to connect with the faculty members who arrived to honor the special guests, asking about future classes and research.

During the event, the ACBS Advising Team, presented our ACBS Outstanding Seniors with a jacket bundle. The first individual honored was the Animal Science Outstanding Senior,



Animal Sciences Outstanding Senior, MaryRuth Hodsden, with Dr. Dieter Steklis.

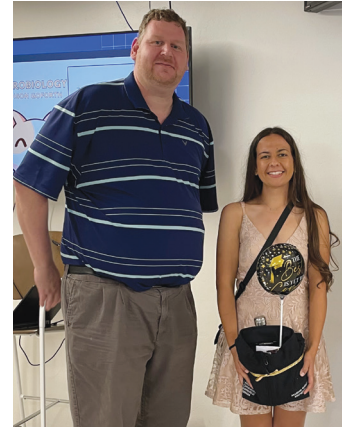
MaryRuth Hodsden. Jasmine Acosta spoke on behalf of Dr. Kathy Broneck congratulating MaryRuth on her accomplishments. After graduation, she has accepted a full-time position in Kentucky working on a cattle breeding farm.

The next individual honored was the

Microbiology Outstanding Senior, Madison Goforth. Dr. Kerry Cooper spoke on the impact Madison has had on his lab, as well as the field of Microbiology. Fortunately, the School of ACBS gets to have Madison for another year as she was accepted into our Accelerated Master's program for Microbiology.

The last individual honored was Lauren Salsburg, our Veterinary Science Outstanding Senior. Dr. Margarethe Cooper reflected on all that Lauren has accomplished while attending the UArizona.

After being accepted into seven veterinary schools, Lauren has decided to attend Cornell for her DVM program. On top of being the Veterinary Science Outstanding Senior, Lauren also had the honor of being selected as the overall CALS Outstanding Senior for the Spring term. This is a huge accomplishment as this is the second semester in a row that ACBS has had the overall CALS Outstanding Senior. Our students continue to make us proud and we look forward to another great year in the Fall.



Microbiology Outstanding Senior, Madison Goforth, with Dr. Kerry Cooper.



Veterinary Science and CALS Outstanding Senior, Lauren Salsburg, with Dr. Margarethe Cooper.

ALVSCE Spring 2022 Staff Award

Debbie Reed, senior program coordinator in the School of Animal and Comparative Biomedical Sciences, received one of two Agriculture, Life and Veterinary Sciences, and Cooperative Extension Outstanding Staff Awards in the spring of 2022 for her energy, dedication, and creativity in supporting ACBS faculty, students, extensionists, and external stakeholders.

"She is the most professional, capable, talented, and competent person that I have ever had to support my extension efforts in the 29 years I've worked ... at three different state universities," ACBS professor and Cooperative Extension horse specialist Betsy Greene wrote in her nomination letter for Reed.

The support she provides is dependent on the individual needs of each program and is based on project management best practices. This includes conducting events and conferences, designing and developing publications, writing content, creating and managing websites, preparing financial statements and records on program activities, and providing progress, status or other special reports as required for management or outside

agencies. Reed works with both internal and external stakeholders from across CALS, the University, and the State to determine need and ensure achievement of project outcomes.

Colleagues credited Reed for her invaluable support of a long list of programs, including the Arizona Livestock Incident Response Team (ALIRT) - a partnership between Cooperative Extension, the Arizona Department of Agriculture, and the Arizona Cattlemen's Association - the Beef Quality Assurance Program, Range Livestock Workshops, Horse Extension Programs, the Food Safety Consortium, the SaferFoodCats Program, UA Food Safety Poster Sessions, and the ACBS Newsletter. Many also noted her proficiency at organizing virtual trainings and seminars during the pandemic.

- Joel Badzinski, ALVSCE

Full article <https://cals.arizona.edu/content/debbie-reed>



2022 State 4-H Horse Judging Contest

The 4-H qualifiers for the Western National Round-up in Denver, CO were determined at the Arizona State 4-H Horse Judging Contest at the Campus Agricultural Center on 5/15/2022. A brief Conformation Clinic was held prior to kicking off the judging contest.

Hearty congrats to the National Team qualifiers:

Emma Carreon, SR. Champion (Silver Spurs)

Allison Piper, SR. Reserve (Vail Community)

Taylor Mack, 3rd (Sombrero Peak)

Hayleigh Burgess, 4th (Sombrero Peak)

Kirra Hicks, 5th (Silver Spurs)

Thank you to the many volunteers involved with Pima County 4-H who made this contest possible:

Organizers: Becky Callahan, Linda Pilling, and Dr. Betsy Greene

Judges: Scott Scheyli/Kristi Transue

Reason takers: Diane Gordon/Sheryl Gonnson

Thank you to Kaitlyn Dirkschneider and Cortaro Equestrian Center for the horses, handlers & riders, and Cheyenne Callahan and Kathy Dirkschneider.



Contestants in the 2022 State 4-H Judging Contest compete in the halter judging class.



2022 State 4-H Judging Contest participants and organizers.

SWIAA

UArizona Cooperative Extension Tribal Agents, Juan Arias (right) and Grey Farrell (left), gave a presentation about Beef Quality Assurance programs specially targeted for tribal ranchers at the Southwest Indian Agricultural Association meetings in Phoenix, AZ in March. These health and management trainings and certification help ranchers ensure that the people buying their meat are getting a wholesome product.



Dr. Greene Receives Henneke Award

Dr. Betsy Greene was selected as the recipient of the Don Henneke Educational Impact Award by the National Association of Equine Affiliated Academics (NAEAA). This award recognizes individuals who have had a sustained, industry-wide, national and/or international impact on education or educational practices within the equine industry.



The award was presented at the 2022 NAEAA Annual Conference, held May 31 - June 2, at Utah University in Logan, Utah.

Influenza and Zoonoses Education among Youth in Agriculture

Dr. Betsy Greene and Renee Carstens (Gila County Director/4-H), are pleased to team up with the Arizona Department of Health Services, to bring lessons about human/animal diseases and prevention (using the “Science Creates Real Understanding of Biosecurity” (SCRUB) curriculum) to 4th graders in Gila County Schools. This new lesson will be added to Renee’s existing Ag DAZE program with the schools (see a quick video: <https://www.youtube.com/watch?v=nOkAXdPLzEo>) which uses hands-on lessons to teach students what agriculture is and how it affects their everyday lives.

The in-class lessons end with a culmination of real-life ranching activities at the H-4 Ranch, located in Payson, AZ. This allows students to put into practice the skills they learn in the classroom activities and gives them a much greater appreciation of the importance of agriculture, from the food that they eat, to the clothes that they wear, and increases their understanding their own health.

Dr. Carey Williams Visits AZ

Dr. Carey Williams (Rutgers University) and Dr. Betsy Greene worked with tribal colleagues to bring a series of Horse Nutrition and Health seminars to tribal communities on Navajo (Grey Farrell, Tuba City and Nathan Notah, Window Rock), Hopi (Susan Sekaquaptewa, Kykotsmovi) and San Carlos Apache (Juan Arias, San Carlos) reservations in mid-March, as a part of the Native American Agricultural Foundation grant with our Tribal Extension Agents, which addresses animal health, management, and sustainability for livestock, small stock and horses. The topics included Horse Nutritional Needs, Reading a Feed Tag, Knowing What’s Normal in Your Horse, and Horse Supplements.



Dr. Betsy Greene with Dr. Carey Williams (red shirt) at the Hopi Tribe Cooperative Extension Office in Kykotsmovi, AZ.

Aquaculture Pathology Lab Updates

Memorial Conference Session for Dr. Donald Lightner (1945-2021)

Dr. Arun K. Dhar (ACBS), Dr. Kevin Fitzsimmons (Environmental Sciences), and Dr. George Chamberlain, the president of the Global Seafood Alliance, organized a memorial session to honor Dr. Donald V. Lightner's life and achievements during the World Aquaculture Society Meeting in San Diego, California, February 28 - March 04, 2022.

The session was well attended by participants from academia, industry and government agencies from around the US and elsewhere in the world. Speakers included Dr. Lightner's wife and former ACBS staff member, Ms. Rita Redman, and their daughter, Elizabeth (Lightner) McCarrell, as well as many of Dr. Lightner's colleagues from around the US.

A virtual kudo board honoring Dr. Lightner's legacy was made for family, friends, and colleagues from around the world to share their thoughts and appreciation for Dr. Lightner's lifelong contribution to the shrimp industry (<https://www.kudoboard.com/boards/1qY2ZLFA>).

Aquaculture Production Training & Certification Program

Dr. Luis Fernando Aranguren Caro was invited to give presentations and conduct a training on shrimp diseases and disease diagnostics in an Aquaculture Production Training & Certification (APTC) Program at the University of Alabama, Auburn, AL, May 31 - June 03, 2022. The program was sponsored by the US United Soy Export Council (USSEC).

Visiting Scholar

Visiting scholar, Alba Melissa Flores Castro, worked with Drs. Hung Mai and Rod Russel Reyes Alenton to receive training on the molecular diagnosis of shrimp diseases. Flores Castro was visiting from La Paz, Mexico, where she works for Blue Genetics, Inc.

Photos from top:

- Dr. Donald V. Lightner Memorial Session
- Aquaculture Production Training & Certification Program - May 31 - June 3, 2022
- Visiting scholar, Alba Melissa Flores Castro (second from left), with APL faculty and staff - (from left to right) Rika Nakamura, Dr. Hung Mai and Dr. Russel Alenton.



Additional ACBS Grants

Sponsor: University of Connecticut

Title: Evaluation of Genomic Selection for Acute Hepatopancreatic Necrosis Disease Survival and Resistance in White Pacific Shrimp: Genomic Prediction and Genome-Wide Association Study

PI: **Arun K. Dhar**

Project amount: **\$223,289**

Sponsor: John Ewing Company

Title: JEC Supplement Trial

PI: **Elaine Norton**

Project amount: **\$117,856**

Sponsor: Center for the Advancement of Science in Space

Title: 4-H Multi-State Space Exploration Consortium (4-H MSSEC)

PI: **Gerardo U. Lopez**

Project amount: **\$66,145**

Sponsor: National Science Foundation

Title: Natural Plant-Made Antimicrobials for Novel Sanitation & Water Reduction

PI: **Bibiana Law**

Project amount: **\$50,000**

Sponsor: Center for Disease Control (CDC)

Title: Influenza and Zoonoses Education among Youth in Agriculture

PI: Renee Carstens with **Betsy Greene (Co-PI)**

Project amount: **\$50,000**

Sponsor: Arizona Department of Agriculture

Title: Arizona Livestock Incident Response Team

PI: **Betsy Greene (Co-PI)**

Project amount: **\$36,000**

Sponsor: National 4-H Council

Title: Designing a Virtual Farming System with XR

PI: **Gerardo U. Lopez**

Project amount: **\$16,000**

Sponsor: Scripps Research Institute

Title: Pharmacokinetics Study of Test Compounds in Calves Exposed or not Exposed to C. Parvum

PI: **Michael W. Riggs**

Project amount: **\$7,456**

Ravishankar Lab News

Outreach Activities

Astrid Cambuston, Kirat Bains, Sean Chen, and Richard Park judged student posters from Canyon View Elementary School for the Southern Arizona Research, Science and Engineering Founding (SARSEF) Science Fair Project, held on February 8, 2022.

Kirat Bains, Elizabeth Sargent, and Richard Park participated in the Yuma Fresh Vegetable Association (YFVA) Southwest Agriculture Summit 2022, to meet with growers and producers to discuss food diagnostics and research collaborations in Yuma, AZ, February 23, 2022.

Dr. Ravishankar and her lab members, Kirat Bains, Salvatore Petruzzella, Richard Park, and Elizabeth Sargent volunteered/judged the New Product Development competition at the Future Farmers of America (FFA) Food Science State Competition event in Tucson, AZ, February 25, 2022.

Dr. Ravishankar and her lab members, Kirat Bains, Richard Park, Sean Chen, Megan Hurr, Astrid Cambuston, Elizabeth Sargent, and Kristina Raygoza, judged the elementary, middle and high school student science fair projects for the University

of Arizona Food Safety Consortium Sponsored Awards at the 2022 Southern Arizona Research, Science and Engineering Foundation (SARSEF) Fair, held February 28 to March 3, 2022, in Tucson, AZ.

Richard Park judged the elementary school science fair projects for the SaferFoodCats Sponsored Awards at the 2022 Southern Arizona Research, Science and Engineering Foundation (SARSEF) Fair, held on March 2, 2022, in Tucson, AZ.

Dr. Ravishankar addressed the students and presented the University of Arizona Food Safety Consortium Sponsored Awards at the 2022 Southern Arizona Research, Science and Engineering Foundation (SARSEF) Awards Ceremony, held on March 5, 2022, in Tucson, AZ.

Dr. Ravishankar participated in Startup Tucson, a community-oriented non-profit which supports first-time founders, small businesses, farmers and food businesses in Tucson and showcased her food testing services during the event held on April 25, 2022, Tucson, AZ.

Dr. Ravishankar traveled to Phoenix, AZ with Alex Strong, of the CALS Development Office and met with local food industries to discuss potential research collaborations, membership in the Food Safety Consortium, and the food testing services offered by the Ravishankar Lab on May 18, 2022, Phoenix, AZ.

Kirat Bains and Dr. Bibiana Law participated in the Food Forward Showcase - Taste the Future of Tucson event, in which they met with new and budding food entrepreneurs, sampled products, and discussed the food testing services provided by the Ravishankar Lab, on May 19, 2022, in Tucson, AZ.

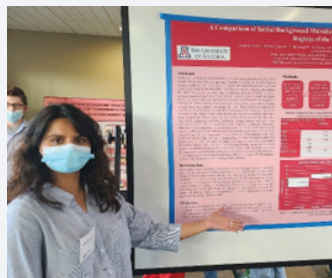
Dr. Ravishankar and Libin Zhu met virtually with the Pima County Health Department team, to discuss the food testing services and HACCP Plan development services, offered by the Ravishankar Lab and how they can cater to the needs of the local food companies (including a Q&A session), on May 25, 2022.



Dr. Ravishankar presenting the University of Arizona Food Safety Consortium Sponsored Awards at the Southern Arizona Research, Science and Engineering Founding (SARSEF) Science Fair Award Ceremony.

Presentations and Symposia

Alshahrani S, Getchell K, Raygoza K, Bains K, Murrell V, Brierley P, Porchas M, Patil B, and **Ravishankar S.** 2022. A Comparison of Initial Background Microbiota on the Surface of Melons Grown in Different Regions in the United States. Poster presentation by Shouq Alshahrani at the Southwest Agriculture Summit 2022 Student Poster Session, Yuma, AZ, February 23, 2022.



Shouq Alshahrani presenting her poster at the Southwest Agriculture Summit 2022 during the Student Poster Session.

Alenton RRR, Mai HN, and Dhar AK. 2022. Reverse-genetics approach in developing a *Macrobrachium rosenbergii* Nodavirus (MrNV)-based viral vector for an oral delivery of therapeutics in shrimp. Aquaculture America 2022 Triennial Conference. February 28 - March 4, 2022, Town and Country Conference Center San Diego, CA.

Aranguren Caro LF, Mai HN, Cruz-Flores R, Marcos FLA, Alenton, RRR, and Dhar AK. 2022. Experimental reproduction of White Feces Syndrome in white leg shrimp, *Penaeus vannamei*.

Aquaculture 2022 Triennial Conference. February 28 - March 4, 2022, Town and Country Conference Center San Diego, CA.

Bains K. 2022. Prevention of Biofilms on Food Contact Surfaces Using Plant-based Antimicrobials. Virtual presentation by Kirat Bains at the Spring 2022 ACBS Seminar Series, Tucson, AZ, May 2, 2022.

Cruz-Flores R, Andrade TPD, Mai HN, Alenton RRR, and Dhar AK. 2022. Identification of a novel calicivirus with a nuclear localization associated with mass mortalities in cultured white leg shrimp (*Penaeus vannamei*). Aquaculture America 2022 Triennial Conference. February 28 - March 4, 2022, Town and Country Conference Center San Diego, CA.

Dhar AK, Cruz Flores R, Mai HN, Allnutt FCT. 2022. Expediting Pathogen Discovery by Combining Histopathology & Genomics in Shrimp Aquaculture. Aquaculture America 2022 Triennial Conference. February 28 - March 4, 2022, Town and Country Conference Center San Diego, CA.

Dhar AK. 2022. Dr. Donald V. Lightner: A Legendary Shrimp Pathologist. Aquaculture America 2022 Triennial Conference. February 28 - March 4, 2022, Town and Country Conference Center San Diego, CA.

(continued on 13)

Greene EA and Mastellar SL. 2022. "Educating horse owners to assess vital signs and other health parameters." Presented at the National Association of Equine Annual Conference Affiliated Academics Annual Meeting in Logan, UT. May/June, 2022.

Greene EA. 2022. "STEM in Agriculture" Arizona 4-H STEM Adult Experience, Prescott, AZ. March 26, 2022.

Greene EA. 2022. "One Health Disease Transfer Activity: Finding the original sick animal in a pen using the SCRUB Kit (Science Creates Real Understanding of Biosecurity) hands-on activities". Presented 3 times at the Arizona 4-H Summit 2022: One Health in Tucson, AZ. June, 2022.

Greene EA. 2022. "Horse Breeds and Conformation", "Knowing What's Normal: How to take Horse Vital Signs", and "Horse Nutrition and Supplements" at Song of the Horse Camp in Tuba City, AZ. June, 2022.

Mai H, Aranguren Caro LF, Cruz-Flores R, Noble BW, Dhar AK. Differently expressed genes in hepatopancreas of Acute Hepatopancreatic Necrosis Disease tolerant and susceptible shrimp *Penaeus vannamei*. Aquaculture 2022 Triennial Conference. February 28 - March 4, 2022, Town and Country Conference Center San Diego, CA.

Padilla T, Schofield P, Mai HN, Aranguren Caro LF, and Dhar AK. 2022. Quantification of the growth rate disparity of *Enterocytozoon hepatopenaei* infected *Penaeus vannamei* and *Penaeus monodon* under laboratory challenge conditions. (Poster Presentation). Aquaculture 2022 Triennial Conference. February 28 - March 4, 2022, Town and Country Conference Center San Diego, CA.

Ravishankar S. 2022. Professional Development Opportunities and Strategies for Success in Higher Education in the United States. Invited virtual presentation by Dr. Ravishankar at the Global Tutelage Seminar, Amity University, India, February 9, 2022.

Ravishankar S. 2022. Food Testing Services at the Ravishankar Lab- UA. Invited presentation by Dr. Ravishankar for Startup Tucson, April 25, 2022.

Ravishankar S. 2022. Emerging Foodborne Microbial Threats: Challenges & Control Strategies. Invited Virtual presentation by Dr. Ravishankar for the Microbiology Consortium of the Philippines and the Philippine Society for Microbiology Spring Webinar Series, April 29, 2022.

Ravishankar S. 2022. Food Testing Services at the Ravishankar Lab- UA. Invited virtual presentation by Dr. Ravishankar for Pima County Health Department, May 25, 2022.

Schofield P, Marcos F, Aranguren Caro LF, and Dhar AK. 2022. Developing an in vivo *Enterocytozoon hepatopenaei* (EHP) experimental challenge model in *Penaeus vannamei*. Aquaculture 2022 Triennial Conference. February 28 - March 4, 2022, Town and Country Conference Center San Diego, CA.

Trigg SA, Major SR, **Cruz-Flores R, Dhar AK,** and Bodnar A. 2022. CRISPR-based diagnostics for disease detection in shrimp. Aquaculture America 2022 Triennial Conference. February 28 - March 4, 2022, Town and Country Conference Center San Diego, CA.

Invited Lectures

Aranguren Caro LF. 2022. Auburn University. School of Fisheries Aquaculture and Aquatic Sciences. Aquaculture Production Training & Certification (APTC), sponsored by the US United Soy Export Council (USSEC). "Shrimp anatomy, preparation and disease diagnostics techniques".

Aranguren Caro LF. 2022. Auburn University. School of Fisheries Aquaculture and Aquatic Sciences. Aquaculture

Production Training & Certification (APTC), sponsored by the US United Soy Export Council (USSEC). "Review of relevant diseases affecting the international shrimp farming industry".

Dhar AK. 2022. "*Enterocytozoon hepatopenaei* (EHP) and White Feces Disease: From Obscurity to Global Attention in Shrimp Disease". 12th Indian Fisheries and Aquaculture Forum (Virtual Mode). May 05-07, 2022, Chennai, India.

Dhar AK. 2022. "The Race to Identify Shrimp Viral Disease Etiology: Combining Histopathology and Genomics in Pathogen Discovery". National Conference on Virology (Virtual Mode) on "Emerging and Re-emerging Viral Diseases- Climate Change Impacts and Mitigation, Indian Virological Society, March 26-28, 2022.

Dhar AK. 2022. "Diseases of Shrimp". Davis Thompson Foundation, Gurnee, Illinois, USA, January 18, 2022, <https://davisthompsonfoundation.org/>

Dhar AK. 2022. "Combining Histopathology and Genomics in the Discovery of New Pathogens in Shrimp". A virtual conference on the 'Application of Modern Biotechnological Tools for Management of Aquatic Genetic Resources', Module 2: Aquatic Animal Disease and Biosecurity, organized by the Indian Council of Agricultural Research (ICAR) and Asia-Pacific Association of Agricultural Research Institutes, Lucknow, India, January 12, 2022.

Publications

Andrade TPD, **Cruz-Flores R, Mai HN, and D, AK.** 2022. Novel Infectious Myonecrosis Virus (IMNV) variant is associated with recent disease outbreaks in *Penaeus vannamei* shrimp in Brazil. Aquaculture. 554: 738159.

Camacho LE, Davis MA, Kelly AC, Steffens NR, **Anderson MJ** and **Limesand SW.** 2022. Prenatal Oxygen and Glucose Therapy Normalizes Insulin Secretion and Action in Growth-Restricted Fetal Sheep. Endocrinology. Jun 1, 2022. 163, 6.

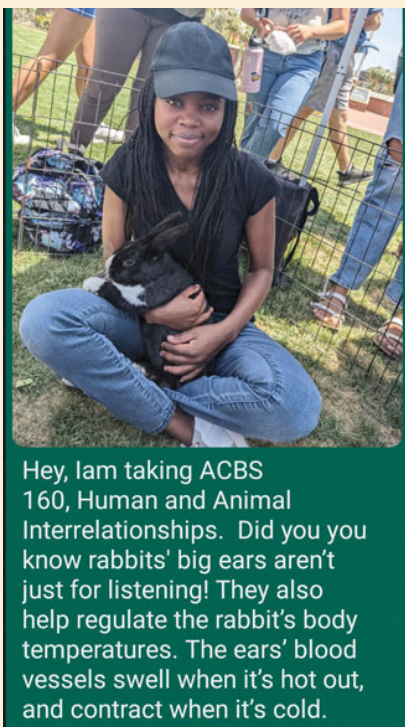
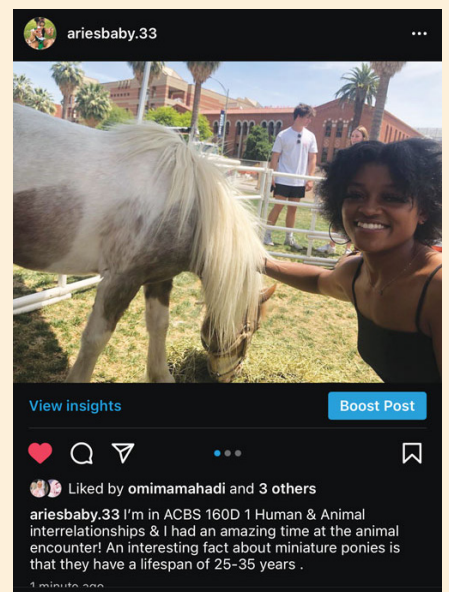
Cruz-Flores R, López-Carvallo A, Cáceres-Martínez J, and **Dhar AK.** 2022. Microbiome analysis from formalin-fixed paraffin-embedded tissues: current challenges and future perspectives. Journal of Microbiological methods. 196: 106476.

Jones AK, Wang D, Goldstrohm DA, Brown LD, Rozance PJ, **Limesand SW** and Wesolowski SR. 2022. Tissue-specific responses that constrain glucose oxidation and increase lactate production with the severity of hypoxemia in fetal sheep. American Journal of Physiology - Endocrinology and Metabolism. Feb 2022. 322, 2, p. E181-E196.

Limesand SW and **Goyal R.** 2022. Epigenetic Modifications Guide Maturation Processes in Rat Pancreatic Islets. Endocrinology. Jan 1 2022. 163, 1.

Liu T, Li R, Luo N, Lou P, **Limesand SW,** Yang Y, Zhao Y and Chen X. 2022. Hepatic Lipid Accumulation and Dysregulation Associate with Enhanced Reactive Oxygen Species and Pro-Inflammatory Cytokine in Low-Birth-Weight Goats. Animals. March 1 2022. 12, 6, 766.

Park R, Rowlands D, Wei Q, Brierley P, Porchas M, Crosby K, Patil B, Friedman M, and **Ravishankar S.** (2022). Understanding Cross-Contamination of *Listeria monocytogenes* and *Salmonella enterica* via Environmental Matrices onto melons Grown in Different Regions of the United States. ACS Symposium Series. 2022; 1415:69-87.



Examples of student selfies created during the ACBS 160 "Animal Encounters" interactive exhibit on the UArizona Mall.

ACBS Newsletter

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